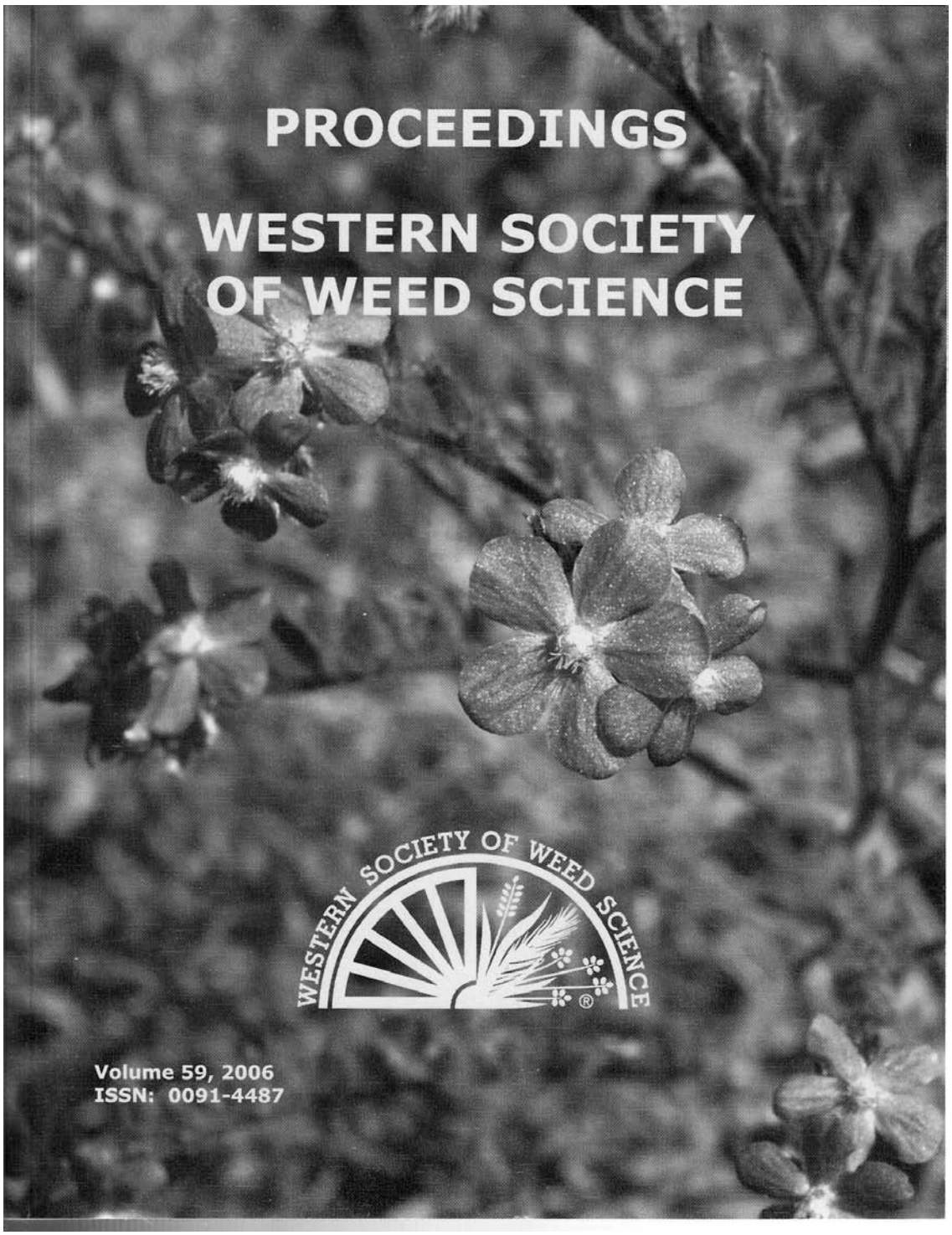
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PROCEEDINGS

OF

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PAPERS PRESENTED AT THE ANNUAL MEETING

MARCH 14-16, 2006

JOHN ASCUAGA'S NUGGET HOTEL

SPARKS, NEVADA

PREFACE

The Proceedings contain the written summary of the papers presented at the 2006 Western Society of Weed Science Annual Meeting plus summaries of the research discussion groups and of the business transacted by the Executive Board. The paper number located in brackets at the end of each abstract corresponds to the paper number in the WSWS Program. Authors and keywords are indexed separately. Index entries are published as received from the authors.

Copies of this volume are available at $20.00 per copy from WSWS Business Manager, 205 W. Boutz, Bldg. 4, Ste 5,Las Cruces, NM 88005.

Cover photograph, common bugloss (*Anchusa officinalis* L), by Sandra Robins. Other photography by Pat Clay.

Proceedings Co-Editors: Joan Campbell and Traci Rauch

This Proceedings is dedicated to Wanda Graves for her years of service to WSWS

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GENERAL SESSION

PRESIDENTIAL ADDRESS: THE LONG AND WINDING ROAD THAT IS WSWS. Phil Banks, MARATHON-Agricultural & Environmental Consulting, Inc., 205 W. Boutz, Bldg. 4, Ste. 5, Las Cruces, NM 88005.

I'm honored to have served as WSWS President over the past year and I owe a great thanks to those of you serving as fellow officers and on the various committees that make our society work. I especially want to thank Program Chair Kassim Al-Khatib; Local Arrangement Committee Chair Tom Lanini; Business Manager Wanda Graves; and the Staff of the John Ascuaga's Nugget Hotel for their work to ensure a successful meeting. We also owe our corporate sponsors a debt of gratitude for sponsoring the Member's and Retiree's Reception last night, the Business Breakfast, and the coffee breaks. Mike Edwards did a great job of coordinating this effort.

I want to remind everyone to participate in the "Take a Student to Dinner" program that we started a few years ago. It is a great way for the students and members to get to know each other. There is a sign-up sheet located at the registration desk. Please take time to go to the poster room and look at the poster that Phil Stahlman prepared for the recent WSSA meeting that chronicles the history of WSWS. It was one of the best of the member society posters at the WSSA meeting, their 50th. President-Elect Kassim Al-Khatib asked me to remind you to contact him if you are interested in serving on a committee. I also urge you to consider nominating a deserving person for one of our awards or a Fellow. Don Morishita is chair of the Awards committee and Vanelle Carrithers is chair of the Fellows and Honorary Members committee.

Briefly, I want to discuss the status of our Society with you. We currently have 507 members with an attendance at this meeting of 340. I hope everyone knows that anyone can be a member of our society even without attending the meeting each year. For only $ 25 you will be included in the membership directory with access to search the directory for other members, get all of the newsletters, receive e-mail notices regarding events and activities of interest, and get to vote for new officers each year. The net value of WSWS is approximately $ 350,000.00, so it is evident that we are financially sound. The Board of Directors approved the expenditure of $ 129,000.00 to reprint 12,000 copies of Weeds of the West. This book continues to sell 4,000 to 5,000 copies each year. A big thanks to those who spent the time and effort to make this publication the success it is.

Most of you already know that Wanda Graves, our Business Manger for the past 17 meetings, is retiring at the end of March. Wanda has done a great job as our Business Manager and most members have no idea of the time and effort required to make sure the Society runs smoothly and all members needs and questions are met. Wanda has done this with grace and efficiency for all of these years. We will more formally thank Wanda for her service tomorrow at the Awards Luncheon. I also want to thank the Board of Directors for their confidence in me and my company in hiring us to provide business management services to WSWS in the future. We will not let you down.

My topic for today is "The Long and Winding Road that is WSWS". I'm not sure why I chose this title, it sure sounded good when Kassim asked for it last January. But whatever, it made me think about the beginnings of our Society and where we are today. In fact on any journey it is really a matter of perspective as to where you are at any given time. Are we still at the beginning of the journey with WSWS even though the Society began in 1938? Or are we at the end of the journey or

still somewhere in between? To address these questions we need to know: From where have we come? How did we get here?; Where are we going?; and How are we going to get there?

As for where the origin of our Society, it all began in 1938 when H.L. Spence said these words "We tried to work out a program for this conference, which is an outgrowth of two former meetings, the last of which was held in Tacoma, but as we have no formal papers, we will throw the meeting open for individual discussion". It's not sure that our current discussion sections format originated with this statement in 1938, but there's nothing wrong with believing it to be true. The primary reason of the first meeting was to agree on objectives for the society and to try to coordinate the western states in regards to weed seed and management laws and regulations. By 1945, our 7th meeting was held in Boise, Idaho and was addressed by then Idaho Governor Charles Gosset, the only time a setting Governor has addressed the group. The main topic of the 1945 meeting was the newly discovered and publicly released herbicide 2,4-D. The primary findings were: 1. 2,4-D will sterilize soil for a time; 2. Crops differ greatly in susceptibility; and 3. Soils differ in extent of activity from 2,4-D. Looking back on this, it is better understood when you realize that the rates being evaluated were 10 to 20 times more than the use rates of today.

Slowly, others recognized the importance of what was happening and other regions formed weed science societies and a national organization was founded. But how did we get to where we are today? Basically, it was because of the efforts of the leaders that voluntarily provided the insight, time, knowledge and dedication to the continuing success of WSWS. These members did not necessarily think of themselves as doing anything out the ordinary, just doing what was needed to be done at the time. Here is a not complete list of those that have contributed to our success:

Walter Ball	George Hyslop
Alden Crafts	Leonard Timmons
William Harvey	Bill Furtick
Harold Alley	LaMar Anderson
Arnold Appleby	David Bayer
Gary Lee	Clyde Elmore
Alex Ogg	Jack Evans
Larry Mitich	Don Thill
Charlotte Eberlein	Rod Lym

I know that some in this audience will be put on this list in the next 20 years. Most importantly, it is important to remember that each of these individuals was a regular member to begin with and stepped forward when called upon. The diversity of the membership of WSWS is one of it's greatest strengths and this along with the willingness of the members to serve are responsible for the accomplishments we have attained.

The next question is: "Where are we going?" This leads to the additional questions of: "Is there a destination, or is the journey the most important thing?" And,
"What have been the objectives of the WSWS, have they changed, or should they change?" The original objectives as stated in 1938 were:

- Cooperate with other regions and agencies in the solution of weed problems.
- Encourage national and state research in weed control.
- Foster educational work on weeds through all appropriate agencies.

- Formulate plans for organized weed control programs.
- Function as a clearing house for weed matters.
- Assist in the development of uniform weed, seed and quarantine legislation in the States.
- Foster adequate national weed, seed and quarantine legislation.

Our current objectives are:

- To foster and encourage education and research in weed science.
- To foster cooperation among state, federal and private agencies in matters of weed science.
- To aid and support commercial, private and public agencies in the solution of weed problems.
- To support legislation governing weed control programs and weed research and education programs.
- To support the Weed Science Society of America and foster state and regional organizations and agencies interested in weed control.

The objectives have changed little, but the ways we accomplish them have changed dramatically. We now have a better understanding of our science and the techniques we use are greatly improved:

- Ecology and biology of the weeds
- Mapping (GIS)
- Low rate selective herbicides
- Precision application equipment
- Biological management
- Interactions with other types of management
- Communication and teaching methods

This leads to the last question: "How will we get there?" The techniques listed above along with the past and future advances in our science and the application of them, are leading us to the future. Most importantly, you, the members will determine where we are going. Those that will lead us to the future are in this room today. There are people in this room that are just as good at what they do as the best athletes, musicians, artists, or entrepreneurs of our time. Think of a great young athlete such as Michelle Wie who may well be the best golfer of all time if she lives up to her potential. There is a young weed scientist in this audience with this same potential. Or take Lance Armstrong, a dedicated, gifted athlete that has accomplished what no other cyclist has done while over coming great obstacles. There is a person in this audience that has done the same thing in our discipline. We have individuals that conduct their science with the same skill and ability as great musicians such as B.B. King or Mozart. Or have the organizational skills and leadership skills as the best entrepreneurs or elected officials. The point that I'm trying to make is that "you", the membership of WSWS, are the "Long and Winding Road that is WSWS". Thank you for your attention and I hope everyone has a successful meeting. [80]

NATIONAL AND REGIONAL WEED SCIENCE SOCIETIES: DIRECTOR OF SCIENCE POLICY UPDATE. Lee Van Wychen, WSWS Science Policy Director, Washington, DC 20002.

Abstract not submitted. [81]

INVASIVE PLANTS THAT THREATEN THE LAKE TAHOE REGION . Joseph M. DiTomaso*, University of California, Davis.

A significant proportion of the naturalized flora of most states is represented by non-native species. Although these species are often introduced accidentally, in most cases they are intentionally introduced through the nursery or aquarium industries, or for erosion control, livestock forage, or as food, fiber, or medicinal plants. In Nevada, these intentional introductions represent about 50% of the state listed noxious weeds, where as in California it is even higher. Despite the high number of non-native species in both California and Nevada, only a small proportion of species have severe economical and environmental impacts. Of the 20 species that are considered to threaten the Lake Tahoe and surrounding area, the thistles and knapweeds represent 11 species. Their impacts are numerous, but primarily associated with decreased livestock and wildlife forage, and reductions in native plant and animal diversity. These important species are categorized as being landscape transformers. That is, they change the character, condition, form or nature of a natural ecosystem over a substantial area. These species are considered significant ecological threats and often have important economic impacts. The way in which they transform the landscape can vary. For example, many terrestrial and aquatic species can excessively use resources, such as light, water, oxygen and carbon dioxide. Others can promoter wildfires and shorten the natural fire interval. Important invasive species within the Tahoe Basin, such as Scotch broom, can also act as nitrogen donors that lead to invasion of other ruderal species that outcompete low fertility adapted natives. Many of the thistles and knapweeds promote erosion, because their plant architecture is such that water movement is more rapid on sloped hillsides compared to the native perennial grasses. Other species, both riparian and rangeland, can accumulate litter, salt or heavy metal, thus suppressing the growth and establishment of desirable natives. The species that are considered landscape transformers are of highest priority in research and management efforts within the Tahoe Basin. [82]

FOUR DECADES OF CHANGE. Charles Goldman, Professor, University of California, Davis, CA..

Lake Tahoe was first observed by the early invaders of western United States from a mountain top south west of the lake by General John Fremont and his tired group of cavalry. Development for a century proceeded slowly with stage coaches and summer visitors finding their way gradually to the shore of the lake. When Mark Twain visited the lake, he was extremely impressed by its cobalt blue waters and commented in “Roughing It” that the lake was the “fairest sight the whole earth affords”. With the discovery of gold and silver in the Comstock Lode at Virginia City, the first of the major disturbances of the Lake Tahoe basin occurred .This was the clear cutting of most of the Tahoe basin’s timber to shore up the mines of the Comstock The timber was required for the boxed scaffolding as the miners went ever deeper into Nevada’s earth. When mines ran out of silver most of the old growth timber was also gone. White fir and brush grew back in dense, over crowded stands which have created a major fire hazard in the basin today. This period of revegetation was important , however, in slowing the high soil erosion rates which characterized the peak logging period. The high loses of soil which is chronicled in the sediments dropped back to less than a quarter of those that occurred during the lumbering activity. Lakes are in fact reservoirs of history in the sense that they are able to record in their bottom sediment an indelible record of what has occurred on the land, the air, and in the water. Sawdust from the saw mills at Glenbrook along the east shore is still perfectly preserved in sediment samples extracted from the lake bottom. A unique chemical record also exists in the sediments from the tetra ethyl lead used in gasoline as well as mercury from the

California gold rush and various sources of industrial atmospheric pollution. Even the fossil remains of invertebrates and fish scales can provide forensic evidence of the post glacial history of Lake Tahoe. With the return of forests to the basin, Tahoe recovered its pristine quality as one of the clearest large lakes in the world. John le Conte in 1887 measured the lake's transparency at over 100 feet. This lake revival provides the hope that the lake can once more recover from the current period of high development activity.

Over seventy percent of the Tahoe basin is US Forest Service land under the control of the federal government. Despite this dominant ownership there was ample room for extensive development around the lake shore. Post World War II construction of roads and buildings, for the most part, had proceeded using the flatland technology of the less-sensitive lower elevations and tended to ignore problems associated with development on steep slopes, fragile soils, and the limited vegetation cover of the subalpine Tahoe basin. In the late 1950's when the value of wetlands was not well understood, the Dillingham Corporation was allowed to construct a marina development by digging up the Pope Marsh. This single largest wetland in the Sierra Nevada was transformed into an extensive marina development at the south end of the lake known as the Tahoe Keys. In so doing, the important filtering capacity of Pope Marsh was lost forever. To make things worse the major tributary to the lake, the upper Truckee River, was canalized along the east side of the Tahoe Keys and delivers nutrients and sediment directly to the lake without the filtering benefits of the former wetland. .

The Keys, which became a habitat whose water was warmer than that of the lake and has served as refugia for a number of invasive plant and animals. Unfortunately over the years people transported aquarium plants and fish to the Keys. Rather than taking them home at the end of the summer they dumped them into the keys. These invasive species, now exemplified by the spread of the notorious waterweed *Eurasian watermilfoil*, have gradually spread from the Keys to other areas around the lake. Warm-water fish introduced to the Keys have been able to move with the *Eurasian watermilfoil* to the new, warmer micro environments that the weeds have created. Other invasive fish, particularly the cold water tolerant Smallmouth Bass, may eventually threaten the very existence of the native minnow, trout and salmonid populations. The invasion of these exotic organisms will be further aided by the gradual warming of the lake. Tahoe' enormous volume of 156 cubic kilometers of water has already increased a half of a degree in temperature over the last twenty years through climatic change and global warming. Unfortunately this warming trend appears very likely to continue.

Although development along the lake shore was slowed by World War II. the construction of casinos at the state line on both the north and south ends of the lake, together with a developing summer boating and winter ski industry, Tahoe gradually attained the status of a resort destination. So popular is the lake in summer that it is not unusual to record a million vehicle miles around the lake in a single day. Selection of Tahoe for the 1960 Winter Olympics gave it global publicity and greatly increased the visitor traffic to the basin. The beauty of this lake is now world renowned, but like most of the world's lakes, human impacts are gradually taking their toll. Since my studies began in 1959, the lake has lost a third of its remarkable transparency and algal growth has increased by about five percent per year. Small particles of dust and sediment remain suspended in the water column for years adding to the gradual but relentless transparency loss. Air pollution is no stranger to the Tahoe basin and nitrogen pollution of the lake is greater from the atmospheric deposition than it is from stream
water input.

The limnological studies which started in 1959 were instrumental in convincing a consulting group of eminent civil and environmental engineers in the 1960s to require the total export of both treated and untreated sewage from the Tahoe basin. Although the availability of a basin wide sewage system was probably a stimulation to additional near shore development, had this export not been achieved, the clear water picture which appear at the beginning of this article would not have been possible. A major factor in achieving the sewage diversion was the growing realization that Tahoe was revered for its remarkable cobalt blueness and that keeping Tahoe blue was a difficult but achievable goal. An extremely effective activist group, the League to Save Lake Tahoe, was instrumental in passing the scientific data collected by the Davis faculty of the University of California's Tahoe Research Group to the public at large. This translation of scientific data to layman's terms was particularly important. As the League's membership grew, so too did the public's awareness of the growing threats to Lake Tahoe's water quality. "Keep Tahoe Blue" bumper stickers began to appear all across the states of California and Nevada. Another important activist, Alfred Heller, published a journal entitled "Cry California" which dealt with the many contemporary problems of the state and provided the author with an opportunity to publish two articles on the plight of Lake Tahoe and compare it with the nearly undeveloped great Siberian Lake Baikal. Some years later the Tahoe Baikal Institute was founded to provide student exchange between the two lakes each year.

Reflecting on the important decisions that haven been made since my arrival at Lake Tahoe in 1958, several stand out. Creation of the Tahoe Regional Planning Agency for example brought a lake divided by two states and five different counties, various municipalities, agencies and local governments under a single central authority. I accompanied League to Save Lake Tahoe leaders in successful meetings with governors Paul Laxalt of Nevada and Ronald Reagan of California to urge creation of the bistate agency charged with protecting the lake's unique environment. While this federal mandate was unpopular in some circles, since it imposed federal control of an area split between two states and five counties, it provided an essential unification of purpose. The objective was simply to preserve the environmental quality of by regulating future development and repairing the damage that had already been done. Federal Judge Garcia issued a landmark decision to halt the development in the basin for two years until control measures could be adequately established to protect the resource. I have participated in successfully defending the Tahoe Regional Planning Agency from various legal assaults over the years. Strong scientifically based arguments have been the decisive factor in winning these cases for the Agency.

A milestone event which greatly influencing the future of Lake Tahoe was a political meeting at the lake in 1997 referred to as the "Lake Tahoe Summit". Both President Bill
Clinton and Vice President Al Gore attended this meeting at the lake at the invitation of Nevada's well known Senior Senator Harry Reid. As Director of the Tahoe Research Group I had the opportunity to show both the President and Vice President first hand the condition of Lake Tahoe from aboard our University of California research vessel the "John le Conte". They spent almost an hour aboard examining the lake's water quality before returning to shore to sign a declaration for the lake's protection. This event was unique for a President and Vice President of the United States and was fully covered by news papers and world wide television. The Tahoe Summit has now become an annual event. A few years later when President Clinton was on a post presidential speaking tour at the Davis Campus of the University of California he began his speech by saying how he remembered this lake expedition and getting his biology course from me.

I was invited to accompany the J.T. Revize, an outstanding Tahoe color photographer, when he displayed his photographic artistry and his wife's poetry in Washington, DC, at the U.S. Senate Rotunda. The exhibition was instrumental in focusing attention at the nation's capital on one of the country's most valuable and scenic natural resources. The senior senators Harry Reid of Nevada and Dianne Feinstein of California have continued their essential leadership in championing the cause of helping to protect the lake from further degradation. To further this cause in the Fall of 2006 the UC Davis Tahoe Environmental Research Center will be moved into a new world-class facility to support research and help provide the important science-based decisions for management of the Tahoe basin for this and future generations.

Over a century and a half of development and environmental abuse have occurred since it first became known to the western settlers. Tahoe remains an extraordinarily beautiful and remarkably clear lake. It is one of the West's most treasured resources. We have now moved beyond most of the conflicts of the past and it is generally agreed between developers and conservationist alike that every one loses if Tahoe's water quality and scenic beauty is allowed to deteriorate. There has been a growing public understanding of the value of this unique natural resource and a growing willingness to do what ever is necessary to protect the lake for this and future generations. [83]

POSTER SESSION

EFFECTS OF GRAZING, BURNING, AND HERBICIDES FOR WEED CONTROL AND PERENNIAL GRASS GROWTH STIMULATION. Kelly Uhing*, Adams County Weed Department, Brighton, CO; and Thaddeus Gourd, Colorado State University Cooperative Extension-Adams County.

Established perennial grasses require stimulation in order to recycle nutrients, increase light intensity to plants, and improve plant water supply. Perennial grasses that do not receive proper stimulation can result in poor growth and sometimes death. As a result, these areas become susceptible to noxious weed invasion. The purpose of this study is to determine which method best stimulates perennial grasses in order to make them more competitive against noxious weeds. In addition, areas were monitored to determine which treatment had optimum effect on existing noxious weeds. Research plots were initially established on March 31, 2003 in Adams County, Colorado. In those plots, the majority of the existing grasses were blue grama, western wheatgrass, crested wheatgrass, and sand dropseed with significant leaf litter covering a majority of the plots. Broadleaf weeds included perennial pepperweed, kochia, curly dock, and field bindweed. Treatment methods included grazing, burning, herbicide applications, and an untreated check. Each treatment was replicated four times in 20 foot by 40 foot plots. Animals used for grazing were sheep and a guard llama. For the controlled burns, the Atarus Ranger propane flamer was used. The herbicides used were 2,4-D amine at 1.5 pints/acre or 591.4 milliliters/liter water and metsulfuron at 1 ounce/acre or 0.75 grams/liter water. Grazing occurred from April 8th through 12th, 2003, burning followed on April 15, 2003, and herbicides were applied on May 12, 2003. Follow-up vegetation surveys were conducted in June and July 2003. It was observed that burning had the best effect on grass stimulation and significantly reduced the amount of leaf litter. The numbers for blue grama and western wheatgrass had significantly increased as compared to the pre-burn vegetative survey. Grazing had a similar effect on the grasses but increased kochia populations had occurred. Herbicides provided excellent weed control, but grass populations observed in those plots before or after the treatments were lower. In general, burning and grazing have proven to be effective methods at stimulating grass growth in

order to provide necessary competition against noxious weeds. After data was analyzed from 2004 treatments, it was proven that burning and grazing were stressful on grass populations if repeated each year. The decision was made to take one year off from grazing and burning and to perform herbicide applications instead. Each plot that was grazed or burned in 2003 and 2004 was treated with herbicides in 2005. The herbicides used were 2,4-D at 1.5 pints/acre or 591.4 milliliters/liter water and metsulfuron at 1 ounce/acre or 0.75 grams/liter water. The application date was June 8, 2005. Each of the grazed and burned plots were divided into north and south halves and the herbicides were applied to the north halves only. Follow-up vegetation surveys were conducted in July and September of 2005. It was observed that on previously burned plots, herbicide treatments resulted in an increase in grass populations and densities, especially with blue grama. Very little to no weeds, such as kochia or perennial pepperweed, existed. In the south halves where herbicides were not applied, the grass populations were lower and there was an increase in weeds. On the previously grazed plots, herbicide treatments resulted in an increase in grasses, some better than the burned plots. There were very little to no weeds present. In the south halves where herbicides were not applied, grass populations decreased and were lower as compared to the burned plots. High populations of weeds were observed and appeared to be higher in density than in the burned plots. Data collected in 2005 for the untreated checks were compared to data collected in 2004 for the grazed and burned plots. [1]

JAPANESE KNOTWEED MANAGEMENT IN NON-CROPLAND. Amy Peters*, Oregon State University Extension Service, Myrtle Point; and Jed B. Colquhoun, University of Wisconsin, Madison.

Japanese knotweed (*Polygonum cuspidatum* Sieb & Zucc.) has become an increasing problem in Oregon and has continued to spread through rhizome transport in fill dirt and streams. Rhizomes can be up to 60 ft in length, emerge from soil depths up to 3 ft, and penetrate asphalt. Recommended control strategies have been limited. On-farm field trials were conducted in Coos County, Oregon to determine the efficacy of various herbicide active ingredients, applied individually and in combination. Glyphosate (1 lb ae/a), triclopyr (1.5 lb ae/a), imazapyr (1.25 lb ae/a), and a combination of the three (at the same rates) were foliar applied with a non-ionic surfactant at 0.25% v/v. Plants were initially mowed with a weed eater to simulate spring conditions. Applications were made to 1 to 4 ft tall plant re-growth on October 7, 2004. Plants were monitored weekly for four weeks and again six months later. Four weeks after application, triclopyr, imazapyr, and the combination were most effective at greater than 90% control. After six months, there was no significant difference between any of the applied treatments ($p=0.05$). Japanese knotweed control was 100% with imazapyr and the combination six months after treatment. Stem counts (plants per 10.76 ft^2) were measured six months after treatment. Stem density reduction compared to the control was similar where imazapyr, glyphosate, and the combination of herbicides were applied. The data suggest that control six months after treatment was greatest where imazapyr and the combination of herbicides were applied. [2]

CROSSING BOUNDARIES WITH INVASIVE PLANT SPECIES MAPPING. Johnson, Kimberly, Fremont County Wyoming Weed and Pest Control District.

The Greater Yellowstone Coordinating Committee Noxious Weed Subcommittee is successfully compiling mapping data for invasive plant species from numerous local, state, and federal agencies in Idaho, Montana and Wyoming. The data are put into a large coverage that consists of an area of

approximately 28 million acres. Currently 24 agencies contribute their mapped invasive plant species data, including United States Forest Service, BLM, Yellowstone National Park, Grand Teton National Park, local Weed & Pest Control Districts, Rangeland groups, and Weed Management Areas. Files submitted by some agencies contain invasive plant species data for several other agencies that have contracted with them to treat or map infestations. For example, in the file submitted by Fremont County Wyoming Weed & Pest Control District there are data on land managed by the Shoshone National Forest, BLM, Bureau of Reclamation, Wind River Indian Reservation, State of Wyoming lands, Sinks Canyon State Park, Boysen State Park, Wyoming Game and Fish, and private land owners. As of December 31, 2004 there are approximately 160,000 records of invasive plant infestations. The data are invaluable in interpreting the spread of invasive species, where that species has not been found to occur before and by what means/trends/paths the infestations are spreading. Because different agencies collect data in different ways with varying amounts of accuracy and with different species priorities, it should be understood that this coverage is only a representation of the infestations. If more detailed information is needed, then the agency that submitted the data is contacted. [3]

GENETIC DIVERSITY WITHIN AND AMONG INVASIVE POPULATIONS OF YELLOW TOADFLAX. Sarah Ward*, K. George Beck, Judy Harrington, Scott Reid and Jason Sutton, Colorado State University, Ft. Collins.

Intraspecific genetic diversity may contribute significantly to invasiveness and control problems, but has been characterized in only a small number of invasive weed species. We examined 56 ISSR loci in each of 220 individuals from 11 invading populations of yellow toadflax sampled across five western states. All populations showed high levels of allele diversity (48.2 - 83.9% polymorphic loci) with heterozygosity estimates consistent with expectations for an outcrossing species (mean He 0.183 - 0.266). Calculated population values for Shannon's H ranged from 0.217 to 0.388, and AMOVA revealed 30.6 % genetic variation among populations vs. 69.4% within populations. Eight populations had significant values for Mantel's R at $p = 0.05$ suggesting some fine-scale positive genetic structuring, possibly from restricted gene flow. Population clustering based on calculations of Nei's genetic distance between populations and either UPGMA or neighbor joining methods did not reflect geographic location and suggests multiple introductions of this species may have occurred across the Intermountain West. The high levels of within-population genetic diversity we detected in yellow toadflax indicate that sexual reproduction via seed may contribute more to patch expansion than clonal propagation, at least at the spatial scale we sampled: in only one population were pairs of adjacent individuals identical at all ISSR loci detected that could be ramets of a single clone. Extensive genetic diversity within yellow toadflax populations may also account for the variable response to herbicide application previously reported. [4]

PROPOXYCARBAZONE: A NEW ACTIVE INGREDIENT FOR USE IN RANGELAND AND PASTURE MANAGEMENT. Shane Hand*, Dennis Scott, Charlie Hicks, and Al Scoggan, Bayer CropScience, RTP, NC.

Olympus is a new postemergence herbicide being evaluated by Bayer CropScience for control of susceptible grass and broadleaf weeds, including certain invasive and/or noxious weeds, in rangeland, permanent grass pastures and other similar areas. Olympus is comprised of the active ingredient propoxycarbazone-sodium. This herbicide acts as an inhibitor of acetolactate synthase (ALS) and is a member of the sulfonylaminocarbonyl triazolinone class of chemistry.

Propoxycarbazone-sodium will provide control and partial control of many important annual and perennial grass and broadleaf weeds in rangeland and permanent grass pastures and is highly active on downy brome, cheatgrass and Japanese brome as well as a multitude of broadleaf weeds such as wild mustard, black mustard, and tumble mustard. Best weed control can be expected when applications are made before grass weeds tiller and broadleaf weeds are smaller than 2 inches in diameter. Applications of Olympus must include a tankmix partner of a non-ionic surfactant at a concentration of 0.25-0.5% v/v. In recent field experiments in North America, predominant species of desired native grasses such as crested wheatgrass, western wheatgrass, prairie junegrass, and smooth brome exhibited excellent tolerance to propoxycarbazone-sodium at 45 to 60 g ai/ha in a single application. The low use-rate, excellent weed control and desired native grass safety combined with favorable toxicological and environmental properties will make this product a valuable new tool for use in rangeland and permanent grass pasture management. [5]

PRACTICAL IMPLEMENTATION OF EARLY DETECTION RAPID RESPONSE USING GIS TECHNOLOGY IN THE TREATMENT OF INVASIVE SPECIES. Kim Johnson, John L. Baker*, and Craig Smith, Fremont County Wyoming Weed and Pest Control District.

With the nation wide interest in Early Detection – Rapid Response (EDRR), Fremont County Weed & Pest Control District, Fremont County, Wyoming implemented an EDRR policy in the treatment of noxious weeds. This strategy includes identifying the areas in Fremont County that are weed free and setting a high priority to keep these areas weed free. In the summer of 2005, several projects were started to accomplish this goal. The first consisted of dedicating one employee to a systematic survey for noxious weeds. He was able to survey approximately 600,000 acres of land consisting mostly of rangeland owned by BLM, private landowners, and the State of Wyoming. The edges of continuous infestations were mapped and smaller outlying infestations were found and marked for eradication. In this acreage there were approximately 30 small infestations identified as very high priority for rapid treatment. Another project implemented was the treatment of previously identified small outlying infestations of saltcedar. This project is able to continue through winter months by identifying the outline of larger infestations and targeting of the smaller infestations for eradication. Working with private landowners within an irrigation district to establish the outline of huge Russian knapweed infestations and identifying outlying small infestations for eradication is another project employees are working on in conjunction with their normal duties. Implementing early detection of the small infestations for a rapid response in order to keep areas weed free is the overriding goal of these projects. [6]

IMPLEMENTING A MAPPING PROGRAM IN CONJUNCTION WITH INVASIVE PLANT TREATMENT. Kim Johnson* and Craig Smith, Fremont County Wyoming Weed and Pest Control District.

Fremont County, Wyoming contains nearly 6 million acres of land which are managed and owned by federal, state, local agencies, and private land owners. For over 12 years Fremont County Weed & Pest Control District, has integrated a mapping system with a noxious weed treatment program. The main problems in accomplishing a mapping program is the large area of land, limited capabilities and limited funding. To accomplish this goal, existing data on paper maps were digitized into a digital format. Gathering new data continued using USGS topographical maps and the Montana Noxious Weed Survey and Mapping System. To skip the digitizing step, it was decided to gather the data in a digital format. To begin we tried using an inexpensive handheld Trimble GPS unit in addition to mapping using ESRI Arcview on a laptop. In 1999 we purchased one trial Garmin III handheld unit.

In 2000 we purchased all spray crews Garmin III+ units. The use of the Garmin units has allowed us to not only monitor weed infestations, but also track treatment information and track locations of areas surveyed and found to be weed free. In addition there has been successful experimentation with laptop computers and software doing "real time" mapping. Currently we are experimenting with moving tablet computers in spray trucks. [7]

VEGETATIVE GROUND COVER ON *APHTHONA NIGRISCUTIS* RELEASE SITES, TRACKING THE TRENDS OVER FIFTEEN YEARS. Nancy A. P. Webber and John L. Baker, Fremont County Weed and Pest, Lander, WY.

In 1990 the biological control agent *Aphthona nigriscutis* was released on heavy infestations of leafy spurge in the Squaw Creek area west of Lander in Fremont County, Wyoming. In 1993 Weed and Pest Control staff started collecting data to assess the impact that the bio-agents were having on the leafy spurge at a number of the sites where *A. nigriscutis* had been released. With the exception of 1998 and 1999, the data has been collected every year since 1993. The release sites were analyzed for plant canopy coverage using a point frame. Permanent transects were laid out in a spoke like fashion from the point of release. At four sites five 50 foot transects were measured at five foot intervals along each transect totaling 500 data points at each of these sites. The other three sites have eight 100 foot transects measured at 10 foot intervals totaling 800 data points per site. While the data shows considerable variation from site to site, and from year to year, at all sites the vegetative ground cover of leafy spurge has leveled off at considerably lower levels than before the insects were introduced. When the four most consistent rangeland sites were averaged the leafy spurge coverage went from 50% in 1993 to 11% in 2005, over the same period the percentages of grasses and forbs went from 35% up to 70%. On the one riparian site studied the data shows the leafy spurge canopy coverage decreased from 44% cover in 1993 to 4.4% while grasses and forbs increased from 56% up to 94%. With the introduction of the biological control agent, *A. nigriscutis*, there has been a reduction in leafy spurge canopy and an increase in desirable vegetation on both dry rangeland and riparian sites. [8]

ESTABLISHMENT OF NATIVE GRASSES IN FIELD BINDWEED AND BROADLEAF INFESTED RANGELAND. James R. Sebastian and K.G. Beck, Colorado State University, Fort Collins.

Abstract. Management strategies are needed to reclaim the productivity and biological diversity of degraded grasslands. The most important phase of ecological reclamation is the reintroduction and establishment of native or other desirable species. We used broadleaf herbicides as a management strategy to improve perennial grass establishment by controlling field bindweed and other broadleaf weeds during desirable species establishment. Native grass reintroduction should be enhanced if grass seedlings are provided a weed-free environment during establishment. The establishment of perennial grasses in weedy forb infested rangeland presents significant challenges. The combination of limited moisture and competition from broadleaf weeds often precludes or limits establishment of seeded species. Once introduced and established, grass species provide a competitive edge to prevent invasion of the seeded site by noxious weeds. A replicated field study was established to evaluate broadleaf weed control and native grass response to broadleaf herbicide treatments. A mix of native cool and warm season grass species was drilled in November 2003. The perennial grasses that were seeded in this study were blue grama (Bouteloua gracilis; BOUGR), sideoats grama; (Bouteloua curtipendula; BOUCU), big bluestem (Andropogon gerardii; ANDGE), green needlegrass (Stipa viridula; STIVI), and western wheatgrass (Agropyron smithii; AGRSM). All herbicides were sprayed

on May 26, 2004. The experiment was designed as a randomized complete block and treatments were replicated four times. Herbicides used in this experiment included picloram, picloram tank mixes, 2,4-D ester, 2,4-D acid, or dicamba plus 2,4-D ester. Broadleaf weeds present at application were field bindweed (Convolvulus arvensis; CONAR, 6 to 13" long liters), prickly lettuce (Lactuca serriola; LACSE, 3 to 7" tall), and kochia, (Kochia scoparia; KCHSC, ¼ to 1" tall). Cool season grass species (AGRSM and STIVU) were 3 to 8" tall with three to four leaves while warm season species (ANDGE, BOUCU, and BOUGR) were dormant at the time of application. Visual estimates of CONAR, LACSE, and KCHSC control were made on August 9, 2004 approximately 90 days after treatment (DAT). All treatments controlled 97 to 100% of LACSE and all treatments with picloram, 2,4-D acid, or 2,4-D ester (alone or tank mixed) controlled 91 to 100% of CONAR in August 2004. These same treatments controlled 83 to 100% of CONAR approximately 1 to 15 months after treatment and rate of control varied. For example, 2,4-D acid or ester sprayed alone or in tank mixes controlled CONAR quickly (100% at the June 2004 evaluation, approximately 14 DAT) whereas treatments with only picloram controlled 65 or 83% of field bindweed by the same date. Dicamba tank mix treatments controlled 73 to 80% of KCHSC while treatments without dicamba controlled 0 to 34% KCHSC. Native grass biomass was harvested in December 2004 and 2005. There was a dramatic increase in grass biomass with the release from broadleaf weed competition. Non-treated control plots only produced 29 lb/A of perennial grass in 2004 compared to 67 to 120 lb/A in treated plots. Ideal growing conditions existed in 2005 and produced almost twice as much perennial grass in 2005 compared to 2004. Non-treated control plots produced only 29 or 58 lb/A of dry grass biomass in 2004 or 2005 compared to 151 to 230 lb/A in treated plots in 2005, respectively. There was a two to four-fold increase in native grass biomass both years where broadleaf weeds were controlled compared to non-treated control plots. The spectrum of broadleaf weeds controlled varied by herbicide treatment, which in turn influenced the quantity of grass biomass that was harvested. Herbicides (or tank mixes) that controlled several species tended to produce more grass in 2004 than herbicides that only controlled a small spectrum of broadleaf weed species (Table 2). For example; picloram (32 oz ai/a) sprayed alone controlled 100% of CONAR and LACSE, and 0% KCHSC in August 2004. When picloram (8 oz ai/a) was tank mixed with dicamba (4 oz ai/a) 100% of CONAR and LACSE, and 80% of KCHSC were controlled. Picloram (8 oz ai/a) sprayed alone produced 80 lb/A of native grass while picloram plus dicamba produced 120 lb/A in 2004 (a 50% increase in grass production with the tank mix). Treatments without dicamba in the tank mix controlled 0 to 34% of KCHSC and grass biomass tended to be lower in these treatments in 2004. KCHSC and LACSE densities were extremely low in 2005 (not evaluated) and thus were not as competitive with the native grasses. CONAR density was fairly high and competed with grass establishment in both 2004 and 2005. All treatments that controlled CONAR effectively (81 to 100%) in 2005 provided similar native grass biomass production (166 to 230 lb/A); however, the highest native grass biomass was produced in treated plots where multiple broadleaf weeds were controlled in 2004 when grass was first getting established (although these were not always statistically different). The lowest native grass biomass in treated plots was produced in the diflufenzopyr plus dicamba plots where KCHSC and CONAR were not controlled effectively (64 and 73%) in 2004. Diflufenzopyr plus dicamba still produced a two- to three-fold increase in native grass biomass in these plots in 2004 and 2005 compared to the untreated check plots. [9]

THE INVASIVE ANNUAL GRASS *TAENIATHERUM CAPUT-MEDUSAE*: A RECIPROCAL TRANSPLANT EXPERIMENT. Robert R. Blank, USDA-ARS, Reno, NV; René Sforza, USDA-ARS, Montpellier, France. .

The annual grass *T. caput-medusae* (medusahead) is highly invasive on rangelands of the western United States. To increase our knowledge of the soil factors that may contribute to its invasiveness, we conducted a reciprocal planting experiment. Seeds used were from an invasive population in northeastern California, USA and from a native population in southern France. Four soils were used: two from northeastern, California, invaded (USI) and non-invaded (USN) by medusahead; two from southern France, with medusahead occupied (FR+) and a similar soil presently unoccupied (FR-) by medusahead. Treatments were control and autoclaved. Six replicate seeds were sown in each soil of the reciprocal planting matrix and allowed to grow for 60 days. Following harvest, aboveground tissue was dried, weight recorded, and analyzed for nutrient concentrations and various soil nutrient pools were quantified. Aboveground mass of medusahead was greatest in the USN soil and least in the FR- soil. Growth was affected by significant seed source by soil type and treatment by soil type interactions. For the USN soil, French seed produced larger plants than did US seed. For the USI soil, plant growth was significantly greater in the autoclaved soil relative the control and US seed performed superior to the French seed in that treatment. Availability of soil Fe, Mn, and ortho-P were significant predictors of plant growth as shown by stepwise regression and suggests that their greater availability in US soils may contribute to the invasivness of medusahead. Moreover, that autoclaving of USI soil had such a positive effect on the growth of medusahead, may not be due to death of inhibitory biological factors, but rather increased nutrient availability. Our data also suggests that US seed may have evolved a greater ability to uptake Mn from soil than French seed. [10]

MEDUSAHEAD REPRODUCTIVE POTENTIAL DEPENDS ON EARLY GERMINATION. Guy B. Kyser* and Joseph M. DiTomaso, University of California, Davis.

Plant phenology may respond to many factors, e.g., day length, heat accumulation, and water availability, depending on species. This study was designed to determine whether heat accumulation (degree days) predicts timing of medusahead flowering and seed production in north central California. For three consecutive years (2002 through 2005) at UC Davis we planted seed from three populations of medusahead (Yolo, Yuba, and Lassen counties) once a month from November to April, in six replications per planting. We recorded stages of plant development from reproductive culm elongation through seedhead maturity and senescence. Over all years and all populations, 93% of plants seeded in November survived till awn emergence; these plants produced an average 178 g dry wt at senescence and 330 seedheads. Of December-seeded plants, 94% survived, averaging 99 g and 210 seedheads. Only 48% of plants seeded in January reached awn emergence, averaging 51 g with 16 seedheads. Plants seeded in February or later failed to produce seedheads, although some of the plants survived into mid-summer. In comparing several degree-day models, a model with a baseline of 0 C and no upper limit gave the lowest coefficient of variation (CV) for predicting flowering and was a better predictor than total precipitation or solar radiation. However, a simple count of days from planting to flowering gave an even lower CV. Given the mean maturation time of 159 days, plants seeded in February should flower shortly after summer solstice. Their failure to flower probably indicates an effect of day length on phenology. [11]

THE RELATIONSHIP OF VEGETATION GROUND COVER TO NON-TARGET FEEDING BY *APHTHONA NIGRISCUTIS,* A BIOLOGICAL CONTROL AGENT FOR LEAFY SPURGE. John L. Baker*, Nancy A.P. Webber, and Kimberly K. Johnson, Fremont County Weed and Pest, Lander, WY.

The biological control agent Aphthona nigriscutis has been established in Fremont County, Wyoming since 1992. Near one release site a mixed stand of Leafy Spurge and a native plant (Euphorbia brachycera Engelm. var robusta (Engelm.) Dorn) was discovered in 1998. During July of 1999, A. nigriscutis. were observed feeding on both Leafy Spurge and E.b. robusta. A total of thirty-four E.b. robusta plants were located and staked on about four acres of land which had a visually estimated Leafy spurge canopy of over 40%. Eighty-eight percent of the E.b. robusta plants showed feeding damage. By August of 2001, the Leafy Spurge canopy had declined to less than 5% and the E.b. robusta had increased to 450 plants. Only 26 of 450 plants (5.7%) showed any feeding damage. July 2002 data followed the same pattern. For the four-year period, Leafy spurge canopy was inversely correlated to E.b.r. density and positively correlated to A.n. feeding damage showing that as Leafy Spurge density declines so does Aphthona nigriscutis feeding on Euphorbia brachycera robusta. The dramatic increase in E.b.r. numbers may reflect an expansion into areas previously occupied by the Leafy Spurge. [12]

PERENNIAL PEPPERWEED AND RUSSIAN KNAPWEED CONTROL WITH IMAZAPYR AND IMAZAPIC. Corey V. Ransom* and Joey K. Ishida, Oregon State University, Ontario.

Russian knapweed and perennial pepperweed are troublesome across the Western U.S. Perennial pepperweed is often associated with riparian areas. The recent registration of imazapyr for use in aquatic weed control makes it a candidate for controlling perennial pepperweed and its activity on Russian knapweed is also of interest. Four trials were conducted to evaluate imazapyr and imazapic for control of Russian knapweed and perennial pepperweed. Russian knapweed trials were established adjacent to Succor Creek, south of Adrian, Oregon. One perennial pepperweed trial was established adjacent to the Snake River in Ontario, Oregon and the other near the Malheur River west of Vale, Oregon. Treatments evaluated included imazapyr (0.0625, 0.094, 0.125, 0.187, 0.25, 0.375, and 0.5 lb ai/acre) and imazapic (0.125 and 0.187 lb ai/acre). Treatments were arranged in a randomized block design with four replicates. One trial was treated August 31 when Russian knapweed was starting to senesce. The second trial was treated November 2. The first perennial pepperweed trial was treated June 14 while the pepperweed was in full bloom. The second trial was sprayed December 14. All treatments included methylated seed oil at 1.0 qt/acre. Herbicide treatments were applied with a CO2-pressurized backpack sprayer calibrated to deliver 20 gpa at 30 psi. All trials were evaluated for weed control the following June. With summer herbicide application to Russian knapweed, the following spring only 0.5 lb ai/acre provided greater than 90% control and control decreased with rates below 0.25 lb ai/acre. Imazapyr rates below 0.125 lb ai/acre and imazapic at 0.125 and 0.187 lb ia/acre provided 21% or less Russian knapweed control. When herbicide treatments were applied to dormant Russian knapweed in November, imazapyr rates above 0.25 lb ai/acre provided 99 to 100% control. Russian knapweed control declined as imazapyr rates were reduced, to a low of 54% with 0.0625 lb ai/acre. Imazapic at 0.125 and 0.187 lb ai/acre provided 67 and 87% control, respectively. Both imazapyr and imazapic were more active on Russian knapweed when applied in the fall as compared to the summer. For perennial pepperweed, summer application of imazapyr and imazapic resulted in 95% or greater control the following June regardless of herbicide rate. When applied in December, perennial pepperweed control the following summer was 94% with imazapyr at 0.5 lb ai/acre and declined at imazapyr rates of 0.25 lb ai/acre or

lower. Imazapic provided 64 and 71% control at the respective rates of 0.125 and 0.187 lb ai/acre. This research demonstrates that herbicide application timing can significantly affect the efficacy of herbicides on different weed species. [13]

MEDUSAHEAD RYE CONTROL IN RANGELAND. Sandra M. Frost*, Larry H. Bennett, Daniel A. Ball, Oregon State University, Columbia Basin Agricultural Research Center, Pendleton, OR; Gordon Schumacher, Confederated Tribes of the Umatilla Indian Reservation, Pendleton; Jean Wood, Umatilla National Forest, Pendleton, OR.

Upland foothills of northeastern Oregon and southeastern Washington that have shallow soils and steep slopes are grasslands. Areas once dominated by native forbs and bunch grasses such as bluebunch wheatgrass and Idaho fescue have been supplanted by the invasive, annual weed medusahead rye. Two studies were established on rangeland administered by the Confederated Tribes of the Umatilla Indian Reservation near Pendleton, OR in fall 2004 to investigate the response of medusahead rye (*Taeniatherum caput-medusae*) to herbicides + harrowing + native grass seeding and to herbicides. Results indicated that imazapic + glyphosate (0.125 g ai/a + 0.5 g ai/a) applied in spring gave almost 100% control of medusahead rye, and also reduced percent cover of non-native, redstem filaree (*Erodium cicutarium*). Split application of glyphosate (0.5 lb ai/a + 0.5 lb ai/a) fall and spring gave good control of medusahead rye (88% and 83%) without reducing the redstem filaree percent cover. Harrowing and seeding of a mix of 5 perennial native grasses (Big bunch wheatgrass, Sandberg bluegrass, Bottlebrush squirreltail, Big bottlebrush squirreltail and Idaho fescue) with a hand rotary seeder did not affect herbicide performance. No seeded native grasses germinated by September 2005. Imazapic + glyphosate (0.125 lb ai/a + 0.5 lb ai/a) applied in fall gave good control of medusahead (88%). Sulfometuron + chlorsulfuron + MSO (0.035 lb ai/a + 0.018 lb ai/a+1% v/v) applied in fall gave good control of medusahead (82%). Further evaluation of native perennial grass germination will occur after winter precipitation, in late spring 2006. [14]

METSULFURON METHYL AND CHLORSULFURON: COMBINATIONS THAT PROVIDE POSTEMERGENCE WEED CONTROL IN IMPROVED PASTURES AND RANGELAND. Michael T. Edwards *, Robert N. Rupp, Eric P. Castner, James D. Harbour, C. William Kral, Lawrence S Tapia DuPont Crop Protection Wilmington, DE .

Metsulfuron methyl and Chlorsulfuron are combined in different products to provide residual postemergence weed control in pasture and rangeland. Combinations of metsulfuron methyl, 2,4-D amine and dicamba (Cimarron Max), and combinations of metsulfuron methyl and chlorsulfuron (Cimarron X-tra) are product offerings from DuPont Crop Protection that in replicated field trials have measured grass response and weed control in improved pastures and rangeland. Research showed excellent results on annual and perennial broadleaf weeds including musk thistle, Canada thistle, fringed sagebrush, sand sagebrush, buckbrush (Western Snowberry), kochia and Russian thistle. Multi-year studies continue to show biomass reduction of prickly pear, brittle cactus and yucca. Ongoing clipping studies continue to have a 1 to 3-fold forage increase in grass forage when metsulfuron methyl and chlorsulfuron combinations are used. [15]

A NEW APPROACH TO PREDICTING THE FUTURE DISTRIBUTION OF YELLOW STARTHISTLE. Larry Lass*, Tim Prather, Bahman Shafii, William Price, and Derek Howard, University of Idaho, Moscow, Idaho.

Predicting weed spread has important implications when focusing prevention and containment management resources to reduce environmental loss due to yellow starthistle. The spread of an invasive plant species depends on its ability to reproduce and disperse seed into new areas. Direct measurement of plant's reproduction and seed dispersal has not produced reliable models when applied to large areas. The addition topographic factors, such as slope, aspect, or competitive correlates from vegetation indices related to plant community biomass have improved the accuracy of plant survival and seed movement models. In this research, several spatial network models incorporating these variables will be considered for the prediction of yellow starthistle dispersal. Models differ in their application of costs related to plant movement, which can be separated into two processes, survival to reproduction and seed dispersal. The models are evaluated based on their predictive ability and biological relevance. The optimal model shows the predicted dispersal of yellow starthistle in central Idaho closely match 1987 and 2000 maps given a known 1981 infestation. [16]

ECOLOGY AND MANAGEMENT OF CAMELTHORN (*ALHAGI MAURORUM*): A CASE STUDY IN ARIZONA. John H. Brock, Arizona State University Polytechnic, Mesa.

Alhagi maurorum Medik. (camelthorn) a member of the Fabaceae family, is native to the Middle East, southeastern Russia, and northern Africa. Camelthorn is perennial, semi-woody, with highly branched glabrous stems, small entire leaves, and spines two cm in length. It flowers in mid summer, produces three to five seeds per fruit, and can also vegetatively reproduce from rootstalks. This plant was introduced to the United States in about 1900 as wrapping material of date palm offshoots and in alfalfa seed. Camelthorn is locally abundant in the southwest especially along the Little Colorado River in northeastern Arizona. It is competitive with native vegetation and is grazed lightly by domestic livestock. In 1999 stands of camelthorn were found at an elevation of 2070 m in a Pondersa pine Lawson and Gambell oak forest in northcentral Arizona. The plants were along road right-of-ways and introduced in the construction material approximately 15 years earlier. A total of 40 stands were found containing 4,468 plant crowns, ranging from O.4 to 1.0 m height. Camelthorn is difficult to control. Pulling, fire and mechanical treatments result in numerous resprouts, and there are no known biological control agents. Herbicides can control this plant. Selective, systemic herbicides were applied in mid summer, beginning in 2000 and have been applied annually to re-emerging crowns. Initial mortality from herbicide treatments averaged 84%, by 2005 crown mortality had increased to an average of 98.7%, with little damage to native species. [17]

PARTIAL BUDGET ANALYSIS OF AN AUTOMATIC SPOT SPRAYER IN WESTERN TREE CROPS. Ryan J. Rector*, William B. McCloskey, and Trent Teegerstrom, University of Arizona, Tucson.

Arizona growers broadcast herbicide on thousands of acres in citrus and pecan orchards each year but significant amounts are wasted because weeds naturally occur in patches. Thus, an automatic spot-sprayer that detects and sprays weeds and not bare ground could be economically valuable. A partial crop budget and data from field experiments comparing automatic, spot-spray (WeedSeeker; NTech Industries, Inc) and conventional continuous spray technology were used to calculate operating expenses and the time to recover the investment in the WeedSeeker technology as influenced by:

sprayer cost, hectares sprayed, number of applications, herbicide cost, herbicide rate, and labor cost. WeedSeeker adoption saved $2,691 to $22,123 in the first year and the time to recover the purchase cost ($24,600) ranged from 9.14 to 1.11 years over a range of orchard sizes (40 to 400 ha) and herbicide costs ($2.64 to $5.28/L) assuming no financing, a 50% reduction in herbicide use and the same labor, fuel, and repair costs for both sprayers. The recovery time was also calculated using the above parameters and the number of WeedSeeker applications made per year (5 to 11). The amount of time to recover the investment decreased (9.03 to 1.14 years) as both sprayers were used more often and increased (10.08 to 1.31 years) when the WeedSeeker sprayer was used for one more application per year compared to the conventional sprayer. Decreasing the cost of the technology, using the sprayer over a larger area, and further reducing herbicide use increased the economic incentive to adopt this technology. [18]

TAXONOMIC UNCERTAINTY IN GLYPHOSATE-RESISTANT RYEGRASSES (*LOLIUM SPP.*) OF CALIFORNIA . Anna Sherwood*, Riaz Ahmad, and Marie Jasieniuk, University of California Davis, Davis .

Lolium species, due to introduction, have a world wide distribution. However, determining which species has been introduced to a region can be difficult. The three outcrossing *Lolium* species, *L multiflorum, L. perenne*, and *L. rigidum*, have similar morphology and freely hybridize. Glyphosate resistance has evolved within populations of outcrossing *Lolium* on four continents, including North America. In California, these populations have been referred to as *L. rigidum*. However, no molecular data support this classification. To confirm the identity of the glyphosate resistant populations, we screened 6 Simple Sequence Repeat (SSR) loci for markers specific to *L. multiflorum, L. perenne*, and *L. rigidum*. Each species was represented by at least 12 individuals from USDA germplasm. No SSR markers that distinguished the three outcrossing species were detected. Current studies focus on using nrDNA and cpDNA sequence data to reconstruct the idenity of California glyphosate resistant *Lolium* based on phylogenetic relationships. [19]

MELON TOLERANCE AND WEED CONTROL WITH NEW HERBICIDES . W. Thomas Lanini*, University of California, Davis.

Melons have only a few registered herbicides available for weed control. A field study was conducted in 2004 and 2005 to evaluate cantaloupe, honeydew melon and watermelon tolerance and weed control with clomazone, metolachlor, rimsulfuron, sulfosulfuron, and halosulfuron. Melon stand varied by herbicide treatment, with sulfosulfuron reducing cantaloupe and honey dew melons but not watermelon. Crop injury was evident on the metolachlor and sulfosulfuron plots for the first few weeks after treatment. By five weeks after treatment, the melons had recovered from metolachlor treatment, but not sulfosulfuron treatment. Sulfosulfuron and the combination of rimsulfuron and halosulfuron provided the best early season weed control among the treatments and hand weeding time was correspondingly lower than other treatments. Yield of cantaloupe and honeydew melons was reduced at least 30% by sulfosulfuron treatment, but not by other treatments. Metolachlor, rimsulfuron, and clomazone all provided sufficient crop safety and weed control to warrant further consideration for use in melons. [20]

CHICORY PRODUCTION IN WESTERN NEBRASKA AND SOUTHEASTERN WYOMING. Lori A. Howlett*, Patricia M. Nielsen, and Robert G. Wilson.

Studies were conducted in western Nebraska to explore the development of chicory roots and how this relates to crop harvest. Information will also be provided on chicory production and processing in western Nebraska and southeastern Wyoming. [21]

WEED CONTROL IN BROCCOLI IN COASTAL CALIFORNIA. Oleg Daugovish*, University of California Cooperative Extension, Ventura; Richard Smith, University of California Cooperative Extension, Salinas; and Steve Fennimore, University of California-Davis, Salinas.

Weed control options in broccoli are limited. Pre- and post-emergence herbicides were evaluated for crop tolerance and weed control in four trials at Salinas, California in winter- and spring-seeded broccoli (2003-2004) and one trial at Oxnard, California in fall-transplanted broccoli in 2005. In the winter trials at Salinas, flumioxazin reduced shepherd's-purse nearly 100% compared to oxyfluorfen, DCPA, and untreated, but reduced broccoli yield 60% or more compared to DCPA and the other treatments. In spring trials at Salinas, oxyfluorfen and flumioxazin provided 100% control of burning nettle and hairy nightshade. DCPA was less effective for control of burning nettle, but provided 100% control of hairy nightshade. Flumioxazin was less effective at controlling little mallow and common lambsquarters compared to oxyfluorfen or DCPA and also increased seedling injury from 0.8 to 6.5 (qualitative scale 0 to 10, 0=no injury, 10 = dead plant) and reduced crop yield up to 35% compared to untreated. By contrast, oxyfluorfen and DCPA did not cause crop injury and yields were similar to untreated. At Oxnard, oxyfluorfen and flumioxazin reduced numbers of shepherd's-purse up to 90% compared to DCPA, which did not control shepherd's-purse. In fact, DCPA did not control shepherd's-purse at either location, but broccoli yields were not affected by shepherd's-purse competition. In general, while the grower standard, DCPA, provided adequate control of most weeds, oxyfluorfen provided even better control with equivalent or even higher yields. Flumioxazin generally controlled weeds but was injurious to broccoli seedlings at all locations. Flumioxazin reduced yields in the winter and one spring seeded trial, but in two other spring trials and the fall-transplanted trial flumioxazin had similar yields to untreated, indicating a potential for broccoli to outgrow early flumioxazin injury. At Oxnard, other materials such as dimethenamid increased seedling injury from 0 to 3 and reduced yields 30% compared to the commercial standard, DCPA. Pyraflufen was extremely phytotoxic in spring trials at Salinas and reduced yields up to 100%. Thyme oil is being tested for potential herbicidal use in organic systems, but this product did not control weeds in trials at Salinas. [22]

POST-BLOOM HERBICIDES IN TULIP. Timothy W. Miller and Carl R. Libbey*, Washington State University Northwestern Washington Research and Extension Center, Mount Vernon.

Tulip cultivars 'Negrita' and 'Preludium' were tested during 2003 and 2004 for sensitivity to post-bloom applications of herbicides. Tested herbicides were glyphosate, glufosinate, diquat, paraquat, flumioxazin, bentazon, sulfentrazone, cloransulam, and carfentrazone. Post-bloom treatments were applied in early May following flower removal, as a directed spray below tulip foliage using a single nozzle, shielded sprayer. Due to excessive foliar injury from paraquat and diquat (34 and 47%, respectively) in 2003, these products were dropped from further testing. In 2004, oxyfluorfen, pyraflufen, pelargonic acid, and flaming treatments were included in the trial. Foliar injury was less than 11% for herbicides other than paraquat and diquat. All treatments resulted in 85% or greater weed control in both years. In 2004, carfentrazone provided 97% weed control, while control with

sulfentrazone, glufosinate, glyphosate, oxyfluorfen, and flaming exceeded 90%. In 2003, average bulb weight was lowest following diquat and paraquat treatments. Flumioxazin, glyphosate, and flaming resulted in the lowest average bulb weight in 2004. [23]

POSTEMERGENCE HERBICIDE EFFECTS ON ESTABLISHMENT OF SEEDED BERMUDAGRASS TURF. Trent A. Murphree, Charlie A. Rodgers, Seeds West Inc, Maricopa, AZ, Kai Umeda*, Gabriel Towers, University of Arizona Cooperative Extension, Phoenix .

The new planting and establishment of seeded bermudagrass can be a challenge because of competition with grass and broadleaf weeds. Postemergence (POST) herbicides can be used to help control weeds in seeded bermudagrass, but most POST herbicide are limited to applications made after the second mowing due to the risk of injury to immature bermudagrass. Many new herbicides can be applied POST but safety of early timing has not been fully determined for applications during establishment of seeded bermudagrass. The objective of this study was to determine how soon POST herbicides can be applied safely to newly seeded bermudagrass. This study was performed in 2004 and 2005 at the University of Arizona Maricopa Agricultural Center, located in Maricopa, AZ. POST herbicide applications were made to bermudagrass cv. Princess 77 which was planted at 1 lb/1000 ft^2. Treatments for the study were foramsulfuron at 0.019 and 0.054 lb ai/A, trifloxysulfuron at 0.0094 and 0.028 lb ai/A, sulfosulfuron at 0.065 and 0.188 lb ai/A, flazasulfuron at 0.018 and 0.047 lb ai/A, rimsulfuron at 0.024 and 0.063 lb ai/A, chlorsulfuron at 0.046 and 0.138 lb ai/A, metsulfuron at 0.0094 and 0.024 lb ai/A, halosulfuron at 0.062 lb ai/A, diclofop at 0.75 and 1.0 lb ai/A, quinclorac at 0.75 lb ai/A and dithiopyr at 0.18 lb ai/A. Herbicide treatments were applied at three timings which were 14, 21, and 35 days after planting (DAP). Plot size was 3 by 5 feet and all treatments were applied using a CO_2 backpack sprayer calibrated to deliver 103 GPA. Herbicide injury evaluations for each timing were made at 2, 4, and 6 weeks after treatment. For most rating dates the year by herbicide by timing interactions were significant therefore years were analyzed separately. Injury to bermudagrass was most severe when herbicides were applied at 14 DAP. In 2004, at 2 WAT diclofop at both rates and flazasulfuron and chlorsulfuron at the high rate were most injurious (37 to 60%). The high rate of sulfosulfuron and metsulfuron and the low rate of chlorsulfuron, halosulfuron, and dithiopyr caused noticeable injury (20 to 33%). At 4 WAT, injury from most treatments decreased. At 6 WAT, all treatments were safe except for chlorsulfuron which still showed injury (20%). At 21 DAP, early ratings showed that sulfosulfuron and diclofop at both rates and chlorsulfuron, quinclorac, and dithiopyr showed injury (up to 28%). At 4 WAT, only chlorsulfuron at the high rate caused significant injury (22%). By 6 WAT, the bermudagrass did not show any injury. In 2005 at the 14 DAP timing and when rated 2 and 4 WAT, sulfosulfuron at both rates and chlorsulfuron and metsulfuron at the high rate were most injurious (30 to 48%). By 6 WAT, chlorsulfuron at the high rate was the only treatment which caused injury (22%). At 21 DAP, at the early rating date sulfosulfuron, chlorsulfuron, and flazasulfuron at both rates and metsulfuron at the high rate showed significant injury (up to 35%). By 4 WAT only chlorsulfuron at the high rate showed unacceptable injury (32%). At 6 WAT, all treatments were safe. In both years at 35 DAP good safety was observed for all herbicide treatments at all rating dates. These data suggests that at labeled rates foramsulfuron, rimsulfuron, and trifloxysulfuron could be applied safely to seeded bermudagrass cv. Princess 77 at all application timings observed in this study. Results from this study also indicate that seeded bermudagrass cv. Princess 77 can tolerate most of the above herbicide applications under optimum growing conditions after a period of time. [24]

EFFECT OF SEASON LONG FLAMMING FOLLOWED BY GRASS COVER CROP ON CANADA THISTLE BIOMASS IN ORGANIC STRAWBERRY PRODUCTION. Thaddeus Gourd*, Colorado State University Cooperative Extension, Brighton, Tim Ferrell, Berry Patch Farms, Brighton, CO .

Perennial weeds are a problem associated with organic strawberry production in Colorado. The use of thermal (flame) weed control systems is an alternative to mechanical cultivation and herbicides for controlling weeds. The purpose of this study was to examine the effect of multiple flame applications on Canada thistle (Cirsium arvense) weed biomass in a three-acre fallow strawberry field. Weeds were flamed using the Flame Engineering TD-12 LPS Alfalfa Field Flamer. Five flame applications were used during the 2004 growing season. Good activity was seen immediately after the flame treatment on Canada thistle; however, rapid re-growth continued throughout the summer, thus requiring multiple flame applications. On August 7, 2004, five days after the fifth and final flame application, the above ground fresh weight of Canada thistle foliage averaged 88.6% less than the untreated check and root biomass comparisons revealed a 55% reduction in fresh root weight. On September 13, 2005, 407 days after the fifth flame application, the above ground fresh weight of Canada thistle foliage averaged 67.94% less than the untreated check and the root biomass of the flamed treatments showed a 64.4% reduction in fresh root weight compared to the untreated check. Canada thistle plant population density fell from 37.3 plants per square meter to 2.05 in the flamed plots one year later. This decrease in Canada thistle biomass and plant populations is attributed to the combination of flame applications, cover crop competition, and mowing during the course of this study. [25]

SALT CEDAR RESEARCH, MAPPING, AND CONTROL IN COLORADO. Philip Westra, Dept. of Bioagricultural Sciences and Pest Management, Colorado State University, Ft. Collins, CO 80523.

Salt cedar is an invasive, water-loving bush or small tree that has invaded thousand of acres of pristine riparian habitat in Colorado over the past 30 years. As competition increases for finite, limited water sources for urban and rural use, Colorado researchers and citizens have focused special energy and attention to the burgeoning problem of salt cedar in Colorado rivers, streams, and water reservoirs. The Tamarisk Coalition in Grand Junction (tamariskcoalition.org) has sponsored several well attended symposia and workshops under the direction of Tim Carlson. Dr. Tom Stohlgren and his team at the USGS in Fort Collins (http://squall.nrel.colostate.edu) have pioneered a unique nation-wide salt cedar mapping project where anyone can contribute local data to a web-based map of salt cedar infestations. Colorado research by APHIS and CSU biocontrol scientists evaluates the effectiveness of biocontrol approaches for salt cedar management. CSU weed scientists are researching the integrated use of mechanical, chemical, and biological control for salt cedar management and degraded site restoration. Several new herbicides are being evaluated for their control of salt cedar. On Oct. 3 and 4 of 2006, CSU, the Tamarisk Coalition, and other key groups are sponsoring a tamarisk (salt cedar) research symposium at the Hilton hotel in Fort Collins. Contact Andrew at Andrew.Norton@Colostate.edu for information on this upcoming meeting. [26]

WEED CONTROL AND COVER CROPS IN SPRING SEEDED ALFALFA. Dennis A. Merrick* and Ralph E. Whitesides, Utah State University, Logan.

Companion crops have been used in the establishment of alfalfa for many years to prevent erosion, reduce the impact of soil crusting, provide weed control, and increase seasonal yield. When the companion crop, usually a small grain, is seeded at rates greater than 40 lb/A it can compete with alfalfa for moisture, light, and nutrients. This competition can result in reduced alfalfa stand and decreased alfalfa yield during the establishment year. A 2-year study in northern Utah evaluated total yield and weed control using oat (Avena sativa L.) as a companion crop during alfalfa establishment. Oats were seeded at rates of 40 lbs/A or less. Yield and weed control were compared to a tank-mix herbicide treatment of 2,4-DB (1.0 lb ai/A) and clethodim (0.12 lb ai/A) and an untreated control. Highest first cutting DM yield (77% oats and 21% alfalfa) was obtained when 40 lb/A of oats was seeded with 18 lbs/A of alfalfa. Highest seasonal DM yield occurred when 10 lbs/A of oats was seeded with the alfalfa. Dry matter yield from this combination was 32% oats, 64% alfalfa, and 3% weeds. The herbicide treatment provided the best weed control (>95%) and the greatest pure alfalfa content (>99%). Dry matter yield in the herbicide treated plots was the lowest in the study due to herbicide injury to alfalfa and lack of weeds and oats to add biomass. All treatments, herbicide and any oat density provided more than 70% weed control when compared to the control. [27]

EFFECT OF TILLAGE PRACTICE AND PRODUCTION OBJECTIVE ON WEED DENSITIES IN HARD RED WINTER WHEAT. Deena L. Morley* and Thomas F. Peeper, Oklahoma State University, Stillwater.

Continuous monoculture hard red winter wheat is the major crop grown in Oklahoma. Adoption of no-till in Oklahoma has been slow, but recent advances in weed technology and seeding methods suggested a need to further investigate the feasibility of no-till continuous wheat. A three year experiment was conducted in three wheat fields located in north central Oklahoma (Alfalfa, Garfield, and Kingfisher counties) to evaluate the effect of tillage system on wheat forage and grain production. Five production objectives were evaluated: 1.) Wheat for grain only; 2.) Traditional wheat forage and grain (dual-purpose); 3.) Emphasize wheat forage and harvest for grain; 4.) Wheat for forage and hay; 5.) Wheat for forage and hay plus doublecrop foxtail millet hay. All production objectives were investigated using conventional and no-till systems. After three years, winter annual grass weeds were absent from treatments harvested for wheat hay. After three years, rescuegrass was more dense in no-till plots than conventional plots at Kingfisher. Averaged over other factors, cheat densities at Garfield and jointed goatgrass density at Alfalfa were greater in treatments seeded in late September than in treatments seeded in early September or mid-October. These data suggest that wheat seeded in early September may emerge before winter annual grass weeds and thereby gaining a completive advantage compared to wheat seeded in late September, closer to the typical time of emergence of common winter annual grasses. Therefore, recommendations that include delayed wheat seeding for winter annual grass management will need to be revised. [28]

IS ACCASE RESISTANT ITALIAN RYEGRASS (*LOLIUM MULTIFLORUM*) ALSO RESISTANT TO PINOXADEN. Lydia A. Clayton*, Traci A. Rauch, Janice Reed, and Donn Thill, University of Idaho, Moscow.

Italian ryegrass is a serious weed in cereal crops throughout the United States. Herbicide resistant ryegrass weed populations are prevalent in cereal crops in the Pacific Northwest region of the United States. Field studies were established in previously identified ACCase-resistant Italian ryegrass

populations near Moscow, ID to determine control with pinoxaden and other grass herbicides. Additionally, three Italian ryegrass biotypes collected in 2004 from locations in northern Idaho were tested for resistance to group 1, 2, and 15/5 herbicides in greenhouse studies. Populations in the field showed resistance to tralkoxydim (group 1, commonly referred to as subgroup '-dim'), as well as flucarbazone and imazamox (group 2), but not to pinoxaden (group 1, subgroup '-den'). In the greenhouse, plants of one biotype produced from field collected seed showed resistance for group 1, group 2, and group 15/5 herbicides. Progeny of surviving plants showed enhanced levels of resistance in a subsequent greenhouse study. This indicates that incidence of pinoxaden-resistant Italian ryegrass may increase quickly in fields infested with group 1 resistance. [29]

JOINTED GOATGRASS (*AEGILOPS CYLINDRICA*) SEED PREDATION IN A WHEAT/FALLOW SYSTEM. Gustavo M. Sbatella*, Stephen D. Miller, David W. Wilson, University of Wyoming, Laramie.

Field trials were conducted in 2005, to quantify post-dispersal seed predation of jointed goatgrass in a wheat/fallow system in southeastern Wyoming. The effect of background seed density and distance to the edge of the field were examined in adjacent wheat and fallow strips. Seeds were placed on sand paper rectangles and were replaced weekly. A total of 19 observations were made from May 25 to October 3. Preliminary observations indicated rodents as the potential predators. Motion sensitive cameras placed in the field as well as feces deposits over cards confirmed small mice and rabbits as primary predators. Seed removal was not affected by background seed density. The effect of the distance to the edge of the field was only significant in the wheat field. Wheat and fallow fields showed different patterns of predation over time. Two weeks after seeds were offered, 80% predation levels were observed in the wheat field only to decline by week six. During week eight through sixteen, predation fluctuated from 0 to 30%. No predation was observed in the fallow strip from week one to five. After this initial period seed removal rapidly increased and reached 100% by week seven. Predation remained constant until week thirteen when plots were mowed and seed removal decreased to 20%. Soon after mowing, seed predation returned to 100%. Results of these trials suggest that jointed goatgrass seed remains as part of a rodent's diet for an extensive period of time. Vegetation covering and disturbance both affected seed predation by rodents. [30]

RATTAIL FESCUE CONTROL WITH GLYPHOSATE IN CHEMICAL FALLOW. Eric Jemmett*, Traci Rauch, and Donn Thill, University of Idaho, Moscow; Dan Ball, Sandra Frost, and Larry Bennett, Oregon State University, Pendleton; Joe Yenish and Rodney Rood, Washington State University, Pullman.

Rattail fescue (*Vulpia myuros*) control in direct seed cropping systems is becoming problematic in PNW dryland direct-seed winter wheat cropping systems. With less disturbance of the soil, rattail fescue is no longer controlled and infestation numbers and population density are increasing dramatically. In the absence of tillage, herbicides are used to suppress invasive and existing weed populations in chemical fallow. Field studies were conducted in three regions throughout the PNW to develop methods to control rattail fescue during fallow periods in direct seed winter wheat cropping systems. Glyphosate (Roundup Ultra Max) at 0.375, 0.562, 0.75, and 0.937 lb ae/A and paraquat/diuron (Surefire®) at 0.75 lb ai/A were applied early (EPOST) and late postemergence (LPOST) alone and in combination to determine the effect of there treatment on visible control and panicle reduction of rattail fescue. On average, sequential applications of glyphosate controlled and reduced panicle numbers of rattail fescue 88 and 52%, respectively, compared to EPOST (73 and

39%) and LPOST (63 and 27%) treatments of glyphosate. Control and panicle reduction generally increased with increasing rates of glyphosate. [31]

INTERACTIONS OF SOIL RESIDUAL ALS INHIBITING HERBICIDES. Bryce G. L. Geisel*, Jeff J. Schoenau, Kenneth L. Sapsford, University of Saskatchewan, Saskatoon; Eric N. Johnson, AAFC, Scott, SK; and Frederick A. Holm, University of Saskatchewan, Saskatoon.

ALS inhibiting herbicides exhibit high bioactivity at low concentrations and may persist in the soil and affect sensitive rotational crops. To examine possible interactions between combined residues of these herbicides applied in successive years, field trials were performed in three contrasting Saskatchewan soils. Field plots seeded to Roundup Ready canola were used to assess residual effects of combinations of ALS inhibiting herbicides applied to peas and wheat in the previous two years. The field plots were sprayed in year 1 with imazamox/imazethapyr or a non-residual herbicide on peas, followed by imazamethabenz, flucarbazone-sodium, sulfosulfuron, florasulam, or a non-residual herbicide on wheat in the second growing season. Soil samples were taken from the plots after the second growing season. A root length inhibition bioassay based on oriental mustard was used to test for residual herbicide phytotoxicity in samples of soil from the field trials at the three study sites. To determine the interactions (antagonistic, additive or synergistic) between the herbicides investigated, Colby's equation was applied to the bioassay responses. The results to date indicate predominantly additive interactions. [32]

STRAIGHT COMBINING CANOLA USING DESICCANTS AND SPODNUM. Kent R. McKay*, Lee A. Novak, Gary P. Willoughby, North Dakota State University, Minot; Robert Henson, North Dakota State University, Carrington; Burton L. Johnson, North Dakota State University, Fargo.

In the Northern Great Plains, canola harvest is preceded by swathing. Current North Dakota State University Extension recommendations and guidelines indicate swathing at the optimum stage will reduce green seed problems and seed shatter losses. Green seed content is a major marketing factor in canola where 2% or higher results in severe discounts. The canola swath is allowed to cure and ripen for a minimum of 10 to 14 days, during which a strong wind may blow the swaths out of the windrow making combining very difficult and often resulting in yield losses due to shattering. There is increased interest in straight combining canola; however, it is not recommended due largely to the lack of research to define the risks of seed shatter and uneven crop ripening. A polymer coating called Spodnam has been developed to reduce the pod shattering of canola when straight combined. Spodnam is applied to early maturing pods to reduce or delay expansion and splitting of the drying pod. Paraquat is being evaluated as a crop desiccant to aid in crop dry down and eliminate green areas in the field. IR-4 residue trials were initiated in 2005 for Paraquat in canola. In 2005, an experiment to evaluate canola harvest method and timing was conducted at Minot and Carrington, ND. Straight combining with and without Spodnam and/or Paraquat was evaluated at four harvest timings and compared to the standard practice of swathing. There were no differences in yield with any straight combining treatment with or without Spodnam or with Gramoxone when compared to similar harvest timings at both locations. At Minot, the Gramoxone/Spodnam straight combining treatment had significantly higher yield compared to swathing. The Gramoxone treatment was straight harvested 14 days after application and there were no increased seed shatter loss or green count compared to other delayed harvest timing treatments. In general, the straight combining treatments with or without Spodnam and Gramoxone tended to have higher yields at the optimum and 7-day-delay harvest timings compared to the swath treatments. [33]

RATTAIL FESCUE CONTROL IN IMAZAMOX-TOLERANT WINTER WHEAT IN 2005. Traci Rauch*, Eric Jemmett, Donn Thill, University of Idaho, Moscow; Dan Ball, Larry Bennett, Sandy Frost, Oregon State University, Pendleton; Carol Mallory-Smith, Chuck Cole, Oregon State University, Corvallis; Joe Yenish and Rod Rood, Washington State University, Pullman.

Rattail fescue is a winter annual grass that is found in direct-seed cereal production systems in the Pacific Northwest. Rattail fescue is typically controlled by tillage; however, populations are expanding with the increase in low disturbance farming systems. Few herbicides are currently registered for rattail fescue control in winter wheat. Rattail fescue control and wheat response with diuron, flufenacet, imazamox, mesosulfuron, pendimethalin, and sulfosulfuron was determined in imazamox-resistant winter wheat in four to six studies established in Idaho, Oregon, and Washington in 2004 and in 2005. The experimental design at all locations was a randomized complete block. Herbicides were applied preemergence in the fall and/or early postemergence in the spring. Rattail fescue control was evaluated visually and biomass was collected. Wheat seed was harvested at crop maturity. At Genesee, ID in 2005, mesosulfuron injured wheat 4%. No other wheat injury was observed in 2005 experiments. At all sites in 2005, rattail fescue was controlled best with flufenacet applied alone preemergence or combined with all other herbicides (89 to 99%). At Pendleton, OR, sulfosulfuron and imazamox alone or combined with pendimethalin controlled rattail fescue 92 to 98%. Rattail fescue biomass was reduced 60 to 100% compared to the untreated check by flufenacet or pendimethalin in combination with other herbicides and flufenacet alone. Wheat yield varied across sites, primarily due to differences in growing season precipitation. [34]

EFFECTS OF HULL ON THE GERMINATION, VIABILITY AND MORTALITY OF WILD OAT SEED. Qasim A. Khan*, Montana State University Southern Agricultural Research Center, Huntley, and James A. Mickelson, Pioneer Hi-Bred International, Inc, Johnston, IA.

The hull of the wild oat seed is thought to be a major mechanism of resistance to attack by microorganisms. The hull may also influence water absorption and seed imbibition and may play a role in germination as well. It is known that the hull can impede germination of seeds in the lab, however, the importance of the hull has not been tested in the field and its effects have not been compared between dormant and nondormant lines. A two-year study was conducted to determine whether the hull of wild oat seed affects seed mortality and/or seedling emergence under field conditions. Wild oat seed banks were established in the field using a randomized complete block design with four replications. Treatments were a factorial arrangement of 2 wild oat lines and 2 hull treatments. On average, removal of hulls increased seed mortality by 21%, infection by microorganisms by 20%, and decreased seed viability by 28%. Hull treatment significantly affected seed viability and mortality in both wild oat lines; however, the effects were more pronounced in the high dormancy line compared to the low dormancy line. [35]

WEED CONTROL IN IMAZAMOX-RESISTANT WHEAT IN WESTERN OREGON. Richard P. Affeldt, Charles M. Cole, Jed B. Colquhoun, Carol A. Mallory-Smith, and Bill D. Brewster, Oregon State University, Corvallis.

From 2001 through 2004, 15 field experiments were conducted to evaluate weed control with imazamox in imidazolinone-resistant winter wheat in the Willamette Valley of western Oregon. All experiments were conducted at Hyslop Research Farm near Corvallis. In the Willamette Valley, winter wheat is often grown in rotation with cool-season grasses grown for seed. This rotation results in high populations of weedy grasses in winter wheat. These grasses germinate in the fall and winter and continue to grow slowly throughout the winter months. Grass weed species included in these trials were: Italian ryegrass, tame oat, rattail fescue, California brome, and annual bluegrass. Broadleaf weed species included in these trials were: shepherd's-purse, mayweed chamomile, Persian speedwell, ivyleaf speedwell, sticky chickweed, and common chickweed. Imazamox was very effective controlling tame oat. Imazamox was somewhat effective controlling Italian ryegrass, rattail fescue, and California brome. Control of these three grasses was reduced when imazamox was applied after the grasses had developed four leaves. Imazamox did not control annual bluegrass,and provided poor broadleaf control in most trials. [36]

WEED CONTROL IN GLYPHOSATE-TOLERANT/SULFONYLUREA-TOLERANT SOYBEAN. Jerry L. Ries, North Dakota State University, Fargo; Brian M. Jenks, North Dakota State University, Minot; and Richard K. Zollinger, North Dakota State University, Fargo .

Glyphosate-Tolerant/Sulfonylurea-Tolerant soybean is a relatively new soybean type to enhance weed control of wild buckwheat, volunteer glyphosate resistant canola, and glyphosate tolerant weeds. Research was conducted in 2004 at two locations near Ipswich, SD, and at Fargo and Minot, ND, in 2005 to evaluate crop safety and weed control. All weed control evaluations were taken at 14 and 28 days after treatment (DAT). Treatments of 12 oz/A of a 4.5 lb ae/gallon full adjuvant load glyphosate were applied alone and in combinations with thifensulfuron at 0.03 to 0.25 oz/A, chlorimuron at 0.08 to 0.27 oz/A, imazamox at 0.12 oz/A, imazethapyr at 0.5 oz/A, and pyrithiobac at 1.02 oz/A. All treatments contained 17 lb/100 gallon ammonium sulfate. All treatments gave less than 7% soybean injury at 7 DAT and 0% injury at 14 and 28 DAT. Although treatments with pyrithiobac showed injury ranging from 28 to 33% at 14 DAT at Fargo and 0% injury at 28 DAT. All treatments gave 99% yellow foxtail and redroot pigweed control. All treatments gave greater than 96% kochia control at Minot, and greater than 90% kochia control at Ipswich. Glyphosate alone gave 0% control of volunteer glyphosate resistant canola. Adding thifensulfuron at 0.06 oz/A gave 37 and 38% control at 14 and 28 DAT, but the higher rate of 0.25 oz/A antagonized canola control (28 and 33%). Chlorimuron at 0.08 oz/A applied with glyphosate generally gave the greatest canola control, 47 and 60% control at 14 and 28 DAT. Thifensulfuron at 0.03 and 0.25 oz/A plus chlorimuron at 0.08 oz/A gave 50 to 60% canola control at 14 and 28 DAT. Tank-mixing ALS-inhibitor herbicides of imazamox, imazethapyr, and pyrithiobac with 0.25 oz/A thifensulfuron, reduced control of canola to 35% at 14 DAT, but similar at 28 DAT (60%). Tank-mixing thifensulfuron at 0.06 to 0.25 oz/A with glyphosate increased wild buckwheat control compared to glyphosate applied alone. Adding chlorimuron at 0.08 to 0.27 oz/A with glyphosate increased control of wild buckwheat. Tank-mixes of glyphosate plus chlorimuron and thifensulfuron increased wild buckwheat control greater than glyphosate applied alone. Generally, applying thifensulfuron and chlorimuron alone or together with glyphosate resulted in equal control of wild buckwheat compared to glyphosate applied alone. Glyphosate tank-mixes of thifensulfuron at 0.25 oz/A, imazamox, imazethapyr, and pyrithiobac increased wild buckwheat control over glyphosate applied alone. [37]

WEED FREE FORAGE - AN INSPECTOR'S VIEWS. Bruce Hagstrom, Fremont County Weed and Pest Control District, Lander WY.

The North American Weed Free Forage Program is a Federal Agency induced program to limit the dissemination of noxious weed species through forage and mulch. A Federal Government agency insisting that a program be developed to slow the spread of noxious weeds on their managed lands, words of conflict or words of cooperative weed control. The Weed Free Forage Program can be a good tool for an integrated pest management program or one more duty added to a busy schedule of an individual in a weed control program. [38]

ALFALFA INJURY RESULTING FROM APPLICATION OF FLUMIOXAZIN WITH A NONIONIC SURFACTANT. Adrienne A. Olson*, Andrew R. Kniss and Stephen D. Miller, University of Wyoming, Laramie.

Greenhouse trials were conducted to evaluate the effect of flumioxazin with and without tank-mix partners on alfalfa (*Medicago sativa*) phytotoxicity. Flumoixazin at 56 ai/ha was applied to 6 month old 'Dekalb 137' alfalfa alone or in combination with nonionic surfactant (NIS) at 0.25% v/v, liquid nitrogen (N) at 1% v/v, or imazamox at 36 g ai/ha. The experiment utilized a randomized complete block design and was repeated. Treatment effects on visual injury were highly significant ($p<0.0001$) at 3 and 10 days after treatment. Flumoixazin + NIS resulted in over 40% visual injury and was greater than any other treatment. Flumoixazin + N was the only other treatment to cause significantly greater injury than the untreated control 3 days after treatment, but injury was minor (5%). Ten days after treatment, visual injury from flumioxazin + NIS had decreased to 22%. These results confirm the alfalfa phytotoxicity, observed in the field in 2005, was caused by the addition of a nonionic surfactant to flumioxazin. [39]

WEED CONTROL IN CONVENTIONAL- AND NO-TILL FIELD PEA. Gregory Endres*, North Dakota State University, Carrington; and Kirk Howatt, North Dakota State University, Fargo.

Field trials were conducted in 2005 in eastern North Dakota to examine weed control and field pea response to selected soil- and POST-applied herbicides. Two trials were conducted at Carrington on loam soil with 7.9 pH and 3.1% organic matter in a conventional-till trial and 6.7 pH and 2.9% organic matter in a direct-seeded trial. At Fargo, a conventional-till trial was conducted on a silty clay soil with 7.5 pH and 5.0% organic matter. Glyphosate at 0.75 lb ae/A plus ammonium sulfate at 1% v/v was applied as a burn-down treatment across the direct-seeded trial at Carrington. In all trials, rainfall totaled over 1 inch within 8 to 12 days after application of PRE herbicides. At Carrington, early POST herbicides were applied to 2-inch tall field pea, 1- to 2-leaf yellow and green foxtail, and 0.5-inch broadleaf weeds. In all trials, POST herbicides were applied to 5- to 9-inch tall pea, 2- to 4-leaf foxtail, and 0.5- to 6-inch broadleaf weeds. In the conventional-till trial at Fargo, yellow foxtail and redroot pigweed control generally was greater when the treatment included a PPI or PRE component (pendimethalin, imazethapyr, pendimethalin+imazethapyr, or ethalfluralin) compared with only POST treatments (bentazon&sethoxydim, immazamox+bentazon, or immazamox+bentazon&sethoxydim). In the conventional-till trial at Carrington, excellent control (93 to 99%) of foxtail, common lambsquarters, redroot pigweed, and wild buckwheat was achieved with labeled rates of PPI pendimethalin&imazethapyr and ethalfluralin+imazethapyr. In the direct-seeded trial at Carrington, fall- or PRE-applied sulfentrazone at 0.188 lb/A provided similar broadleaf weed control. PRE imazethapyr+pendimethalin provided 88% foxtail control and excellent broadleaf weed control (96 to 99%). Crop injury (reduced plant biomass) ranging from 17 to 18%

occurred with spring-applied sulfentrazone at 0.188 lb/A. Severe pea injury and yield loss occurred with POST fomesafen. Sequentially-applied bentazon at 0.5 lb/A + sethoxydim at 0.1 lb/A improved common lambsquarters but not pigweed or wild buckwheat control compared to one application of bentazon at 1.0 lb/A + sethoxydim at 0.2 lb/A. Pea seed yield ranged from 68.9 to 70.7 bu/A with sulfentrazone followed by bentazon+sethoxydim, and imazethapyr+pendimethalin compared to the untreated check at 49.2 bu/A. [40]

HERBICIDE RESISTANCE MANAGEMENT IN CONTINUOUS RICE USING ALTERNATIVE ESTABLISHMENT TECHNIQUES. Michael J. Moechnig*, South Dakota State University, Albert J. Fischer, James E. Hill, University of California, Davis.

Rice establishment systems that facilitate the use of alternative herbicides were evaluated for their potential to reduce populations of herbicide resistant weed species in California rice growing regions where crop rotations are not economically practical. Alternative rice establishment options to conventional water-seeding include drill-seeding, stale seedbed, and spring no-till. Drill-seeding facilitates the use of pendimethalin and the stale seedbed approach facilitates the use of non-selective herbicides prior to planting. These herbicides provide alternative mechanisms of action, may be less expensive, and may be more environmentally benign than some of the herbicides used in conventional water-seeded rice. Therefore, a field experiment was conducted in 2004 and 2005 to evaluate five rice establishment treatments that included 1) conventional water-seeded, 2) conventional drill-seeded, 3) spring-tilled/stale seedbed/water-seeded, 4) no spring tillage/stale seedbed/water-seeded or 5) no spring tillage/stale seedbed/drill-seeded rice. The experimental design was a RCB with four replications. Recruitment results indicated that weed communities in the water-seeded treatments were dominated by sedge and broadleaf weed species whereas drill-seeded treatments were dominated by grass weed species. In the drill-seeded treatments, an application of a pendimethalin+cyhalofop-butyl (1.1 kg ai ha^{-1}+ 0.3 kg ai ha^{-1}) resulted in 92% and 87% control of the grass weed species in 2004 and 2005, respectively. In the stale seedbed systems, the fields were flushed prior to pre-plant applications of glyphosate (1.3 kg ae ha^{-1}). After rice emergence, this procedure resulted in reduced densities of smallflower umbrella sedge (*Cyperus difformis*) by more than 50% in the water-seeded treatments and reduced densities of *Echinochloa* spp. and sprangletop (*Leptochloa fascicularis*) by more than 40% and 50%, respecitively, in the drill-seeded treatment. Results from this research demonstrated that weed species recruitment in rice could be manipulated using alternative rice establishment techniques. Drill-seeding or stale seedbed approaches may be used to effectively reduce populations of weed biotypes resistant to herbicides commonly used in conventionally water-seeded rice. In addition, eliminating spring tillage reduced smallflower umbrella sedge densities by more than 89% in the stale seedbed/water-seeded treatments, suggesting that this may be an effective cultural technique to further reduce weed populations in rice. Measured herbicide efficacy and establishment systems effects on weed recruitment were used to calibrate a process-based growth model that may be used to generate hypotheses regarding optimal rice cropping system rotations to minimize densities of various weed species or biotypes. [41]

RESPONSE OF ACCASE INHIBITOR RESISTANT WILD OAT BIOTYPES TO PINOXADEN. Kee-Woong Park*, Ahmet Uludag, Joshua B. Cannon, and Carol A. Mallory-Smith, Oregon State University, Corvallis, OR.

Pinoxaden, a recently developed phenylpyrazolin herbicide, is an acetyl-CoA carboxylase (ACCase) inhibitor as are the aryloxyphenoxypropionates (APP) and cyclohexanediones (CHD) herbicides. However, in some instances, pinoxaden can be used to control APP or CHD resistant biotypes. Five ACCase inhibitor resistant wild oat biotypes (R1 to R5) were collected in wheat and lentils fields in the Pacific Northwest. Whole plant dose-response experiments showed that the five resistant biotypes were 2 to 24 times more resistant to the APP herbicides, fenoxaprop, diclofop, and quizalofop, than was the susceptible biotype. The R1 biotype was moderately resistant to fenoxaprop and diclofop (R/S ratios of 4.8 and 8.9, respectively) and was highly resistant to quizalofop (R/S ratio of 15). The R2 biotype was moderately resistant to fenoxaprop and quizalofop (R/S ratios of 4.8 and 4.3, respectively) and was highly resistant to diclofop (R/S ratio of 23.4). The R5 biotype was more than 10 times as resistant to all APP herbicides tested as was the susceptible biotype. The response of the R3 and R4 biotypes to APP herbicides was similar. These biotypes were slightly resistant to fenoxaprop and quizalofop, and moderately resistant to diclofop. However, none of the resistant biotypes were resistant to the CHD herbicides, sethoxydim and clethodim. R2 was the only biotype resistant to tralkoxydim and pinoxaden. The R2 biotype was 35 and 16 times more resistant to tralkoxydim and pinoxaden, respectively, than was the susceptible biotype. The level of resistance or cross resistance patterns were variable among biotypes indicating more than one mechanism of resistance is involved in these resistant wild oat biotypes. [42]

CONVENTIONAL AND NO-TILL SAFFLOWER TOLERANCE TO SULFENTRAZONE. Brian M. Jenks, Neil R. Riveland, Erik D. Ericksmoen, Denise M. Markle, and *Gary P. Willoughby, North Dakota State University.

Safflower (Carthamus tinctorius) is a deep-rooted, drought-tolerant crop grown in western North Dakota. It is an oilseed commonly used for oil, meal, or birdseed. Acreage in ND has increased from 22,800 acres in 2002 to over 31,000 acres in 2005. Safflower is not a very competitive crop and early season weed control is necessary to maintain yield at an economic level. A study to evaluate the effect of sulfentrazone on safflower was established at three locations in North Dakota, Minot, Hettinger, and Williston. Sulfentrazone was applied pre-plant and PRE in conventional and no-till systems. In Minot, visible safflower injury in the conventional tillage system on June 15 was as high as 36% from sulfentrazone at 2.25 oz ai, however, safflower height and density were not significantly different than the untreated check. Injury tended to be lower in the no-till system, with only 16% injury with the same herbicide treatment. Safflower yields tended to be highest where sulfentrazone was applied at 1.5 oz ai pre-plant, followed by the lower rates of sulfentrazone applied PRE. Safflower tended to yield higher where sulfentrazone was applied at any rate compared to the untreated or handweeded check in either tillage system. At Hettinger, initial visible injury tended to increase with increasing herbicide rates but diminished over time. Plant stands and heights were not significantly different where sulfentrazone was applied compared with handweeded or untreated checks. Safflower yields were similar where sulfentrazone was applied compared with the untreated check, regardless of tillage system. At Williston, there were no significant differences in stand density or crop injury between sulfentrazone treatments and the untreated check in both the conventional and no-till systems. Safflower tended to yield higher where sulfentrazone was applied compared to the untreated or handweeded check in either tillage system. In summary, sulfentrazone tended to cause more safflower injury in the conventional system compared with the no-till system.

In addition, the safflower in the no-till system tended to yield higher compared to the safflower in the conventional system. However, sulfentrazone treated safflower yielded similar or greater than untreated safflower, regardless of tillage system. [43]

VOLUNTEER CANOLA CONTROL IN CORN, SOYBEAN, SUNFLOWER, DRY PEA, AND FLAX. Brian M. Jenks*, Gary P. Willoughby, and Denise M. Markle. North Dakota State Univ., Minot.

A volunteer canola (VC) control study was conducted in 2004 and 2005 at the North Central Research Extension Center, Minot, ND to evaluate several herbicides for control of VC in dry pea, flax, sunflower, soybean, and corn. The trial evaluated the effect of canola growth stage on herbicide efficacy. In general, VC control was better when postemergence herbicides were applied at the 3-leaf canola stage compared to 6-leaf or later. Only six postemergence herbicides provided excellent (>90%) VC control at both application timings including tribenuron, nicosulfuron&rimsulfuron, nicosulfuron, foramsulfuron+isoxadifen safener, imazamox, and fomesafen+adjuvants. Several postemergence herbicides provided good to excellent VC control when applied at the 3-leaf canola stage, but provided significantly less control when applied at the 6-leaf stage. In peas, soil-applied metribuzin provided good to excellent VC control. Metribuzin applied postemergence provided good VC control at the 3-leaf stage, but only fair control at the 6-leaf stage. In 2004, VC control with MCPA amine and bentazon was good to excellent at the 3-leaf stage, but very poor when applied at the 6-leaf stage. In 2005, MCPA amine and bentazon provided poor to fair control at either stage. Imazamox provided good to excellent VC control at either stage both years. In flax, soil-applied sulfentrazone provided poor VC control. Bromoxynil&MCPA ester provided excellent VC control when applied at the 3-leaf stage, but control dropped 10-20% when applied at the 6-leaf stage. Thifensulfuron provided poor to fair control. In tribenuron-resistant sunflower, tribenuron and imazamethabenz provided good to excellent VC control at either application stage. Soil-applied sulfentrazone provided very erratic control in sunflower and dry pea with control varying from poor to good depending on crop and year. In soybeans, soil-applied flumioxazin and imazethapyr & glyphosate provided good to excellent VC control, while metribuzin and flumetsulam provided fair to good control. Imazamox and fomesafen applied postemergence provided excellent VC control at both timings. Lactofen provided good control at the 3-leaf stage, but much 25-50% less when applied at the 6-leaf stage. Bentazon provided excellent control at the 3-leaf stage, but only fair to good control at the 6-leaf stage. Acifluorifen provided poor VC control at either timing. In corn, soil-applied isoxaflutole provided excellent VC control. Postemergence herbicides nicosulfuron & rimsulfuron, nicosulfuron, and foramsulfuron provided excellent VC control at both application timings. VC control with mesotrione and dicamba&diflufenzopyr dropped 9-18% with the 6-leaf application, while control with 2,4-D amine dropped 15-43%. Fluroxypyr provided very little control at either application stage. Atrazine provided almost no control in 2004 at 0.25 lb ai, but provided poor to fair control in 2005 at 0.375 lb ai. [44]

EFFECT OF SEEDING RATE AND HERBICIDES ON WEED MANAGEMENT IN LENTIL. Brian M. Jenks*, Gary P. Willoughby, Denise M. Markle, and Kent R. McKay. North Dakota State Univ., Minot.

Four studies were conducted in 2005 to evaluate no-till lentil tolerance to herbicides and weed control. In study 1, fall- and spring-applied ethalfluralin was evaluated for lentil tolerance and weed control with and without incorporation. In study 2, lentil was evaluated for tolerance to different rates of 2,4-DB applied alone or as a tank mix with a grass herbicide. If shown to be safe to the crop, 2,4-

DB may provide postemergence control or suppression of some weeds. In study 3, several herbicides were evaluated to determine lentil tolerance to preemergence applications. A preemergence herbicide is needed to control weeds not adequately controlled by glyphosate at the preplant or preemergence burndown such as volunteer canola, wild buckwheat, prickly lettuce, and false chamomile. In study 4, our objective was to determine if higher lentil seeding rates would offset crop injury from spring-applied sulfentrazone. In study 1, most treatments caused only slight crop injury. Pendimethalin caused about 16% injury, while ethalfluralin at 1.0 lb caused as much as 14% injury. There were no differences in crop density between treatments. Weed control was generally better where ethalfluralin was incorporated with one pass of a heavy harrow. None of the treatments provided good control of all weeds. However, it should be noted that there were very dry conditions at application time in the fall and spring, which may have hindered herbicide incorporation. It should also be noted that even though this study was established in barley stubble, the field had not been in no-till in previous years. Lentil yield tended to be higher where ethalfluralin was not incorporated; however, we believe this is due to where the plots were located in the field and not necessarily due to crop injury. Some areas of the study were waterlogged with 11 inches of rain in June alone. In study 2, 2,4-DB caused 15-43% lentil injury 1 week after treatment (WAT), but the injury subsided to less than 15% 4 WAT. Lentil yield with pendimethalin followed by 2,4-DB + quizalofop + COC was similar to yield with pendimethalin alone. In study 3, tribenuron and thifensulfuron applied preemergence (PRE) in lentil caused less than 10% crop injury 4 WAT. Sulfentrazone and 2,4-DB applied PRE caused slight to moderate crop injury. In study 4, lentil was seeded at two rates to determine the impact of different spring-applied sulfentrazone rates on lentil yield. Sulfentrazone controls or suppresses economically important weeds such as kochia and wild buckwheat. If shown to not cause excessive lentil injury, sulfentrazone could provide a better alternative for kochia control in no-till lentil. At Minot, spring-applied sulfentrazone caused moderate to severe lentil injury at three different rates. Lentil yield was similar across sulfentrazone treatments whether lentil was seeded at 12 or 18 plants/ft^2. Lentil yield was higher in the pendimethalin treatment where lentil was seeded at 18 plants/ft^2 compared to 12 plants/ft^2. Lentil yield in the pendimethalin treatment was higher than yield in the sulfentrazone treatments. At Williston, lentil yield was higher when seeded at 18 plants/ft^2 compared to 12 plants/ft^2 with all sulfentrazone rates. However, lentil yield still tended to be higher in the pendimethalin treatment compared to sulfentrazone at either 12 or 18 plants/ft^2. [45]

VIABILITY OF FERAL RYE AND WILD OAT SEED IN CONSERVATION TILLAGE SYSTEMS. David W. Wilson* and Stephen D. Miller, University of Wyoming, Laramie.

A new method of tracking and studying the effects of tillage on weed seed viability was begun in September of 2001. The microchip methodology allowed free movement of nylon packets of 100 seeds per sample in fields exposed to five different tillage methods. The viability of wild oats and feral rye in a wheat/sunflower/millet crop rotation under different reduced tillage applications was compared to laboratory stored controls. The five tillage treatments included a no-till field and the use of an Australian prickle chain, a rod weeder, a field cultivator and a disk harrow in four other fields. Only one type of tillage was used in each field. Samples were pulled from the field sites in September of 2002, 2003, 2004 and 2005 for tetrazolium (live seed) testing. The movement of packets varied from 0 to 100 cm horizontally along the soil surface and 0 to 15 centimeters vertically in the soil profile. The rod weeder moved seeds the furthest along the upper surface of the soil, while the disk harrow had the highest impact on vertical seed movement in the soil profile. The viability of feral rye dropped to under 5% in the first year of the study and was 0% by the third year for all tillage treatments, compared to a stored sample viability of 26% (third year) and 16% (fourth year). Wild Oat seed took two years to fall below a 5% viability level, and attained 0% in the fourth year,

compared to a stored control of 3% (fourth year). There were no significant differences between minimal tillage treatments on seed viability for both species tested. Significant differences were only observed between the controls (laboratory stored samples) and all tillage treatments. [46]

PRICKLY LETTUCE CONTROL IN DRY PEA. Brian M. Jenks*, Kent R. McKay, Denise M. Markle, and Gary P. Willoughby. North Dakota State Univ., Minot.

A study was conducted near Beach, ND in 2005 to evaluate several soil-applied and postemergence herbicides for prickly lettuce control in dry pea. Dry peas were seeded May 4. Herbicide treatments were applied just before planting (preplant) on May 4 or postemergence on June 16. Individual plots were 10 x 30 ft and replicated three times. Glyphosate was applied preplant to all plots with the exception of the untreated plot. Prickly lettuce, which is a winter annual, was in the rosette stage at the preplant application (about 5-10 cm in diameter, 100-150 per sq m). Some prickly lettuce plants survived the glyphosate application. Metribuzin at 0.188 lb ai/A provided slightly better prickly lettuce control than at 0.094 lb. However, metribuzin, imazethapyr + sulfentrazone, and tribenuron applied preplant with glyphosate generally did not provide additional prickly lettuce control over that provided by glyphosate alone at any evaluation date. MCPA amine, bentazon alone, and bentazon + imazamox combinations applied postemergence provided 89-94% prickly lettuce control, with the exception of where bentazon + imazamox was applied at reduced rates. Bentazon + imazamox (0.25 lb + 0.016 lb) provided only 75% prickly lettuce control or about 15-20% less control compared to the normal use rates. Although MCPA amine provided 93% control, it also caused about 30% crop injury. Treatments containing bentazon caused 8-14% crop injury. 2,4-DB showed some activity on prickly lettuce, but provided only 78% control and caused about 9% injury. It was clear that the glyphosate burndown was critical for reducing prickly lettuce competition to allow the crop to get a head start. Cold spring temperatures less than 50-55 F may reduce glyphosate effectiveness. Without an effective glyphosate burndown, the postemergence herbicides alone would not be as effective since prickly lettuce would be larger and more dense at the postemergence application. [47]

CONTROL OF MULTIPLE ITALIAN RYEGRASS CULTIVARS WITH POSTEMERGENCE HERBICIDE APPLICATIONS. Chuck Cole*, Bill Brewster, Richard Affeldt, Carol Mallory-Smith, and Jed Colquhoun, Oregon State University, Corvallis, OR.

Italian ryegrass has been undergoing testing in the Midwestern and Southern regions of the U.S.A. as a winter cover crop within conventional tillage corn-soybean rotations. Previous research has demonstrated that glyphosate, when applied at the optimum rate and timing, can provide adequate control for the removal of the Italian ryegrass cover crop. However, a small percentage of plants can be expected to escape, produce seed, and potentially become a management issue in subsequent corn, soybean, or wheat crops. Several commercially grown Italian ryegrass cultivars are often blended for the cover crop market. Individual cultivars were tested for susceptibility to several ACC-ase inhibitor herbicides in order to identify any cultivar that may be tolerant to this class of herbicides. A field study was established to evaluate the susceptibility of seven Italian ryegrass cultivars to labeled rates of diclofop, clethodim, quizalofop, tralkoxadim, applied at either the 2-node or flower stage of growth, and pinoxaden applied at the flower stage of growth. A companion study was conducted in the greenhouse with herbicides only applied to 4-leaf Italian ryegrass. A split-block design with 4 replications and a completely randomized design with 8 replications were used for the field and greenhouse experiments, respectively. Cultivars significantly differed in their susceptibility to labeled rates of certain herbicides when measured as reductions in biomass relative to the untreated check and as estimated via visual control ratings in both studies. [48]

COMPARISON OF DESICCANT TIMING AND HARVEST METHOD IN CANOLA. Brian M. Jenks, Denise M. Markle*, and Gary P. Willoughby, North Dakota State University, Minot; John R. Lukach, North Dakota State University, Langdon; and Fabian D. Menalled, Montana State University, Bozeman.

A study evaluating the use of desiccants as a harvest aid in canola was conducted at three locations in 2005: 1) North Central Research Extension Center, Minot, ND, 2) Langdon Research Extension Center, Langdon, ND, and 3) Montana State University, Bozeman, MT. The objectives of the study were to: 1) determine the effect of paraquat applied preharvest at three timings on canola yield, seed moisture, and seed quality, 2) determine the effect of diquat applied preharvest at three timings on canola yield, seed moisture, and seed quality, 3) compare yield, seed moisture, and seed quality of swathed canola to paraquat and diquat-treated canola, and 4) determine the effect of harvest timing following a paraquat or diquat application on canola yield, seed moisture, and seed quality. Paraquat and diquat were applied preharvest at three timings (early, optimum swath timing, and late). Paraquat was applied at 7.8 oz ai with NIS at 0.25% v/v. Diquat was applied at 6 oz ai with NIS at 0.25% v/v. One treatment was swathed with a plot swather on the same days the paraquat/diquat treatments were applied as a comparison to current grower practices. The paraquat, diquat, and swath treatments were harvested 7 and 14 days after treatment (DAT). The study was a 3-factor factorial (desiccant, timing, harvest date) arranged in a randomized complete block design. In Minot, paraquat- and diquat-treated plots produced similar canola yields compared to swathed treatments averaged across all timings and harvest dates. Canola yields were also similar for the 2 harvest dates averaged across desiccants and timings. Additionally, there were no significant differences in test weight and oil content between desiccated or swathed canola averaged across all timings and harvest dates. Paraquat-treated plots lost 37 lb/a to pre-harvest shattering, compared with 24 and 18 for diquat and swath, respectively. However, this loss would be minimal in canola production. In Langdon, paraquat- and diquat-treated plots produced similar canola yields and seed weight compared to swathed treatments averaged across all timings and harvest dates. However, the later desiccant/swath timing produced higher yield and seed weight than timing 2, which in turn, was higher than timing 1. Also, canola harvested 14 DAT yielded higher than that harvested 7 DAT. This is probably because of higher seed moisture at the first two application/swath timings where seed was less physiologically mature compared to the Minot location. The swathed canola had the greatest pre-harvest seed loss at 38 lb/a, again, this amount would be considered minimal in canola production. In Bozeman, paraquat- and diquat-treated plots produced similar canola yield and test weight compared to swathed treatments averaged across all timings and harvest dates. Canola yields were also similar for the 2 harvest dates averaged across desiccants and timings. However, canola swathed or desiccated at the third or latest timing did yield higher than canola treated at the other two timings. Additionally, all canola desiccated or swathed at the earliest timing had a significantly lower test weight than canola desiccated or swathed at the later two timings. Furthermore, canola harvested 7 DAT had a lower test weight than canola harvested at 14 DAT. Again, this may be due to lack of physiological maturity at earlier desiccation/swath timings. In summary, based on preliminary results, there is potential to successfully use paraquat or diquat to desiccate canola without suffering drastic losses due to shattering or lower seed yield or quality. This study will be conducted again to determine the effect of different years and environmental conditions on shattering and seed quality. [49]

FLUMIOXAZIN FOR DODDER MANAGEMENT IN NEW MEXICO ALFALFA . Justin H. Norsworthy* and Mark Renz, New Mexico State University, Las Cruces.

Two field and one greenhouse study were conducted to evaluate the efficacy of flumioxazin on dodder (*Cuscuta* spp.) in established alfalfa (*Medicago sativa* L.). In the field experiment, flumioxazin plus a non-ionic surfactant (0.25% v/v) was applied at 0.125 or 0.25 lb ai/A when alfalfa was semi-dormant (before the first irrigation), after the first cutting, or in a sequential application (semi-dormant and after the first cutting). Results were compared to imazethapyr applied at 0.00945 lbs ai/A or imazamox at 0.046875 lb ai/A (both treatments included 0.25% v/v non-ionic surfactant and 2.5 lbs ai/A of ammonium sulfate). Alfalfa injury 23 DAT averaged 12-38% following the flumioxazin treatments; however, alfalfa quickly recovered and yields 56 d after the semi-dormant application did not differ between treatments. Dodder cover was reduced with all semi-dormant applications except imazamox 50 DAT. Ratings taken 116 DAT showed flumioxazin applied at the semi-dormant and sequential application, and imazamox applied after the first cutting were the only treatments that were still providing greater than 80% control. Due to the variable control seen in the field, a greenhouse study was conducted to compare control of dodder when flumioxazin (0.125 or 0.25 lb ai/A plus 0.25% v/v non-ionic surfactant) or imazamox (0.46875 lb ai/A plus 0.25% v/v non-ionic surfactant and 2.5 lb ai/A ammonium sulfate) are applied PRE or POST. Flumioxazin applied PRE at either rate provided 77% reduction in emergence compared to the untreated control 10 DAT, while imazamox applied PRE did not reduce dodder emergence. All applications applied post-emergent provided no reductions in emergence compared to the untreated controls. The POST applications were made while the dodder plants were small, and lack of herbicide contact may have lead to a decrease in control. [50]

EVALUATION OF FOLIAR APPLIED PENOXSULAM IN CALIFORNIA WATER-SEEDED RICE. Alan Haack*, Rick Mann, and Debbie Shatley, Dow AgroSciences, Indianapolis.

Penoxsulam is a triazolopyrimidine sulfonamide herbicide developed globally by Dow AgroSciences LLC for control of major rice weeds. Granite® SC is a new liquid formulation (240 grams penoxsulam/liter SC) product being developed for postemergence weed control in California rice. When applied postemergence in rice research trials, penoxsulam provided excellent control of watergrass (), annual arrowhead (*Sagittaria* spp), ducksalad (*Heteranthera limosa*) and ricefield bulrush (*Scirpus mucronatus*). Rice has demonstrated excellent tolerance to liquid postemergence applications of penoxsulam in research trials in California. Penoxsulam can be applied in tank-mix with cyhalofop and propanil to increase the weed control spectrum. In large commercial type trials penoxsulam as Granite® SC was applied to rice at 10 different locations in the Sacramento Valley, CA. Trial sites ranged from 5 - 20 acres in size and were managed by grower/cooperators, which provided a true assessment of product performance under commercial conditions. Control of susceptible weed species, including but not limited to watergrass (*E. oryzoides*), ricefield bulrush (*S. mucronatus*), ducksalad (*Heteranthera* spp) and annual arrowhead (*Sagittaria* spp) met or exceeded grower expectations. No adverse effects to the rice were observed. ® Registered trademark of Dow AgroSciences LLC. [51]

SULFENTRAZONE/ISOXAFLUTOLE COMBINATIONS FOR WEED CONTROL IN CHICKPEA. Eric N. Johnson, Agriculture and Agri-Food Canada, Scott, SK; Ken L. Sapsford and Frederick A. Holm*, University of Saskatchewan, Saskatoon.

Field trials were conducted at Scott, SK (sandy loam soil, OM 3%, pH 6.0) and at Saskatoon, SK (clay loam soil, OM 4.5%, pH 7.2) in 2005. Sulfentrazone (0, 70, 140 and 280 g ai/ha) and isoxaflutole (0, 39, 52, 79 g ai/ha) were applied in a four replicate, RCBD, factorial design three days after seeding Desi chickpeas. Glyphosate at 450 g ai/ha was added to each treatment to control emerged weeds. No in-crop weed control treatments were applied. Chickpeas showed excellent tolerance to all herbicide combinations. Wild mustard and stinkweed were controlled by isoxaflutole at 39 g ai/ha but control of these species required a minimum of 140 and 280 g ai/ha of sulfentrazone, respectively. Wild buckwheat was not controlled by any rate of isoxaflutole but sulfentrazone at 70 g ai/ha provided good control of this species. Wild tomato was controlled by 39 g ai/ha of isoxaflutole. Sulfentrazone suppressed this species at 70 and 140 g ai/ha and controlled it at 280 g ai/ha. Green foxtail was suppressed at lower rates of both compounds and controlled at the highest rates. In tank-mix combination, isoxaflutole at 39 g ai/ha and sulfentrazone at 70 g ai/ha controlled all of the weeds in these trials. At Scott, cow cockle was controlled by sulfentrazone applied at 280 g ai/ha but the addition of isoxaflutole did not improve the level of control achieved. Based on these results, low rate combinations of these two herbicides show significant promise for effective, broad spectrum control of broad leaved weeds in chickpeas. [52]

WEED SHIFTS IN GLYPHOSATE-RESISTANT CROPS: TRENDS AFTER EIGHT YEARS IN WYOMING. Andrew R. Kniss, Sandra M. Frost, Lisa L. Boggs, and Stephen D. Miller*, University of Wyoming, Laramie.

A long-term field study was initiated at Torrington, Wyoming in 1998 as part of a four-state effort to examine potential weed shifts brought on by glyphosate-resistant and conventional cropping systems. A split-plot randomized complete block design with four replications was employed with two crop rotations (continuous corn or corn-sugarbeet-wheat) as whole-plot factors and four herbicide treatments as split-plot factors. Herbicide treatments included glyphosate applied twice each year at a recommended rate (high glyphosate), glyphosate applied twice each year at half the recommended rate (low glyphosate), a conventional herbicide program applied each year (no glyphosate), and a treatment that rotated between the high glyphosate and no glyphosate treatments in alternating years (rotating glyphosate). Each year of the study surface weed densities were evaluated in June (approximately 14 days following the final herbicide application) and again in August. Data were analyzed separately by species using year of the study as a covariate. An overall trend for increasing broadleaf weed density was observed over time; this was accompanied by a weaker trend for decreasing grass weeds. Crop rotation had a significant effect on the prevalence of several weed species. Wild buckwheat and green foxtail were more prevalent in the continuous corn, while common lambsquarters and hairy nightshade were more prevalent in the corn-sugarbeet-wheat rotation. Herbicide treatment had a pronounced effect on all weed species except hairy nightshade. Wild buckwheat and common lambsquarters were more prevalent in the low glyphosate treatment, where common lambsquarters tended to dominate in the corn-sugarbeet-wheat rotation, and wild buckwheat dominated in the continuous corn. Kochia, field sandbur, and green foxtail were present in greater densities in the no glyphosate treatment compared to other treatments. The high glyphosate treatment was not different from the rotating glyphosate treatment with respect to any species except redroot pigweed. Redroot pigweed tended to be present in higher densities in the high glyphosate

treatment. This response was likely enhanced by an open ecological niche, as glyphosate treatments effectively controlled early emerging weeds and allowed the later emerging pigweed to survive. [53]

CARFENTRAZONE IMPROVES BROADLEAF WEED CONTROL IN PROSO AND FOXTAIL MILLETS. Drew Lyon, Robert Higgins*, University of Nebraska Panhandle Research and Extension Center, Scottsbluff; Andrew Kniss, and Stephen Miller, University of Wyoming, Laramie .

Proso and foxtail millets are regionally important dryland crops for the semiarid portions of the Central Great Plains. However, few herbicides are labeled for use in either crop. Crop tolerance and efficacy of carfentrazone was studied in proso millet at the University of Nebraska High Plains Agricultural Lab located near Sidney, NE from 2003-2005 and in foxtail millet at the University of Wyoming Sustainable Agriculture Research and Extension Center located near Lingle, WY in 2004 and 2005. Carfentrazone was applied postemergence at 0.008, 0.012, and 0.016 lb ai/A with combinations of 2,4-D amine, prosulfuron and dicamba. Weeds observed included Russian thistle, kochia, lanceleaf sage, volunteer sunflower and buffalobur. Although proso and foxtail millet plants treated with carfentrazone exhibited some leaf spotting, new leaves were healthy and the injury soon became difficult to detect. Grain and forage yields were not affected by the application of carfentazone. Dicamba and 2,4-D amine, both commonly used herbicides in proso millet production, provided visual control of 30% or less for buffalobur. Adding carfentazone to one or both of these herbicides improved buffalobur control to 85% or greater. Carfentrazone, applied at the 0.016 lb/A rate, improved Russian thistle and kochia control in 2003 when plants were drought-stressed, but it did not seem to help with these weeds during wetter years or with the control of lanceleaf sage or volunteer sunflower. Buffalobur has been declared a noxious weed in several western states, which makes buffalobur seed in proso millet a major concern for the birdseed industry. Carfentrazone provides proso millet producers with a way to control buffalobur. In foxtail millet, carfentrazone provides producers with a postemergence broadleaf herbicide that poses little risk for crop injury, which has been a concern with 2,4-D, currently the only herbicide labeled for use in foxtail millet. [55]

ALS RESISTANCE IN A BIOTYPE OF BUSHY WALLFLOWER. Dallas E. Peterson, Kassim Al-Khatib, and Rickey Roberts, Kansas State University, Manhattan.

Bushy wallflower is a winter annual mustard species that commonly infests winter wheat fields of the central Great Plains region. Bushy wallflower has been effectively controlled in wheat for many years with the use of acetolactate synthase (ALS) inhibiting herbicides. Several cases of poor bushy wallflower control with ALS-inhibiting herbicides were reported in central Kansas during the 2004-2005 wheat growing season. Bushy wallflower seed was collected in the spring of 2005 from a wheat field in Marion County Kansas that had been treated unsuccessfully with chlorsulfuron plus metsulfuron and had a history of ALS herbicide use. A greenhouse experiment was conducted to evaluate several ALS-inhibiting cereal herbicides at typical field use rates for control of a susceptible and the suspected ALS-resistant bushy wallflower populations. The herbicides evaluated included chlorsulfuron, metsulfuron, triasulfuron, tribenuron, sulfosulfuron, propoxycarbazone, and imazamox. All ALS-inhibiting herbicides gave complete control of the susceptible biotype of bushy wallflower. However, the bushy wallflower biotype collected from Marion County was not controlled by any of the ALS-inhibiting herbicides. The resistant bushy wallflower generally exhibited a low level of growth reduction from ALS herbicide treatment, but none of the plants were

killed by any of the herbicides. Alternative control measures such as 2,4-D or MCPA will need to be implemented to achieve acceptable control of ALS-resistant bushy wallflower. [56]

GREEN FOXTAIL, YELLOW FOXTAIL, AND SHATTERCANE CONTROL WITH MESOTRIONE AND SULFONYLUREA HERBICIDES IN CORN. Christopher L. Schuster, Kassim Al-Khatib, and J. Anita Dille, Kansas State University, Manhattan.

Mesotrione is a registered soil- and foliar-applied herbicide for control of annual weeds in corn. Postemergence applications of mesotrione, however, do not provide adequate control of grasses and as a result, are often tank mixed with atrazine and/or sulfonylurea herbicides. Recent complaints have contended that control of shattercane and foxtail species is reduced when sulfonylurea herbicides are applied in combination with mesotrione. Field experiments were conducted near Manhattan and Rossville, KS in 2004 and 2005 to evaluate the efficacy of various sulfonylurea herbicides applied with mesotrione or mesotrione + atrazine on green foxtail, yellow foxtail, and shattercane. Plants were treated at 7.5 to 12.5 cm height with mesotrione (105 g ha^{-1}), mesotrione + atrazine (105 + 757 g ha^{-1}), nicosulfuron (35 g ha^{-1}), foramsulfuron (37 g ha^{-1}), nicosulfuron + rimsulfuron (26 + 13 g ha^{-1}), or a combination of mesotrione or mesotrione + atrazine with any one of the three sulfonylurea herbicides. Adjuvants were included in tank mixes as recommended on herbicide labels. Grass injury was visually assessed 7 and 21 days after treatment (DAT) based on a scale where 0% = no injury, and 100% = plant mortality. Treatments were combined over years due to a lack of interactions. Visual injury of green and yellow foxtail were greater than 77%, while shattercane injury was greater than 90%, when treated with nicosulfuron, foramsulfuron, or nicosulfuron + rimsulfuron. Injury of green foxtail and yellow foxtail was reduced to 66 and 55%, respectively, when mesotrione was tank mixed with nicosulfuron at Rossville. An application of mesotrione + foramsulfuron resulted in 59 and 51% visual injury of green foxtail at Manhattan and Rossville, respectively. Tank mixing mesotrione with nicosulfuron + rimsulfuron did not result in an antagonistic interaction when applied to yellow foxtail or shattercane at either location. The addition of mesotrione + atrazine to nicosulfuron + rimsulfuron at Manhattan, however, resulted in only 77, 70, and 78% visual injury of green foxtail, yellow foxtail, and shattercane, respectively. Similar antagonistic interactions were observed at Rossville. The addition of mesotrione + atrazine to a sulfonylurea herbicide further decreased the herbicidal efficacy on the selected grass species, as compared to the sulfonylurea herbicide applied alone or in combination with mesotrione. [57]

COTTON INJURY SYMPTOMS AND YIELD AS AFFECTED BY MULTIPLE SIMULATED DRIFT APPLICATIONS OF 2,4-D. Molly Marple*, Douglas Shoup, Kassim Al-Khatib, Dallas Peterson, Kansas State University, Manhattan.

Cotton Injury Symptoms and Yield as Affected by Multiple Simulated Drift Applications of 2,4-D. Molly E. Marple*, Douglas E. Shoup, Kassim Al-Khatib, Dallas E. Peterson, Graduate Research Assistant, Graduate Research Assistant, Professor, and Professor, Department of Agronomy, Kansas State University, Manhattan A field study was conducted in 2004 and 2005 at Manhattan, Kansas to compare cotton injury and yield reduction with 2,4-D and dicamba to other hormonal-type herbicides. The herbicides evaluated were dicamba (Clarity), 2,4-D amine, 2,4-D ester, clopyralid (Stinger), picloram (Tordon), fluroxypyr (Starane), and triclopyr (Remedy); herbicide rates were 0, 1/100, 1/200, 1/300, 1/400 of the use rate. The use rates were 561, 561, 561, 280, 561, 210, and 561g ai/ha for 2,4-D amine, 2,4-D ester, dicamba, clopyralid, picloram, fluroxypyr, and triclopry, respectively. Herbicides were applied at 5 to 6 leaf stage. A separate study was conducted to determine the effect of multiple exposure of simulated 2,4-D drift from multiple exposures to cotton.

2,4-D amine was applied at 0, 1/400, 1/800, 1/1200 of the use rates. Plots were treated with 1, 2 or 3 applications of 2,4-D amine at 2 week intervals. In general, injury symptoms and yield reduction was the greatest with 2,4-D when compared to other hormonal-type herbicides. Visual injury and yield reductions were greatest with 2,4-D and picloram. Similar injury was observed from both 2,4-D amine and ester. The lowest injury was with triclopry and clopyralid, whereas dicamba and fluroxypyr injury was intermediate. In the multiple exposure study, visual injury was the greatest at the highest rate of 2,4-D applied at 2 or 3 times. However, yield loss was still evident at the 1/1200 use rate of 2,4-D regardless of application timing. Cotton is extremely susceptible to 2,4-D drift, thus the use of 2,4-D should be avoided around cotton fields by using an alternative herbicides such as clopyralid and triclopry. [58]

RECORD KEEPING PROGRAM FOR HERBICIDE SOIL PERSISTENCE AND RESISTANT WEED MANAGEMENT. Joan Campbell*, Donn Thill, Todd Young, Eric Jemmett, and Donald Pierce; University of Idaho, Moscow, ID .

A computer based herbicide record keeping program is being developed to allow users to track herbicide use based on mode of action and soil persistence to help prevent weed resistance and crop injury. The program also serves as record keeping for state department of agriculture required pesticide application data. All herbicides used in Pacific Northwest dry land wheat systems have been compiled and entered into a Microsoft Access database. The database includes herbicide names, group numbers, and rotational crop restrictions. Users begin by choosing a crop and herbicide for a chosen field on their farm. As subsequent crops are entered, the program will determine if the rotational restriction has been met for the herbicides used previously. If time between the previous herbicides and the chosen crop is shorter than the label specifies, the user will be alerted with a message. This allows selection of an alternate crop. When two herbicides from the same group number are chosen in subsequent years, a yellow alert message is displayed. A red alert message is displayed when herbicides from the same group are chosen three or more years in a row. This allows the user to select an alternate herbicide to help prevent development of a herbicide resistant weed population. Users are able to view a table of herbicides with corresponding group numbers and labeled plantback restrictions for crops grown in dry land wheat systems. This information may be printed for ease of use. Rainfall, soil pH, and tillage system restrictions will be included for some herbicides. Fill-in boxes allow the users to record wind speed, air temperature, and other comments. Herbicide EPA registration numbers will automatically display for most herbicides. Information is recorded for each grower field. Once a field is entered, it is stored in a drop down menu. The user can click on a field or type in new selections. Users may display all information for a single field, all information for a single application time, or all information for a specific year. The program will be loaded on the users computer using runtime Access. Therefore, users will not need to purchase Access. Updates will be downloaded from the world wide web. [59]

NSF-ADVANCE: INSTITUTIONAL TRANSFORMATION TO INCREASE FACULTY DIVERSITY . Tracy M. Sterling*, Lisa M. Frehill, and Cecily Jeser-Cannavale, New Mexico State University, Las Cruces.

Since 2001, the National Science Foundation has funded 19 Universities to address the gender equity issues in science, technology, engineering, and mathematics (STEM) fields through ADVANCE: Institutional Transformation (ADVANCE: IT) awards. These awards seek to change institutions to accommodate the 21st century labor force and are five-year awards of ca. $3.5 million. The reasons for continuous under-representation of women in STEM are the pipeline, climate, unconscious bias,

and balancing family and work. The percent of women faculty trail the percent of women receiving doctoral degrees in agriculture, biology, physical sciences, and engineering. Chilly climates cause women to leave academia because of the lack of collegiality in the department or the feeling of isolation from the departmental community. Unconscious bias by both genders discriminates to reduce the number of qualified female candidates. Therefore, the ADVANCE: IT grant at New Mexico State University (NMSU) implemented the following "best practices" to increase the number of women recruited and retained in STEM faculty positions. Recruitment initiatives focused on start-up package enhancements, dual-career initiatives, and department head training. Retention initiatives included research and travel awards, mentoring program, leadership development, workshops for faculty development and promotion and tenure; many of which have been extended to include most departments on campus as well as equal representation by both genders. The number of women recruited into the STEM fields at NMSU has doubled over the last four years. These practices and research findings have been disseminated to decision-makers on campus, at national and international conferences, and published in journals. [60]

HISTORY OF THE WESTERN SOCIETY OF WEED SCIENCE . Phillip W. Stahlman, Kansas State University Agricultural Research Center-Hays.

The Western Society of Weed Science (WSWS) is the oldest professional weed science organization in the United States. The organization was formed as the Western Weed Control Conference (WWCC) and held its first meeting in Denver, CO, on June 16-17, 1938. Two years earlier at the annual meeting of the Western Plant Quarantine Board (WPQB), an organization of mostly entomologists and administrators, Harry L. Spence, an Extension Agronomist in Idaho, presented a paper titled Our Weed Problem and took ". . . the liberty of suggesting to your organization that an annual symposium be arranged as a section of the WPQB meeting, whereby you could bring together the men working on weed problems from various western states." Furthermore, "It would aid materially in coordinating the various programs and furnishing a valuable opportunity to interchange suggestions in regards to our many weed problems." His idea was implemented and starting in 1950, the WWCC met every other year in even years until meeting in consecutive years in 1962 and 1963. The next four years, meetings were held in odd years to avoid meeting during the same year as the Weed Science Society of America. This proved unsatisfactory and annual meetings were resumed in 1967. The name of the organization was changed in 1968 from the Western Weed Control Conference to the Western Society of Weed Science. The WSWS has had only two Business Managers in its history. Lamar Anderson served in that capacity from 1967 to 1989 and Wanda Graves served from 1989 through the 2005 annual meeting. The Society has grown from 11 member states originally to 21 states and provinces currently: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, Texas, Utah, Washington, Wyoming, Alberta, British Columbia and Saskatchewan. Much of the historical information above is from the book The Western Society of Weed Science 1938-1992 by Arnold P. Appleby. 1993. The Western Society of Weed Science, Newark, CA. 177 pp. [61]

SALT CREEK PECOS PUPFISH HABITAT RESTORATION PROJECT. Mike McMurry* , Texas Department of Agriculture, Austin, Texas et al .

In 1997, a large scale ecological restoration project was initiated in the Pecos River watershed in far West Texas. Salt Cedar (Tamarisk) an exotic, invasive tree had created a mononculture in the riparian zones of the Pecos River and it's tributariesand was sapping water from the river and associated desert spring systems. A Section (24)c special local needs exemption was applied for an obtained from EPA by the Texas Department of Agriculture (TDA) for the use of Arsenal (imazapyr) herbicide for the treatment of salt cedar in the Pecos River and other areas of western Texas. Several specific areas were excluded from treatment due to the presence of federally listed threatened and endangered plant species. In 2001 TDA was contacted by the Fort Worth Zoo Aquarium to amend the 24(c) for Arsenal on salt cedar to include Salt Creek in Culberson County in the salt cedar treatment area to save a wild population of Pecos pupfish which were in imminent danger due to encroachment of salt cedar on spring and stream flows in Salt Creek. A partnership of supporters joined to make this treatment possible and the herbicide which was previously banned was approved and used to restore the habitat and preserve the species. [63]

VEGETATION ON IRRIGATION CANALS IN SOUTHERN NEW MEXICO. Cheryl Fiore*, Xiaoli Liu, Jill Schroeder, Sara Schuster, Leigh Murray, Robert Sanderson, Mark Renz, April Ulery and Osama El-Sebai, New Mexico State University, Las Cruces.

Elephant Butte Irrigation District (EBID) provides services to approximately 30,000 ha in southern New Mexico's Mesilla Valley. The system is primarily a gravity flow system with containment and delivery in the form of compacted earthen canals and laterals. Irrigation water is distributed through two canal and lateral types; intermittent facilities that hold water only when land is being irrigated from the canal or lateral and continuous facilities that hold water throughout the irrigation season. The irrigation season generally runs from February through October. Weeds that grow along the network of canals reduce the amount of available water for irrigation, obstruct the flow of water, and produce seeds that are deposited, and germinate in irrigated crops, urban landscapes and riparian areas. The objective of this poster is to discuss the vegetation surveyed at sites along the canal banks during the 2002 through 2005 sampling seasons. There were a total of 77 species found at all 226 sites sampled. Due to the abundant variety of species present on the canals, related species were merged together into broad categories to aid in statistical analysis. These categories are based on taxonomy, for example Asteraceae species were pooled to form one category and cool season members of the Poaceae family formed another category. The five dominant species are well adapted to the canal environment. Common bermudagrass (Cynodon dactylon (L.) Pers.) and scouringrush (Equisetum hyemale L.) are creeping perennials that reproduce by underground vegetative structures. Forty-two percent of the sites sampled were dominated by bermudagrass, or 114 sites out of a total of 226. Scouringrush was also well established at 75 sites. Buckhorn plantain (Plantago lanceolata L.), curly dock (Rumex crispus L.) and rice cutgrass (Leersia orysoides (L.) Sw.) made up the remainder of dominant species. [64]

COMPETITION BETWEEN PERENNIAL PEPPERWEED AND CREEPING WILDRYE I. ABOVE AND BELOW GROUND COMPETITION. Mark J. Renz*, New Mexico State University; and Robert R. Blank USDA-ARS, Reno, NV.

Perennial pepperweed (PPW) is a competitive, nonnative, herbaceous perennial that has been invading riparian areas throughout the western United States. Rapid development of shoots and roots

has been postulated as a potential mechanism for PPW's high degree of competitiveness. Above and below ground growth of PPW was quantified and compared to creeping wildrye (CWR) as this plant has been observed to resist invasions. Plants were established from perennial roots (PPW) or seedlings (CWR) using clear rhizotron pots 30 cm wide by 90 cm long grown in a greenhouse. To mimic natural subsurface water availability of riparian areas, pots were placed in plastic buckets in which a water level of 20 cm was maintained throughout the experiments. Two experiments were conducted as a randomized complete block design with four blocks consisting of the following planting combinations PPW+PPW, CWR+CWR, and PPW+CWR. In experiment one, treatments were planted on the same day and allowed to grow for 68 days before harvesting. In experiment two, CWR was established 36 days prior to planting PPW then all plants grew for an additional 74 days before harvesting. In experiment one, PPW above ground biomass per plant was 2 times greater than CWR grown alone, and 27 times greater when comparing PPW grown in direct competition with CWR. PPW also developed 2.1 and 3.6 times more root biomass per plant than CWR grown alone and combination with PPW, respectively. In experiment two CWR developed greater than 2 times above ground biomass per plant compared to PPW when species were grown exclusively or in combination. However, even though CWR was planted 36 days prior to PPW, root biomass per plant was similar in all treatments except PPW+PPW. PPW grown exclusively had 4 times less root biomass per plant than PPW grown with CWR. This data suggest that CWR presence is facilitating enhanced growth of PPW. Soil moisture measurements indicate that CWR has the ability to hydraulically lift water to top of the soil profile. PPW could be preferentially utilizing this additional water or resources made available by increased soil moisture to produce more biomass and become more competitive. [65]

COMPETITION BETWEEN *LEPIDIUM LATIFOLIUM* AND *LEYMUS TRITICOIDES* II. PLANT-SOIL RELATIONSHIPS. Robert R. Blank*, USDA-ARS, Reno, NV; Mark Renz, New Mexico State University, Las Cruces, NM..

The invasive wetland species *Lepidium latifolium* and the native riparian species *Leymus triticoides* were grown individually and in competition. Plants were grown from root-stock (*L. latifolium*) and small seedlings (*L. triticoides*) in lysimeters (30 by 5 by 100 cm deep). A sieved and homogenized loamy riparian soil presently being invaded by *L. latifolium* was used as the growth medium. As a lysimeter was filled with soil, resin capsules were placed at depths of 25, 50, and 75 cm below the soil surface to gage nutrient availability. To mimic natural subsurface water availability, lysimeters were placed in plastic buckets in which a water level of about 20 cm was maintained with deionized water. Four replicate lysimeters were used for the following planting treatments: 1) *L. latifolium* + *L. latifolium* , 2) *L. triticoides* + *L. triticoides* , 3) *L. triticoides* + *L. latifolium* , and 4) unplanted controls. After 68 days of growth, individual plants were harvested, dried, weight recorded, and analyzed for tissue nutrient concentrations. In addition, indexes of soil nutrient availability were determined for multiple lysimeter depths. Competition with *L. latifolium* significantly ($p \leq 0.05$) reduced final aboveground mass and tissue concentrations of P, Zn, and K of *L. triticoides* . Nutrient availability was generally affected by significant treatment by depth interactions. Surface soil N availability was greatest in the unplanted controls and the *L. triticoides* + *L. triticoides* treatments and far less for the other two treatments. Later experiments suggest that hydraulic lift by *L. triticoides* maintains higher soil water content thereby promoting N mineralization. At 75 cm, the *L. latifolium* + *L. latifolium* treatment promoted greater ortho-P availability relative the unplanted control. [66]

DETERMINATION OF TEMPERATURE AND MOISTURE PARAMETERS FOR THE DEVELOPMENT OF GIANT REED. Tony Graziani* and Scott Steinmaus, California Polytechnic State University, San Luis Obispo.

Critical temperature and moisture levels for the development of Giant Reed (*Arundo donax*) were estimated using statistical and mathematical approaches. Rhizomes were grown under varying moisture and temperature conditions. In the lab, Polyethylene glycol 8000 was used to simulate water potential levels (0.00 to –0.60 MPa), while temperatures, ranging from 10 to 35°C, were held constant. Field trials followed a randomized block design consisting of three moisture levels, replicated four times. Days to sprouting and percent soil moisture were recorded for each experimental unit. Temperature information was recorded on datalogger. T_{base}, the temperature below which development ceases, was estimated using three mathematical equations. The least standard deviation in degree-days, least coefficient of variation in degree-days, and regression coefficient methods gave estimates of 11.20, 10.93, 10.92°C respectively for the field trials and 12.67, 11.02, 11.28°C for the laboratory data. The reciprocal time to median sprouting under optimal moisture, 0.00 MPa, regressed on temperature was also used to estimate T_{base} for the lab data. T_{base}, estimated by the x-intercept, was 10.95°C, r^2=0.86. Base moisture was estimated from lab data using the aforementioned mathematical equations by replacing temperature with water potential. This resulted in a mean value of -0.603 MPa, which corresponds to about 9% volumetric water content in the sandy loams infested by giant reed. These estimates will be used to parameterize predictive models based on climatic suitability that will serve as an additional tool for the management of giant reed. [67]

SALTCEDAR CUT STUMP TREATMENT AND FUEL REDUCTION PROJECT. Tom Massey* and Kim Johnson, Fremont County Weed and Pest Control District, Lander WY.

In 2002 the Bureau of Indian Affairs and Fremont County Weed and Pest Control District entered into an agreement that focused on fuel reduction along the Big Wind River located on the Wind River Indian Reservation in Fremont County, Wyoming. The project consisted of cutting down very dense infestations of saltcedar, and treating the stumps with herbicide. Another factor considered in this operation was the protection of wildlife habitat including preserving willows and large old cottonwood stands. This project was conducted during the winter months over two consecutive years. One hundred eighty six acres of saltcedar were cut down and the stumps treated with different chemical combinations. The chemicals applied to the cut stumps included triclopyr and imazapyr. Monitoring in the treatment areas has shown the application of triclopyr to be more effective in prohibiting regrowth then the application of imazapyr. [68]

SOURCE-SINK DYNAMICS AND LANDSCAPE PLANTINGS DRIVE RANGE EXPANSION OF INVASIVE POPULATIONS OF ORNAMENTAL PAMPAS GRASS. Miki Okada*, Riaz Ahmad and Marie Jasieniuk, University of California, Davis.

Ornamental plants are a major mode of introduction of invasive species. Pampas grass is a landscape ornamental widely grown in California that has escaped cultivation and is invading natural areas. To infer the demographic processes underlying its invasive spread and to identify cultivated genotypes that are sources of invasive plants, we analyzed the population genetic diversity and structure of cultivated and invasive pampas grass using microsatellite markers. A highly discontinuous spatial pattern of genetic variation was revealed among 33 invasive populations, suggesting that the invasive populations originated most likely from locally introduced landscape plantings. Widely varying FIS

values across loci within populations suggested populations consisting of a small number of families resulting from a limited number of progenitors. Accordingly presence of multiple families was detected within all but two populations. Significant correlation between overall FIS and allelic richness across populations is consistent with the presence of multiple immigrant groups from distinct sources within populations. Based on these observations, we hypothesized that invasive populations are sink populations largely composed of immigrants from landscape plantings. Invasive plants assigned predominantly to two of seven genetically distinct groups of cultivated pampas grass. Frequencies of admixed genotypes between the two gene pools in landscape plantings and in invasive populations are consistent with progeny of landscape plantings making up invasive populations. Cultivated genotypes that assigned to the same two gene pools consisted of the majority of landscape plantings sampled and pampas grass sold simply as "Cortaderia selloana" without cultivar designation, indicating these as the sources of invasive populations. Propagation by seed was also detected in plants assigning to these two gene pools and one additional one out of all seven cultivated gene pools. The cause of invasiveness of the identified genotypes may be the method of propagation that results in the presence of both sexes within landscape plantings and the abundance of such landscape plantings. [69]

POTENTIAL RAPID BIOASSAY TO EVALUATE TREATMENT EFFECTS ON SALTCEDAR. Ruth Richards* and Ralph E. Whitesides, Utah State University, Logan.

The objective of this study is to evaluate the propagation of stem cuttings as a bioassay of saltcedar treatment effects. Two herbicide treatments and grazing by goats were evaluated for effectiveness in controlling saltcedar in a poorly managed, irrigated pasture in Lake Shore, Utah. On May 26, 2004, triclopyr amine or imazapyr was applied at the rate of 1% v/v. The foliage was sprayed to wet using an 8003 flat fan nozzle at 40 psi. Plots not treated with herbicide were grazed by goats. Grazing occurred four times: May 31, June 30, August 4, and September 6, 2004. The original grazing period was 24 hours and gradually reduced to 12 hours by the end of the season when plant biomass was limited. There were 10 to12 goats in each 16 by 16 foot plot to provide equivalent animal biomass. Saltcedar treatments are typically evaluated 2 to 3 years after treatment. To develop a rapid bioassay system, stem cuttings were taken from each saltcedar plot to compare regrowth potential from stored energy reserves. Cuttings were taken in the fall (October 7, 2004) and in the spring (May 3, 2005). Each cutting was 12 inches long and approximately 0.25 inch in diameter. The cuttings were propagated in a sandy soil and watered daily for 1 minute every 6 hours for 18 weeks. The dry weights of the root and shoot materials were then compared and no differences were found among treatments using this method of evaluation. Cuttings from untreated and ungrazed saltcedar plants were also grown in the greenhouse under the same conditions as described above. After 14 weeks, plants were treated with 1% v/v of imazapyr or triclopyr amine. Seven weeks after treatment, dry weights of root and shoot materials were compared and no significant differences were found among treatments. Neither of the bioassay techniques, stem cuttings harvested after field treatments or untreated stem cuttings that were treated and then evaluated, provided a dependable or rapid (18-21 weeks) evaluation method to assess saltcedar control. [70]

INTROGRESSION OF THE IMAZAMOX RESISTANT GENE FROM CLEARFIELD WHEAT TO JOINTED GOATGRASS. Alejandro Perez-Jones*, Carol Mallory-Smith, Oregon State University, Corvallis, OR; and Robert Zemetra, University of Idaho, Moscow, ID.

Imazamox-resistant wheat (*Triticum aestivum*) cultivars are being commercialized in the USA. With this new technology, wheat growers are now able to selectively control jointed goatgrass (*Aegilops cylindrical*), a winter annual grass weed that is especially problematic because of its close genetic relationship with wheat. However, there is a concern with the potential migration of the herbicide resistant gene from wheat to jointed goatgrass. Wheat and jointed goatgrass have the D genome in common and have been found to hybridize and backcross under field conditions. Since the herbicide resistant gene is located on the D genome, it is theoretically possible for resistance to be transferred to jointed goatgrass via backcrossing. To study the potential for gene migration, BC_2S_2 plants were produced using Imazamoz-resistant wheat as the female parent and jointed goatgrass as the male recurrent parent. To evaluate the likelihood of gene introgression, Imazamox-resistant wheat, one jointed goatgrass accession, and 18 randomly selected BC_2S_2 progenies were planted in the greenhouse and treated with imazamox. The percentage of survival was 100% for the Imazamox-resistant wheat, 0% for the goatgrass accession and 8 BC_2S_2 progenies, and 50% or higher for the remaining 11 BC_2S_2 progenies. Two of the resistant BC2S2 progenies were allowed to self to produce a BC_2S_3 generation in order to conduct a herbicide assay at the enzyme level, and to confirm the presence of the herbicide resistant gene. [72]

ADSORPTION AND DEGRADATION OF MESOTRIONE IN FOUR SOILS. Dale Shaner*, USDA-ARS, Fort Collins, CO Galen Brunk, Philip Westra, and Scott Nissen, Colorado State University, Fort Collins.

The adsorption and fate of mesotrione was studied in four diverse soil types varying in pH, organic matter (OM), and texture. The adsorption of mesotrione to each soil was determined using a batch equilibrium method. OM and soil pH were the most significant component of mesotrione adsorption. As soil pH increased, mesotrione adsorption decreased. The rate of dissipation of mesotrione in the plant available soil water (PAW) and soil matrix was determined for all four soils. Mesotrione decomposed rapidly in PAW of a soil with high pH (pH 7.4) whereas there was slower dissipation in PAW in an acidic soil (pH 5.2). Degradation of mesotrione was significantly reduced or eliminated in PAW when soils were sterilized by irradiation. Overall, the extent of adsorption is dependent on soil OM while degradation is driven by soil microbes. [73]

WATER DEFICIT EFFECTS ON WOOLLY LOCO AND SILKY CRAZYWEED SWAINSONINE CONTENT, PHYSIOLOGY, AND GROWTH. Amber D. Vallotton and Tracy M. Sterling*, New Mexico State University, Las Cruces.

Plant species containing the polyhyroxyindolizidine alkaloid swainsonine are called locoweeds. When ingested, swainsonine acts as an alpha-mannosidase inhibitor, thereby preventing the complete metabolism of oligosaccharides. Given significant economic losses due to locoweed poisoning in the western United States, a better understanding of environmental and genetic effects on swainsonine content is crucial for locoweed management. In our initial work, swainsonine levels differed among field-collected woolly loco, silky crazyweed and Lambert's crazyweed plants that had been grown in a common greenhouse environment, thereby suggesting that swainsonine content is genetically controlled. In a subsequent study, field samples of woolly loco var. *bigelovii*, *mollissimus*, and *thompsonae*, also contained different swainsonine levels, further indicating that genetics play a role

in constitutive swainsonine content. However, given different environmental conditions at each of the sampling sites, the role of any environment by genetic interaction is unknown. The objective of this research was to determine the effect of environment, specifically water-deficit stress, on locoweed response in terms of swainsonine levels, physiology, and growth. Populations of woolly loco var. *bigelovii*, *mollissimus*, and *thompsonae*, and silky crazyweed were collected from field locations in New Mexico, transplanted, and acclimated in a common greenhouse environment. These plants were then used for two similar experiments each conducted over a 56-day time course, in which plants were exposed to two, 21-day drought-recovery cycles, followed by a final 14-day drought period. Water-deficit levels for droughted plants were achieved by establishing 40% soil moisture content as compared to well-watered plants. For each of the two experiments, gas exchange parameters and relative water content, as well as swainsonine detection using GC/MS analysis, were measured before and after treatment initiation. Fifty-six days after treatment, total dry weight, root to shoot ratio, and water use/g dry weight/day were also determined. Although water stress of younger leaves was undetectable with relative water content, water use/g dry weight/d for well-watered compared to droughted plants ranged from three-fold (woolly loco var. *bigelovii*) to 23-fold (silky crazyweed). Under water deficit, photosynthesis increased in woolly loco var. *bigelovii*, whereas it decreased in woolly loco var. *mollissimus* and *thompsonae*, and was not different in silky crazyweed. Total dry weight after 56 days was not different between water treatments; however, R to S ratio increased in woolly loco var. *bigelovii* and silky crazyweed with water deficit. Droughted woolly loco var. *mollissimus* produced between five to eight times more swainsonine than silky crazyweed and woolly loco var. *bigelovii*, respectively. Water status had no effect on swainsonine content in silky crazyweed or the low swainsonine producer, woolly loco var. *thompsonae*. These data suggest that woolly loco swainsonine content is more plastic in response to water deficit as compared to silky crazyweed. [74]

DEVELOPMENT OF CUTLEAF (*SOLANUM TRIFLORUM*) AND HAIRY NIGHTSHADE (SOLANUM PHYSALIFOLIUM) SEED GERMINATION METHODOLOGY FOR GREENHOUSE RESEARCH.. Oleg V. Alexandrov*, Pamela J.S. Hutchinson, Daniel M. Hancock, University of Idaho, Aberdeen..

The effects of berry fermentation and gibberellic acid seed treatment on cutleaf (SOLTR) and hairy nightshade (SOLSA) seed germination was investigated. Seeds were extracted from freshly-harvested berries fermented in water at 26 C for 72 h or from non-fermented berries. At 4, 6, 8, 10, and 12 weeks after harvest (WAH), seeds from fermented and non-fermented SOLTR or SOLSA berries were soaked in distilled water or a 5 ppm gibberellic acid (GA) solution in Petri dishes placed in a growth chamber set at alternating day/night temperatures of 26/15 C with a 12 h day, and germination was determined at 14 d. Water-soaked, fermented or non-fermented SOLTR and non-fermented SOLSA seed germination was less than 5%, while water-soaked, fermented SOLSA seed germination rose to 18% by 14 WAH. GA-soaked, non-fermented SOLTR seed germination was 92% by 8 WAH, while GA-soaked, fermented SOLTR or fermented and non-fermented SOLSA seed germination did not exceed 63% or 79%, respectively, by 14 WAH. In a previous SOLSA seed study, germination of seeds treated with 1 ppm GA did not reach 98 to 100% until 18 WAH. Fermentation and/or soaking in 5 ppm GA seemingly did not break the innate dormancy of SOLSA seed in this experiment, either. Similar to reports by other researchers, freshly harvested SOLTR seed was initially dormant in our study. Dormancy of SOLTR seed from berries which had not been fermented was broken as early as 8 WAH with 5 ppm GA. [75]

FUNCTIONAL CONSEQUENCES OF WEED DIVERSITY AND SOIL FEEDBACKS ON WHEAT GROWTH AND COMPETITIVE ABILITY WITH WILD OAT. Richard G. Smith*, Fabian D. Menalled, Bruce D. Maxwell, Montana State University, Bozeman.

Understanding how plants alter the soil environment is critical to the management of crop-weed interactions. Weeds are often perceived as exerting only negative effects on crop performance through competition for limiting nutrients, water, and light. While many studies show crop yield reductions attributable to the competitive effects of weeds, there is an increasing body of theory and experimental evidence suggesting that characteristics of the weed community (i.e. species composition and diversity) may affect the nature of crop-weed interactions through effects on soil resource availability and microbial communities. Interactions between the weed community, soil microbes and resource availability could potentially offset or compound the competitive effects of weeds on crops. We are performing a greenhouse study to assess how the diversity and composition of the weed community impacts standing crop biomass, soil resource status, and growth and competitive ability of spring wheat. The study consists of two phases. In the first phase we establish weed communities of 0, 1, 3, and 5 species at constant density in pots filled with field-collected soil receiving one of two treatments: pasteurization to reduce microbial activity and abundance (P) and no pasteurization (NP). In the second phase we subdivide the soils from each pot and plant spring wheat in one of four treatment combinations: wheat alone (W), wheat alone + supplemental nutrients (W+N), wheat with wild oat (WWO), and wheat with wild oat + supplemental nutrients (WWO+N). The unique design of this experiment allows us to determine 1) the most likely mechanism for diversity effects on wheat growth and competitive ability (i.e. soil resource availability vs. feedbacks with the soil microbial community) and 2) the direction of these effects (negative, positive, or neutral). Preliminary results and their application to weed management will be discussed. [76]

DETERMINATION OF METRIBUZIN RESISTANCE IN TARGETED SOUTHEAST IDAHO REDROOT PIGWEED POPULATIONS. Daniel M. Hancock*, Pamela J.S. Hutchinson, Oleg V. Alexandrov, University of Idaho, Aberdeen.

Metribuzin is widely used in potato production for the control of redroot pigweed and other broadleaf weeds. Redroot pigweed resistance to Group 5 (Photosystem II inhibitors) herbicides has been reported in Oregon and Colorado, but not in Idaho. In 2003, seeds were collected from a suspected metribuzin-resistant redroot pigweed population in a southeastern Idaho potato field surviving a preemergence application of metribuzin at 0.05 lb ai/a. In 2005, plants grown from these seeds were evaluated against plants grown from seeds collected in a susceptible population at the Aberdeen Research and Extension Center. Susceptible and suspected-resistant plants were treated with metribuzin at 0, 0.125, 0.25, 0.5, 1, 2, 4 lb ai/A when 3 to 4 lf. The lowest rate of metribuzin applied (0.125 lb/A) controlled susceptible plants 100% while the suspected resistant population was four times more resistant than the recommended field rate of 0.5 lb/A. In a second whole-plant bioassay, malathion was applied prior to the metribuzin applications. Plant response did not change with the addition of malathion compared with plants sprayed with metribuzin only, however, indicating the resistance is not metabolism-based. In 2005, seeds were collected from the same field as in 2003, and in addition, from surviving redroot pigweed plants in three more fields within a 10-mile radius of the first field. In bioassays conducted using plants grown from the four new samples, metribuzin was applied at 0, 0.5, 1, 2, and 4 lb/A, and resistance ranged from two to greater than four times the recommended field rate. [77]

ARE WOLF/ELK INTERACTIONS CHANGING ELK GRAZING PREFERENCES FOR EXOTIC GRASSES?. Peter A. Maxwell*, W.E. Dyer, S. Creel, and B.D. Maxwell. Department of Plant Science and Plant Pathology, Department of Land Resources and Environmental Sciences, and Department of Biology. Montana State University-Bozeman, MT 59717.

Determining the impact of invasive plant species in nature reserves is complicated by their potential to have subtle non-intuitive influences on food webs. In the Greater Yellowstone Ecosystem (GYE), wild elk (*Cervus elaphus*) graze in a mix of forest, shrub and grassland plant communities. Forage quality is of critical importance in the winter when the elk diet becomes dominated by a mixture of dried grasses, shrubs, and trees. Many of the GYE elk winter ranges are infested with non-native grasses. The recent reintroduction of wolves into GYE winter ranges has been accompanied by significant changes in elk migration and feeding behaviors. The purpose of this study was to determine if these stress-induced changes in feeding behavior resulted in altered elk preference for native or non-native grasses on winter range. Tissue samples were collected in the winter of 2004 from grazed bunchgrasses in georeferenced elk craters (areas where snow was cleared by the elk with their hooves). The sites were revisited in the spring of 2004 to collect reference specimens of the grass species in the area. For species identification, DNA was extracted and trnL intron sequences were PCR amplified and sequenced. DNA sequences were compared against databases using the BLAST algorithm and species identifications were confirmed with a probability $<10^{-10}$. The results indicate that elk are preferentially selecting Kentucky bluegrass (*Poa pratensis*), a non-native species, at a rate greater than would be expected under random selection. Thus, selective feeding behavior by elk may reduce the vigor and/or spread of this invasive species in the GYE. [78]

RANGE AND FOREST

CONTROL OF MEADOW KNAPWEED USING HERBICIDES AND MOWING. Timothy W. Miller*, Washington State University, Mount Vernon; and Cathy Lucero, Clallam County Noxious Weed Control Board, Port Angeles, WA.

Trials aimed at controlling meadow knapweed (*Centaurea debeauxii* Gren. & Godr.) in grass pastures were conducted at two sites in northwestern Washington during 2001 through 2005. In the herbicide screen, several herbicides and herbicide combinations were applied either when meadow knapweed was in pre-bud and again in the fall (April/May and September, respectively), or in pre-flower and fall (June and September, respectively). Clopyralid alone or mixed with 2,4-D or triclopyr, triclopyr + 2,4-D, and glyphosate (applied as Aquamaster + nonionic surfactant and Roundup Pro with and without ammonium sulfate) provided 90 to 100% meadow knapweed control in late April of the following year. Combinations of 2,4-D and dicamba gave fair control in April while control with imazapic was poor. Grass injury from glyphosate applications ranged from 87 to 100%, while injury from all other applications was similar to non-treated grass. A second set of trials tested applications of 2,4-D + dicamba with and without mowing/hand pulling for meadow knapweed control. Mowing plots in June and July (when meadow knapweed was in early bud and early flower, respectively) did not reduce weed biomass compared to non-treated plants in July of the following year. Combinations of herbicide application and mowing/hand pulling resulted in meadow knapweed biomass ranging from 6 to 31% of the non-treated checks. Grass biomass was maximized in plots mowed in June and sprayed in July. [84]

ESTIMATING WIND VELOCITIES FOR DIFFUSE KNAPWEED DISPERSAL. Dirk V. Baker* and K. George Beck, Colorado State University, Fort Collins.

An experimental wind tunnel was designed and constructed to estimate dispersal parameters for diffuse knapweed (*Centaurea diffusa* Lam.) as a tumbleweed and the effects of plant characteristics on those parameters. Four trials were conducted using plants collected from two sites in Colorado to estimate the following parameters: (1) the force at which plant stems break (stem strength), (2) the force exerted on a plant at a given wind speed (drag), (3) the wind velocity necessary to move a plant across a simulated soil surface and, (4) the wind velocity necessary to move a plant across a grass surface. Preliminary results show that stem strength was dependent on site (p=0.0256) with the plants from Site 1 requiring 7.627 kg*cm (5.72, 10.169) to break while plants from Site 2 required 12.5 kg*cm (9.153, 17.068). However, none of the plant size variables we measured explain this difference. The average drag created by a 3.3 m/s wind was 0.066 kg*cm (0.056, 0.078). This estimate allows us to relate the stem breaking strength to a wind velocity (35.68 & 45.64 m/s for Sites 1 & 2, respectively). The wind velocity necessary to move plants on a simulated soil surface was also dependent on site (p=0.0006). Plants from Site 1 required 4.21 m/s (4.05, 4.39) and 3.43 m/s (3.31, 3.56) for Site 2. Despite this statistical significance, a difference of less than 1 m/s is not likely an important one. Movement on the grass surface required 4.56 m/s (4.32, 4.6). The final results from these experiments will be used in parameterizing a spatially explicit model for diffuse knapweed dispersal. [85]

A NOVEL METHOD TO DETECT SPOTTED KNAPWEED (*CENTAUREA BIEBERSTEINII* DC.) USING SPECIALLY TRAINED CANINES. Kim Goodwin* and James Jacobs, Montana State University, Bozeman.

Detection and eradication are fundamental to preventing weed spread, but finding new invasions across large areas is challenging. Specially-trained dogs (*Canis familiaris* L.) have stronger target sensitivity and cover more area than human surveyors. Our objective was to compare the accuracies, search durations, and detection distances of trained dogs to human surveyors in locating spotted knapweed incursions. Three canines were trained to detect spotted knapweed with a combination of detection dog training techniques. Three humans were selected with strong spotted knapweed survey experience. Seven, 0.5-ha field trials were developed on separate sites in a dryland pasture in southwest Montana. Thirteen spotted knapweed targets were present as isolated plants or small patches. Mean density of targets per site was 1.9 (SD 0.69). Canines, with their handlers, and human surveyors performed open grid searches. We calculated accuracies and measured search durations. Detection distances were measured from the targets to the canines or surveyors at first detection. We used ANOVA to determine differences in these variables between canines and humans. Mean accuracy of canines (85.7%, SD 23.1) was better than humans (63.5%, 38.2 SD) (P=0.0007). Mean search duration of canines (30.2 min, SD 8.81) was faster than humans (38.1 min, SD 11.1) (P=0.011). Detection distances were highly variable for both canines (8.1 m, SD 13.2) and humans (4.1 m, SD 6.58), and were not different (P=0.157). Our results indicate detector dogs are effective for detection of spotted knapweed incursions and more accurate and faster than humans at locating incipient stages of invasions. [86]

A PATTERN OF ROOT DISTRIBUTION BY YELLOW STARTHISTLE (*CENTAUREA SOLSTITIALIS*). Steve L. Young*, Victor P. Claassen and Joseph M. DiTomaso, University of California, Davis.

Yellow starthistle is a late season non-native annual forb that is common throughout much of California. The roots of yellow starthistle begin growth in late fall and continue until late spring or early summer. The soil moisture use pattern of yellow starthistle may inhibit native perennial bunchgrasses and other deep-rooted native perennial species from establishing in mesic regions of California. Field studies were conducted near Davis, California to determine the annual rooting and soil moisture use pattern of yellow starthistle. Roots of yellow starthistle were monitored in the field using a rhizotron chamber with a viewing window covering about a two-meter square area below the soil surface. Root numbers were counted bi-weekly beginning in spring following the installation of the root chamber and the appearance of roots on the glass window and ending in mid-summer with senescence of yellow starthistle. Soil moisture was monitored with a neutron probe at 30, 60, 90, 120, 150 and 180 cm depths. The total number of roots (new and old) continued to increase from late April to early May, which coincided with rosette and bolting stages for yellow starthistle. As yellow starthistle plants went from bolting to flowering in late May to mid July, total number of roots declined from 20 roots/cm^2 to 15 roots/cm^2. Total root numbers in the 0 to 60 cm and greater than 60 cm depth declined after April and peaked in May, respectively. Soil moisture content declined at all depths from April to July. From April to May, the greatest decline in soil moisture content occurred between 60 to 150 cm, at the same time that a spike in root growth occurred. Soil moisture decline continued less dramatically at depths greater than 150 cm and after June. In this study, yellow starthistle is using a greater amount of water from deep in the soil profile during the short period between late spring and early summer when plants are bolting. The short period of high soil moisture use by yellow starthistle maybe a mechanism for quick re-generation when cut or grazed and faster use of available soil moisture compared to a slower absorbing native perennial bunchgrass. [87]

BIOLOGICAL CONTROL OF YELLOW STARTHISTLE WITH THE RUST FUNGUS PUCCINIA JACEAE. Alison Fisher* and Lincoln Smith, USDA-ARS, Albany, CA; Dale Woods, California Dept. of Food and Agriculture; and William Bruckart, USDA/ARS, Ft. Detrick, MD.

The rust fungus *Puccinia jaceae* var. *solstitialis* (*P. jaceae*) was first released as a biological control for yellow starthistle in 2003. Due to the limited number of fungal pathogens used in biological control programs, there is little information regarding optimal strategies for releases. A field experiment was initiated in 2005 to determine the optimal time of year for *P. jaceae* introductions and to determine if tents were necessary to achieve high levels of infection after plants were inoculated in the field. Permanent experimental plots were established outside the cities of Napa, Napa County and Woodland, Yolo County. Six blocks, each comprised of seven permanent plots, were installed at each site. Within each block, one plot was repeatedly inoculated every four to five weeks from January to June (January, February, April, May, June), five plots received single inoculations, (one plot for each inoculation date), and one plot was an un-inoculated control, for a total of seven plots. Half of each plot was tented overnight to determine if tents substantially increase disease incidence and/or severity. Disease incidence ranged from 10% to 80% in Woodland. Moderate to high rates of infection occurred at the Woodland field site after inoculation in January, February, May and June. In Woodland, there was a decline in infection after the April inoculation in both tented and non-tented plots. April was the only month that it did not rain within 24 hours of inoculation. Although disease incidence was generally lower in Napa compared to Woodland, ranging from 0% to 50%, plants in Napa did show symptoms of infection after each inoculation with

the highest incidence occurring in May. Severity remained relatively constant from January to July in Woodland; in Napa, severity increased during the summer months of June and July. Tenting did not have an effect on disease incidence or severity at the Woodland site. In Napa, incidence was higher in tented plots in both January and May. Tenting resulted in more severe infections in January, February and May, and less severe infections in June. In January, the temperature outside tents dropped to 0^{o}C, while inside temperatures remained above freezing. Therefore, tents may protect release plots from the detrimental effects of cold. Our results show that infection can be expected after inoculations with *P. jaceae* during most of yellow starthistle's growing season. In addition, while tenting is not necessary for infection, tents may increase the likelihood that plants develop symptoms in cool temperatures. [88]

BIOLOGICAL CONTROL OF KNAPWEEDS AND YELLOW STARTHISTLE. Lincoln Smith*, USDA-ARS, Albany, CA.

The plant genus *Centaurea* (family Asteraceae) includes many species that are important invasive alien weeds in the western U.S. These include spotted, diffuse, squarrose and meadow knapweeds and yellow starthistle. Russian knapweed (*Acroptilon repens*) is closely related and was once included in the genus. Only two species of *Centaurea* are considered to be native to N. America (*C. rothrockii* and *C. americana*); however, these are distantly related to the invasive species and have been placed in a separate genus, *Plectocephalus*. Bachelor's button (*C. cyanus*) will likely also be placed in a separate genus, *Cyanus*. The absence of other closely related native or agronomic plants in N. America makes knapweeds and yellow starthistle suitable targets for classical biological control. Despite their taxonomic similarity, the weedy species represent annual, biennial and perennial forms that are adapted to a range of biomes, including Mediterranean, steppe and coniferous temperate forest. It has been over 30 years since the first agents were introduced for some of these weeds. Now, a total of 20 insects and one pathogen have been introduced. This symposium reviews the status of various projects in 5 states and Canada, noting successes, failures and situations needing further research. [89]

STATUS OF BIOLOGICAL CONTROL OF KNAPWEEDS AND YELLOW STARTTHISTLE IN OREGON. Eric M. Coombs, Noxious Weed Control, Oregon Dept. Agric., Salem, OR Biological Control Entomologist Noxious Weed Control Oregon Dept. Agriculture 635 Capitol St. NE Salem, OR 97301.

Since 1975, 19 species of approved natural enemies of knapweeds (*Centaurea* and *Acroptilon*) have been released as biological control agents in Oregon. Diffuse, Russian, and spotted knapweeds and yellow starthistle were the original targets, however several of the biocontrol agents have become reassociated with black, brown, meadow, and squarrose knapweeds. Of the 19 species of agents, 18 are established and 14 of those are widespread. Over 2,200 releases of knapweed biocontrol agents have been made against exotic *Centaurea*. The seed weevil *Larinus minutus* has reduced stand densities of diffuse knapweed at several sites by over 90%. The seed weevil *Eustenopus villosus* has also reduced densities of yellow starthistle by over 90% at several locations. Seedhead flies are more abundant at wetter sites where there is less competition from seedhead weevils. A site near Mosier, Oregon has the only known established population of the root moth *Pterolonche inspersa* in the U.S. Efficacy of biocontrol appears to be improved by reducing grazing and increasing competition with perennial plants. [90]

STATUS OF BIOLOGICAL CONTROL OF SPOTTED KNAPWEED IN MONTANA. Jim Story*, Montana State University, Western Agricultural Research Center, Corvallis.

Spotted knapweed is a serious weed in Montana, infesting an estimated 1.6 million ha of rangeland. The plant has been the focus of considerable biological control efforts since 1974. Twelve Eurasian, host-specific insect species have been introduced into Montana for biocontrol of spotted knapweed. Seven species are having an impact on the plant in some areas of western Montana. These insects include two seed head flies, *Urophora affinis* and *U. quadrifasciata*, a seed head moth, *Metzneria paucipunctella*, two seed head weevils, *Larinus obtusus* and *L. minutus*, a root moth, *Agapeta zoegana*, and a root weevil, *Cyphocleonus achates*. The *Urophora* spp., *Larinus* spp., and *M. paucipunctella* are causing significant reductions in spotted knapweed seed production. *A. zoegana* is causing reductions in spotted knapweed biomass. *C. achates* caused a 99% and 77% decline of spotted knapweed density at two sites in western Montana. The knapweed at these two sites has been primarily replaced by weedy annual grasses and forbs, particularly downy brome. [91]

IMPACT AND INTERACTIONS BETWEEN KNAPWEED BIOLOGICAL CONTROL AGENTS IN BRITISH COLUMBIA. Rob Bourchier, Agriculture and Agrifood Canada, Lethbridge, Canada.

Spotted and diffuse knapweeds were some of the earliest targets for biocontrol in Canada with the first releases of insects in 1970. A total of 12 agents have been released in BC with nine becoming established and seven becoming locally common. Reports of successful knapweed biocontrol in BC have been on a patch scale and are primarily anecdotal. To provide a quantitative assessment of biocontrol, plant and insect populations were sampled from 2001 to 2004 at 15 spotted knapweed sites in southeastern BC. For this paper I report only on the root insects *Agapeta zoegana* (moth) and *Cyphocleonus achates* (weevil) that were released at the sites between 1996 and 1998. Between 2001 and 2004 knapweed densities declined at almost all release sites and changes in plant densities were larger than changes in insect densities. Within years, there was a significant negative correlation between the density of the weevil in May and knapweed rosette and stalk densities in August. Between the 2001 and 2002 there was a significant relationship between the change in knapweed density and weevil density in 2001. This relationship however was not consistent for subsequent years. Moth densities were correlated with weevil densities. Within-year density relationships between the moth and knapweed were weaker than for the weevil. Relationships between moth densities and between-year changes in knapweed densities were non-significant. For the time period of this study, root insects on their own were not consistently linked with observed changes in plant density. Key words: *Centaurea stobe ssp. microanthos, Centaurea diffusa, Centaurea maculosa,* spotted knapweed, diffuse knapweed, biological control, rangeland [92]

ESTABLISHMENT AND IMPACT OF BIOLOGICAL CONTROL AGENTS ON SPOTTED, DIFFUSE AND SQUARROSE KNAPWEEDS IN CALIFORNIA. Dale M. Woods, California Department of Food and Agriculture, Sacramento, CA.

Five insect species have established as biological controls on diffuse knapweed, six on spotted knapweed and four on squarrose knapweed in California. The root feeding insects *Cyphocleonus achates* and *Agapeta zoegana* have established on spotted knapweed, while *Sphenoptera jugoslavica* is established on diffuse and squarrose knapweed. Three seedhead agents, *Larinus minutus, Bangasternus fausti*, and *Urophora affinis* have established on diffuse knapweed, *L. minutus, U. affinis, Urophora quadrifasciata* and *Terellia virens* have established on spotted knapweed, and *U.*

quadrafasciata, L. minutus and *B. fausti* are on squarrose. Seed destruction studies were performed in the field over 3 to 5 years. Total seed destruction varied year to year; from 50 to 90% in diffuse, from 46 to 78% in spotted and was always over 90% in squarrose knapweed. The weevil *L. minutus* accounted for most seed destruction, with *B. fausti* nearly as important wherever it established. [93]

CHANGES IN DENSITIES OF BIOLOGICAL CONTROL AGENTS AND YELLOW STARTHISTLE AT LONG-TERM STUDY SITES IN CALIFORNIA. Michael J. Pitcairn*, Dale M. Woods, and Viola Popescu, California Department of Food and Agriculture, Sacramento.

Long-term study sites were established to follow the population buildup, combined impact, and interaction of the seed head insects introduced as biological control agents. Field sites were established in Yolo, Placer, and Sonoma Counties to represent three different climatic regions where yellow starthistle occurs in abundance. Four insects (*B. orientalis, U. sirunaseva, E. villosus,* and *L. curtus)* were released at each site in 1993 and 1994. A fifth insect, C. succinea, invaded these sites on its own between 1996-1998. Ten years after the initial releases, we have evidence that attack by these biological control agents has reduced seed production by yellow starthistle at all three sites. The weevil, *E. villosus*, has become the most abundant insect at all locations. In addition to seed destruction by larvae, adult *E. villosus* feed on and kill young developing buds. The loss of early buds produces a change in plant architecture with the damaged plant dominated by stem material. The attack rates of *E. villosus* showed a similar pattern at all three sites: an initial steady increase then a leveling off after 4-5 years. Attack rates by E. villosus over the last 3-4 years ranged from 45-65% at Placer County, 51-74% at Yolo County, and 55-82% at the Solano County site. The second most abundant insect is *C. succinea*. The other seed head insects are uncommon and rarely attack more than 10% of the seed heads annually. Yellow starthistle seed production and plant abundance have declined steadily at two of the sites. The rapid increase of *E. villosus* appears to have resulted in a steady decline in the number of flower heads and the number of seeds per head. Attack by *C. succinea* has increased slowly to 25% in 2004. Attack by this fly combined with the attack by E. villosus has resulted in a high attack rate to the annual crop of seed heads each year and it is likely the combined attack of both insects that has produced the decline in seed production at this site. These observations provide evidence that these natural enemies have reduced yellow starthistle seed production at least two of three sites. While *E. villosu*s is clearly the most important insect, the complementary attack by *C. succinea* appears to be a critical addition to the overall attack rate on yellow starthistle seed production. [94]

COMPETITIVE INTERACTIONS AND IMPACT OF BIOLOGICAL CONTROL AGENTS ON YELLOW STARTHISTLE IN IDAHO. Mark Schwarzlaender*, Rachel Winston and Mark Cole, University of Idaho, Moscow .

Yellow starthistle, *Centaurea solstitialis* L. is an exotic plant infesting more than 10,000 acres of prime wildland in the unique Hell's Canyon ecosystem of Idaho and Oregon. The efficiency of five biological control agents, *Chaetorellia australis* Hering and *Chaetorellia succinea* Hering (all Diptera: Tephritidae) and the weevils *Bangasternus orientalis* Capiomont, *Larinus curtus* Hochhut and *Eustenopus villosus* Boheman (all Coleoptera: Curculionidae) has traditionally been monitored in Idaho by measuring insect abundance and plant density, cover, and to some extent attack rates. While this data provides good indication on the population size and dynamics of the biocontrol agents, there is criticism for the lack of cause and effect studies demonstrating the impact of the biocontrol agents on the invasive plant. We conducted insect exclosure experiments on four yellow starthistle field sites in Hell's Canyon using a combination of imidacloprid and pyrethroid insecticides over the

course of the 2005 growing season. We compared different plant response variables in plots sprayed with the insecticides to control plots sprayed with an equal amount of water. Although insect exclosure was not complete (23.9% of flower heads in the exclosure plots were still attacked), it was significantly lower ($p<0.01$) than for the control plots where 50.4% of flower heads were attacked by juvenile insect stages. Flower heads attacked by biological control agents produced an average of 9.5 viable seeds; those not attacked by insects produced significantly more (34.8, $p<0.05$). We found no significant differences for plant stature, biomass, and density or number of buds produced between treatments. Our study quantified the net biocontrol effect on yellow starthistle vigor in the Hell's Canyon Ecosystem and demonstrates the importance of field exclosure experiments to assess weed biocontrol efficacy. [95]

COMMUNITY IMPACT OF SEED HEAD INSECTS ON REPRODUCTIVE SUCCESS OF SQUARROSE KNAPWEED IN UTAH. Edward W. Evans*, Trent R. Toler, Julie P. Rieder, and T.A. Scott Newbold, Utah State University, Logan.

Squarrose knapweed (Centaurea virgata ssp. squarrosa) has continued to spread in the west desert of central Utah since first reports of its establishment dating back to the 1920s, with recent estimates that it now covers in excess of twenty thousand acres. Since 1989, eight species of host-specific phytophagous insects have been introduced to central Utah as biological control agents of squarrose knapweed. Of these, two species that attack seedheads, first the fly Urophora quadrifasciata and more recently the weevil Larinus minutus, have become especially abundant and widespread throughout the area of infestation. As revealed by sweep samples for adults and by fates of individually marked knapweed flowerheads, the seasonal timing of the two seedhead feeders is offset: first and second generation flies provide important pressure on weed reproduction early and late in the season, while the weevil attacks most seedheads during mid season. Results from multiple release sites studied in 2000-2005 indicate that weevil impact on weed reproductive success has increased gradually to high levels (in excess of 70%) at northern locations, but simultaneously it has declined dramatically at southern locations. During the same period, fly impact has declined slightly at all locations. Declines in impact appear strongly linked to the drought conditions that prevailed during the study. At one site studied intensively in 2001-2005, weevils increased to huge numbers, only to plummet during 2002 when almost no knapweed flowering occurred at the site. The weevils remained all but absent from the site thereafter through 2005 despite the return of substantial flowering. The flies largely vanished from the site as well in the absence of flowering, but adults had recolonized the site in good numbers by late 2004 and fly larvae attacked a sizable percentage of flowerheads (15 %) in 2005. Flowering phenology as well as intensity differed among years at a given site; these two key features of weed reproduction also varied independently among sites across years. Drought and herbivory (especially by Mormon crickets) delayed flowering, thereby providing opportunities late in the season for flies to exploit seedheads with little interference from the competitively dominant weevil. Thus, key differences between the weevil and fly occur in life cycle timing and in ability to disperse and recolonize weed populations from which the insects had previously been locally extirpated. As a result, these two biocontrol agents complement each other well in the west desert of Utah in limiting the seed production of squarrose knapweed. [96]

PROSPECTIVE BIOLOGICAL CONTROL AGENTS FOR YELLOW STARTHISTLE. Lincoln Smith*, USDA-ARS, Albany, CA; Massimo Cristofaro, ENEA C.R. Casaccia, Rome, Italy; Margarita Yu. Dolgovskaya, Zoological Institute, St. Petersburg, Russia; Carlo Tronci, Biotechnology and Biological Control Agency, Sacrofano, Italy; Rustem Hayat, Ataturk University, Erzurum, Turkey.

Yellow starthistle (*Centaurea solstitialis*) is an important alien weed that has invaded about 20 million acres in the western U.S. Six insects that attack yellow starthistle have become established in the western U.S., but only two species are very abundant, and they attack only the seedheads. A rust pathogen (*Puccinia jaceae*) has been recently released in California, and is currently being evaluated. We have been developing additional agents that attack the young plants. Recent foreign exploration in Turkey, Greece, Italy and southern Russia resulted in discovery of a root crown weevil (*Ceratapion basicorne*), a stem-boring beetle (*Psylliodes chalcomerus*), a mite (*Aceria solstitialis*), and a lace plant bug (*Tingis grisea*). We completed host plant specificity experiments and submitted a petition to the APHIS Technical Advisory Group (TAG) requesting permission to release *C. basicorne*, whose larvae develop inside the root crown of yellow starthistle rosettes in the early spring. *Psylliodes chalcomerus* is a flea beetle that attacks the leaves and stems of the young plant. A biotype of *P. chalcomerus* from southern Russia has proven to be highly host specific, and pre-release evaluations are almost complete. Preliminary results indicate that *T. grisea* is also highly host specific. These new agents should complement the impact of the previously released agents and help provide long-term control the weed. [97]

A METHOD FOR MODELING AND PREDICTING PLANT INVASIVENESS. Erik A. Lehnhoff*, Lisa J. Rew and Bruce D. Maxwell, Montana State University, Bozeman.

Recent research in Montana has indicated that non-indigenous species (NIS) are not equally invasive in all years or in all environments. Thus, we believe that the invasiveness of a NIS should be assessed at the population level rather than the species level. Further, a simple analytical tool to measure invasiveness would help land managers prioritize treatment of NIS. In this study, the demography of six discrete populations of yellow toadflax in three separate environments was studied for five consecutive years. An invasiveness index that incorporates change in plant density and patch area was calculated for each population at each yearly time interval using stem count data and a Monte Carlo analysis. Between-year variability was displayed in five of six populations, with the invasiveness index demonstrating both invasive and non-invasive characteristics of the populations. Calculating the overall invasiveness index from the beginning of the study (2001 or 2002, depending on population) to the end (2005), four of six populations were characterized as invasive (using a conservative estimate of greater than zero being invasive). The other two populations had an overall negative invasiveness index, indicating declining populations. When invasiveness was calculated at the environment level, there were significant differences. Populations at one site displayed invasiveness, populations at one site were near equilibrium and the population at the final site was strongly in decline. These results show that quantifying invasiveness of populations is useful, and the invasiveness index can be a valuable tool for prioritizing populations of NIS for management. [129]

PLANT DIVERSITY AND INVASION OF SAGEBRUSH STEPPE. Tim Seipel*, Matt Lavin, Bruce Maxwell, Montana State University-Bozeman.

Sagebrush steppe has been broadly impacted by land development in the Western U.S. in the 19th and 20th centuries and many introduced plant species have become established in the intermountain valleys. Understanding how native plant diversity is influenced by introduced species is important for management of introduced species. Methods included inventory of the relative abundance, measured as cover of all species by species in two sagebrush steppe study sites in Montana. Linear regression was used to test for significant relationships between native and introduced cover and diversity. Introduced diversity varied with the amount of introduced propogule pressure measured as distance from human activity (trail). Plant migration and human disturbance are important predictors of introduced diversity. Minimizing migration and disturbance and understanding the tradeoffs between them is important in preventing spread of introduced plant species. [130]

EFFECTS OF HABITAT, JOURNEY AND ESCORT ON COMMON TANSY EFFICACY IN LEAD, SOUTH DAKOTA. C.L. Ramsey*, M. Sullivan, B. Helbig and N. Breiter; USDA-APHIS-PPQ-CPHST, Fort Collins, CO. 80526..

A herbicide field study was conducted in Lead, SD in July 2005 in order to screen several herbicides and adjuvants for improved control of common tansy (*Tanacetum vulgare*). Common tansy is a perennial, invasive forb that forms dense stands through spreading rhizomes. The objective of this study was to evaluate the effects of three herbicides, metsulfuron methyl, imazapic + glyphosate premix, and imazapyr (Escort, Journey, and Habitat) in combination with methylated seed oil (MSO Concentrate) and a seaweed extract + NPK foliar fertilizer (Stimupro). The application rates were Escort at 0.6 oz ai ac $^{-1}$, Journey at 7.2 fl oz ai ac $^{-1}$, Habitat at 5.74 and 9.18 fl oz ai ac $^{-1}$, MSO Concentrate at 10% (v/v), and Stimupro at 0.16% (v/v). The site was located on an open ski slope, at approximately 6,500 feet in elevation. The 18 by 40' plots were replicated in four blocks, treated in July 2005, and monitored for percent cover on a monthly basis until Sept 2005. Cover was assessed for four vegetation classes: common tansy, grasses, forbs and bare ground. The pre-treatment cover assessment ranged from 52 to 79% cover for common tansy. Although there were significant differences in baseline common tansy cover, this parameter could not be used as a covariate in the final analyses due to interactions between baseline and monthly cover results. The untreated plots averaged 75 stems yd^{-2} (82 stems m $^{-2}$) about 9 WAT. In contrast, Escort reduced common tansy density to 19 and 0.3 stems yd $^{-2}$ (23 and 0.4 stems m $^{-2}$) when applied at 0.6 oz ai ac $^{-2}$ or 0.6 oz ai ac $^{-2}$ + 10% MSO Concentrate, respectively 9 WAT. Habitat also reduced common tansy density by 36 and 10 stems yd $^{-2}$ (43 and 12 stems m $^{-2}$) when applied at 9.18 fl oz ai ac $^{-1}$ or 9.18 fl oz ai ac $^{-1}$ + 10% MSO Concentrate, respectively 9 WAT. Also, native grass cover averaged > 45% cover for all three Escort treatments, while grass cover only reached 25% in the untreated plots, 14 WAT. Habitat is labeled for riparian areas, however it had less control for common tansy and the three treatments reduced grass cover from 4 to 15%, 14 WAT. This study shows the importance of using selective herbicides that can control common tansy, while at the same time release the native grasses for restoration purposes. [131]

AMINOPYRALID EFFICACY ON CANADA THISTLE AND NATIVE PLANT SPECIES IN THEODORE ROOSEVELT NATIONAL PARK. Luke W. Samuel* and Rodney G. Lym, North Dakota State University, Fargo.

Aminopyralid is a newly introduced herbicide developed for control of invasive weeds, including Canada thistle, at much lower use rates than other auxin-type herbicides. A study was initiated to evaluate the effects of aminopyralid on both Canada thistle-infested and native rangeland plant communities in Theodore Roosevelt National Park. Native and Canada thistle-infested plots were subdivided with vegetation in half of each 9- by 6-m plot treated with aminopyralid at 120 g ae/ha in September 2004. Foliar cover of each plant species in all native and Canada thistle-infested sub-plots was determined prior to and 10 mo after treatment. Over 90 plant species were identified, including 64 forbs, 24 graminoids, and 8 shrubs. Prior to treatment, Canada thistle dominated the sub-plot cover, while western snowberry, leafy spurge, and blue lettuce averaged 12, 9, and 6%, respectively. Canada thistle cover 10 mo after aminopyralid treatment was reduced to 6% compared to 31% for the untreated control. Aminopyralid generally did not affect other plant species in Canada thistle-infested sub-plots, such as western snowberry, leafy spurge, Kentucky bluegrass, and western wheatgrass. Native sub-plot vegetation primarily was comprised of western snowberry, silver sagebrush, western wheatgrass, and needle-and-thread, which averaged about 10% cover each. Cover was unchanged following aminopyralid treatment for most native species, but growth of slender wheatgrass and saltgrass was reduced. Litter increased slightly after aminopyralid treatment in native and Canada thistle-infested sub-plots. In summary, aminopyralid decreased Canada thistle without affecting the majority of desirable species, which should allow native plants to revegetate the site. [132]

MILESTONE™ HERBICIDE FOR THE CONTROL OF RUSSIAN KNAPWEED. Vanelle F. Carrithers and Mary B. Halstvedt, Dow AgroSciences, Mulino, OR and Billings, MT; Steven A. Dewey, Utah State University, Logan; Joseph M. DiTomaso, University of California, Davis; and Stephen F. Enloe and Tom Whitson, University of Wyoming, Laramie.

Aminopyralid, the active ingredient in Milestone ™ Herbicide, is a systemic herbicide developed by Dow AgroSciences for use on rangeland, pasture, and non-cropland areas in the United States. In field research in California, Oregon, Washington, Wyoming, and Utah, aminopyralid provided excellent control of Russian knapweed (*Acroptilon repens*). Herbicide treatments were applied using a hand-held boom sprayer delivering 13 to 20 gallons of total spray volume/A. Experiments were designed as randomized complete blocks with 3 to 4 replications per treatment. Percent control was visually evaluated one, and in some cases, twoyears after treatment. Russian knapweed control was assessed at 7 sites where herbicides were applied from bud growth stage to fall senescence. Aminopyralid at 0.8 to 1 oz ae/A and picloram at 6 to 8 oz ae/A applied at bud to seed set stage provided excellent control (98%) 1 YAT. Russian knapweed control with fall-applied aminopyralid at 1 oz ae/A was excellent (94%) and the same as control with picloram at 8 oz ae/A and much better than with imazapic at 2.5 or 3 oz ae/A (19 or 21%, respectively). Aminopyralid provided consistent control, equal to or better than standards, on Russian knapweed 1 to 2 YAT at lower rates than the commercial standards. [133]

CANADA THISTLE CONTROL WITH MILESTONE(TM). Scott J. Nissen*, K. George Beck, Phil Westra Colorado State University, Ft. Collins; Rod Lym, North Dakota State University, Fargo; Robert G. Wilson, University of Nebraska, Scottsbluff; Leon Wrage, South Dakota State Universit; Stephen Enole, University of Wyoming, Laramie; Vanelle Carrithers, Robert A. Masters, and Mary Halstvedt, Dow AgroSciences.

Aminopyralid (Milestone™) is the first herbicide developed specifically for pasture, range and non-crop areas and is closely related in structure and weed spectrum to clopyralid. Like clopyralid, initial evaluations indicated that Canada thistle (*Cirsium arvense* (L.) Scop.) was susceptible to aminopyralid. Since aminopyralid is not a restricted use pesticide and has no ground water restrictions, Canada thistle management in non-crop and riparian areas may be enhanced provided suitable use patterns can be established. Replicated field experiments were conducted in the spring and fall of 2004 at 11 locations in five states for the purpose of comparing Canada thistle response to different rates and timings of aminopyralid, clopyralid, clopyralid + 2,4-D, picloram, dicamba + diflufenzopyr, dicamba + 2,4-D, and dicamba alone. Herbicide treatments were designed to compare early summer (bolting stage) and fall timings. Aminopyralid was applied at 5, 6, 7 oz product per/ac (1.25, 1.5 and 1.75 oz ae/ac) and other herbicides were applied at generally accepted rates which sometimes varied among locations. Canada thistle control was evaluated 12 MAT for both timings and in several locations control was based on percent reduction in above ground biomass. In general, there was very little rate or timing response with aminopyralid when comparing Canada thistle control across locations. Canada thistle control with aminopyralid was comparable to clopyralid and picloram and significantly better than dicamba + diflufenzopyr, dicamba + 2,4-D, and dicamba alone. Although not quantified in these studies, the absence of perennial grass competition appeared to result in reduced aminopyralid performance in at least one location. The importance of grass competition for long-term Canada thistle management with aminopyralid needs further investigation. These results demonstrate that aminopyralid will provide many new opportunities for Canada thistle management especially in riparian environments. [134]

INTEGRATED MANAGEMENT OF INVASIVE MEADOW HAWKWEED WITH HERBICIDES, FERTILIZER AND COMPETITION. Linda Wilson* and Timothy Prather, University of Idaho, Moscow.

Abstract not submitted. [135]

INTEGRATING HERBICIDES AND SHEEP GRAZING TO MANAGE DALMATIAN TOADFLAX. James Jacobs, Montana State University* Brent Roeder, Montana State University Rodney Kott, Montana State University.

Dalmatian toadflax is a rhizomatous perennial forb native to the Mediterranean region and invasive in western North America. A fundamental objective of integrated pest management is to maintain pest populations below an economic or ecological threshold using biological or cultural methods in order to reduce pesticide applications and their potential harmful effects on the environment. Our objectives were to determine the effects of applying metsulfuron and picloram alone and in combination, and sheep grazing alone and in combination with herbicides on Dalmatian toadflax density and the on the biomass of all plant species in the community. The experimental design was a complete factorial, with metsulfuron, picloram, and sheep herbivory as the three factors, applied in a randomized split-plot design with four replications at each of two sites. The whole-plots were herbicide treatments and sub-plots were grazing treatments. On two bluebunch wheatgrass sites in

western Montana, metsulfuron (0.063 kg ai/ha) and picloram (0.56 kg ae/ha) were applied on 4 May 2004 using a backpack plot sprayer calibrated to deliver 5 gallons spray solution per acre. Sheep grazed in July 2004 and 2005. At site 1, sheep grazed fenced plots, and at site 2, a band of sheep grazed over the site. The density of Dalmatian toadflax was sampled from 10 randomly placed 0.2 by 0.5 m frames in each treatment plot in July of 2004 and 2005. Biomass by species was clipped from one randomly placed 1 by 1 m sample plot in each treatment after grazing in 2005. Treatment effects on the average density of Dalmatian toadflax and the biomass of Dalmatian toadflax, grass, and forbs other than Dalmatian toadflax were tested using a split-plot analysis of variance. Means were compared when F-tests resulted in $p<0.05$. Picloram reduced Dalmatian toadflax density similarly at both sites from about 30 plants/m^2 to about 6 plant/m^2 one year after treatment. Metsulfuron only reduced Dalmatian toadflax density at site 2 from 15 plants to 12 plants/m^2. Sheep grazing only affected Dalmatian toadflax density at site 1 where its effect depended upon the picloram treatment. Where no picloram was sprayed, sheep grazing increased Dalmatian toadflax density from 22 to 30 plant/m^2, and where picloram was sprayed, sheep grazing decreased Dalmatian toadflax density from 16 to 14 plants/m^2. Dalmatian toadflax biomass was reduced by picloram (25 to 4 g/m^2) and by sheep grazing (27 to 3 g/m^2) at site 1 in 2005. At site 2, Dalmatian toadflax biomass was reduced from 45 g/m^2 in the check plots to 6g/m^2 where sheep grazed, 8 g/m^2 where picloram was sprayed, and 0.3 g/m^2 where sheep grazed and picloram were combined. However, picloram also reduced the biomass of forbs other than Dalmatian toadflax at both sites, and sheep grazing reduced other forb biomass at site 1 but not site 2. Grass biomass increased where picloram was applied and decreased where sheep grazed, but sheep grazing only reduced grass biomass by 50% at site 1 and 30% at site 2. Results suggest that picloram, and in some cases metsulfuron, reduces Dalmatian toadflax density but control is not improved by their mixture. Intensive sheep grazing reduces Dalmatian toadflax, and grazing Dalmatian toadflax by sheep after picloram application may provide more control than either applied alone. [136]

SEASONAL CHANGES IN CARBOHYDRATES IN THE ROOT OF CANADA THISTLE AND DISRUPTION OF THESE CHANGES BY HERBICIDES. Robert G. Wilson, Professor, University of Nebraska, 4502 Avenue I, Scottsbluff.

Roots of Canada thistle were excavated from the soil monthly from 1999 to 2001 near Scottsbluff, NE, to quantify the influence of changing soil temperature on free sugars and fructans in roots. Sucrose concentrations were low from May through August then increased in the fall and remained at high levels during winter and then declined in April as plants initiated spring growth. Changes in sucrose, 1-kestose (DP 3), and 1-nystose (DP 4) were shown to be closely associated with changes in soil temperature. During the second year of the study average soil temperatures during the winter were colder than the first year and resulted in an increase of sucrose in Canada thistle roots. Experiments were conducted from 2001 to 2004 to determine if there was a correlation between herbicide efficacy, time of herbicide application and the resulting herbicide effect on root carbohydrate and Canada thistle control. Clopyralid applied in the fall reduced Canada thistle density 92% 8 months after treatment (MAT) while treatment made in the spring reduced plant density 33% 11 MAT. Fall application of clopyralid increased the activity of fructan 1-exohydrolase (1-FEH) in roots and was associated with a decline in sucrose, DP 4 and 1-fructofuranosyl-nystose (DP 5) 35 days after treatment (DAT). Spring application of clopyralid also resulted in a decrease of the same carbohydrates 35 DAT, but by 98 DAT, or early October, sucrose level in roots had recovered and was similar to nontreated plants. Fall application of 2,4-D or clopyralid reduced Canada thistle density 39 and 92% respectively, 8 MAT, but only clopyralid resulted in a reduction of sucrose, DP 4, DP 5, total sugar, and increase of 1-FEH compared to nontreated plants. [141]

CONTROL STRATEGIES FOR PERENNIAL PEPPERWEED. Rob Wilson*, University of California Cooperative Extension, Susanville; Joseph DiTomaso, and Debra Boelk, University of California, Davis.

Perennial pepperweed is invasive throughout the Western United States. It thrives in a wide range of environments and is a common weed in floodplains, pastures, wetlands, and roadsides. In disturbed areas, perennial pepperweed rapidly forms monoculture stands that displace favorable vegetation. This experiment examined management strategies that control perennial pepperweed and re-establish desirable vegetation. The experiment was started at two sites in Lassen County California in fall 2002. Study sites were heavily infested with perennial pepperweed and lacked competing vegetation. The experiment was a split-split plot with four replications. Whole-plot treatments evaluated the usefulness of winter burning, mowing, grazing, or fall disking for removing accumulated thatch to facilitate herbicide application and re-seeding. Sub-plot treatments examined chlorsulfuron, 2,4-D ester, or glyphosate efficacy applied at the flower-bud stage. Sub-sub-plot treatments evaluated the influence of no-till seeding native perennial grasses for preventing weed re-invasion. All herbicides reduced perennial pepperweed cover compared to the control, but some herbicide + whole-plot combinations provided better control than others. Averaged across sites, chlorsulfuron or 2,4-D applied alone, chlorsulfuron or 2,4-D in combination with burning, mowing, or grazing, and glyphosate in combination with mowing provided the best control of perennial pepperweed. Disking before herbicide application decreased perennial pepperweed control compared to using herbicides alone. Winter burning in combination with yearly 2,4-D applications gave the best blend of perennial pepperweed control and native grass establishment. Chlorsulfuron caused chlorosis and stunting to western wheatgrass, basin wildrye, and beardless wildrye seedlings when applied the spring before seeding, but in other trials, chlorsulfuron was safe on these native grasses when applied after the 4 leaf stage. No treatment combination offered 100% control after two years of management suggesting multiple follow-up herbicide applications are needed for long-term weed suppression and vegetation restoration. [142]

INVASIVE FORAGE GRASSES IN THE SOUTHWEST. John H. Brock, Arizona State University Polytechnic, Mesa, AZ.

Buffelgrass (*Pennisetum ciliare*) was first introduced to Texas in 1917 but did not survive. It was introduced again in the 1940's near San Antonio, Texas. Lehmann lovegrass (*Eragrostis lehmanniana*) was introduced to Arizona in 1932 and the first field plantings were in southern Arizona in 1937 and 1939. Both species are of African origin and have spread by human plantings. Lehmann lovegrass was planted for forage and soil conservation purposes and buffelgrass was planted for its forage quality. Lehmann lovegrass and to a lesser extent buffelgrass have been planted along many transportation corridors in the warm and arid areas of the United States and Mexico. Both grasses establish readily from seed, compete directly with many native plants forming near monocultures which lowers biodiversity of the desert ecosystem. Both species are fire tolerant and have a fire-species recruitment feed back that promotes their spread. Little research has been completed to provide workable prescriptions for the control of these alien invasive grasses, and in a similar fashion, little research exists on restoration practices to change the trajectory of plant succession on invaded sites. An integrated approach is needed for vegetation management of Lehmann lovegrass and buffelgrass to recover invaded sites and restore components of the natural vegetation. [143]

THE WITHIN-SITE AND REGIONAL IMPACTS OF LEAFY SPURGE: HIERARCHICAL BAYESIAN METHODS ESTIMATE INVASIVE WEED IMPACTS AT PERTINENT SPATIAL SCALES. Matthew J. Rinella*, USDA-ARS, Miles City, MT; and Edward C. Luschei, University of Wisconsin, Madison.

Without information on the severity of invasive weed impacts, natural resource managers cannot compare costs and benefits of weed management actions. The spatial scale of interest to weed managers ranges from very local (e.g. ranchers, park managers) to regional (e.g. policy makers). Our goal was to estimate local and regional impacts of leafy spurge (*Euphorbia esula* L.) on associated species biomass production (and related variables). Our basic approach was to use an empirical model that characterizes weed densities across landscapes in combination with another empirical model that predicts weed impact from weed density. In developing these models, we gave substantial formal attention to parameter uncertainty and sampling error. Our investigation revealed that, without local plant density data, estimates of site-specific leafy spurge impacts are highly imprecise. Supplementing our general predictive model with small quantities of on-site data increased precision considerably. For the 17-state region we considered, 95% Bayesian credibility intervals indicate leafy spurge reduces cattle carrying capacity by 50 to 217 thousand animals, and reduces grazing land value by 8 to 34 million dollars a year. The precision of these estimates would improve substantially if plant density data were collected from randomly selected sites that are occupied by leafy spurge. [144]

NEW RUST PATHOGEN OF WEEDY BLACKBERRY DISCOVERED IN NORTH AMERICA. Amy Peters*, Oregon State University Extension Service, Myrtle Point; Ken French, Tim Butler, Dennis Isaacson, Nancy Osterbauer, Oregon Department of Agriculture, Salem; Norman Harris, University of Alaska, Fairbanks.

Himalaya blackberry, an introduced invasive plant species and noxious weed, dominates millions of acres of riparian, wetland, open forest, and pastures in the Pacific Northwest. Recently, a rust pathogen, Phragmidium violaceum, was accidentally introduced in Oregon, the first official report in North America. This plant disease is commonly found in the Middle East, Africa, and Europe where Himalaya blackberry originated. This rust pathogen is currently used as a biological control agent in Chile, Australia, and New Zealand. In southwestern Oregon, ranchers first noticed and reported dieback of wild Himalaya blackberry in early 2004. Oregon Department of Agriculture, Oregon State University, and United States Department of Agriculture researchers observed rust-like symptoms on affected plants. Purple spots were observed on upper leaf surfaces, while undersides had corresponding yellow pustules. Black, sticky teliospore pustules occurred on the underside of overwintering leaves. Cane dieback was observed where Himalaya blackberry plants were reduced to grayish stems with very few leaves. Studies are currently investigating the distribution and movement using remote sensing and ground observations. Results will be used to develop control strategies for wild weedy blackberry. Test plots containing commercial berry cultivars were established to determine if the disease is a threat to the commercial berry industry. Management strategies for protection of commercial production are being researched. Implications to non-target native, commercial, and wild blackberry populations could be significant. This research will help in determining the potential benefit of this rust as a Himalaya blackberry control agent in the US. [145]

MONTANA WEED PREVENTION AREAS: A COORDINATED APPROACH SAFE-GUARDING PRIORITIZED RANGELANDS FROM WEED SPREAD. Kim Goodwin*, Montana State University, Bozeman; and Roger Sheley, USDA - ARS, Burns, Oregon.

Invasive weeds continue to spread into natural communities in spite of management efforts. Most of our rangelands and natural areas remain weed-free. A shift in emphasis from control to prevention may protect these remaining areas. A fundamental issue in weed management is the appropriate balance between prevention and control. Prevention aims to protect non-infested areas through exclusion, detection, and eradication. Control aims to contain or suppress established infestations, often with ongoing economic and ecosystem costs. The optimal level of prevention and control is species-specific and depends on the relative weed abundance in the area, difficulty of control, significance of threat, and impacts to natural areas and rangelands. The optimal level of management is also site-specific and considers specific habitats or geographic areas that deserve protection from invasion by widespread weeds. For instance, the rangelands of eastern Montana are comprised of mixed-grass prairie and shrub steppe habitats that are still relatively weed-free. Land managers in eastern Montana are concerned spotted knapweed could continue to invade the region because it has already formed expansive infestations in the western part of the state. Climate and physiographic parameters suggest spotted knapweed could thrive in eastern Montana. Local-level weed prevention areas (WPAs) aim to prioritize prevention in eastern Montana. These special management areas are defined as cooperative weed management areas with a prevention focus. Weed prevention areas currently seek to protect over 1.8 million ha in the region. These cooperative prevention programs are designed and led by county weed leadership and private landowners that recognize it is only a matter of time before new weeds appear on rangelands they manage. Instead of waiting for weeds to invade and then reacting to them, landowners are taking a proactive role in preventing their invasion and establishment. Stakeholders collectively implement rancher-designed, WPA-specific, integrated plans to reduce the likelihood of invasion and increase the chances of eradication success. These site-specific plans include mapping strategies, ecosystem management, and prevention and early intervention strategies. Early detection is improved with seasonal weed scouts; investigations are underway to augment their efforts with invasive weed detector dogs. Measuring prevention is challenging because it is difficult to quantify an invasion event that did not occur. Alternative criteria are used to evaluate WPA success. Collective implementation of critical prevention strategies is evaluated to indicate local-level program efficacy. Prevention is weaker if proven strategies are not implemented and stronger when multiple proven strategies are used. This project is evaluated over the long-term through initial GPS inventories to confirm weed-free status for baseline comparison as WPAs progress over time. The protection of non-infested ecosystems from weed spread through WPA development seeks to preserve native plant resources and prevent environmental damage. [146]

MANAGING INVASIVES ON LIMITED RESOURCES: THE NATIONAL PARK EXPERIENCE. Rita Beard, National Park Service, Ft. Collins, CO..

Abstract not submitted. [147]

PREDICTING OCCURRENCE, PRIORITIZING MONITORING AND IMPROVING MANAGEMENT EFFICIENCY. Lisa J. Rew* and Bruce D. Maxwell, Montana State University, Bozeman..

The first step in any land management project has to be defining the goals of the area, in terms of grazing, recreation, wilderness etc. and these goals help to formulate the non-indigenous plant species (NIS) management objectives. While the goals and objectives will vary for different land management areas, a general aim of NIS management should be to prioritize populations for management: placing the focus of management on populations rather than species. The first step is inventory/survey to determine which NIS are present and in which habitats/environments they have become established. However, management areas are generally too large to sample entirely and so to help with the prioritization of NIS management we suggest collecting data in such a way that predictive NIS maps can be generated for the areas not sampled. The probability of occurrence maps can be used to direct future sampling for new populations; they can also be used to select populations for monitoring for invasiveness and impact. Impact of the NIS on the ecosystem, and also impact of the management practices on the NIS and non-target species. All of this information and data can be utilized to prioritize populations and environments where the NIS are most invasive and having most impact. Identified populations should then be targeted for management. Utilizing this approach for NIS management will improve management effectiveness and efficiency. [148]

DEFINING, CONDUCTING, AND USING RESEARCH TO IMPLEMENT SCIENCE-BASED WEED MANAGEMENT. Catherine G. Parks*, USDA Forest Service, Pacific Northwest Research Station, La Grande, OR and Steven R. Radosevich and Bryan A. Endress Department of Forest Science, Oregon State University, Corvallis .

Conducting scientifically rigorous research is fundamental to management of non-native invasive plant species. Research can develop new information about how to close and mange invasion pathways, how the invasive processes works, how to assess the risk of a new plant species becoming invasive, and the benefits vs. the costs of various preventive activities. Research can contribute information on best practices to minimize plant invasions in land management activities such as road maintenance, recreation, and range and forest management. Research at multiple scales is needed to comprehensively examine invasive plant problems but it is difficult to define and implement, especially at the landscape level. Understanding the basic biology and demography of non-native invasive plants is also critical to the development of effective management techniques. A research program that integrates experiments and informs managers and researchers working together within an adaptive management philosophy is an effective way to implement such a research effort. We present a framework for research on non-native invasive plants using our ongoing research program as an example. This program is focused on the invasive plant sulfur cinquefoil (*Potentilla recta*) in the interior Pacific Northwest. Methods for detection, landscape risk and range expansion assessments, habitat- and species-level experiments, and containment and restoration studies in affected areas are generally described. [149]

PREVENTING THE SPREAD OF MULTIPLE HERBACEOUS INVADERS ACROSS RANGELAND. David Finnoff*, John Tschirhart, University of Wyoming, Laramie, WY, and Aaron Strong, G8 Legacy Chair in Wildlife Ecology, University of Calgary.

We consider range management in the face of multiple invasions: a weed invasion and a leafy spurge invasion. Our focus is not only on how management decisions result in changes in ecosystem composition but on how management decisions perturb the speed of the adjustment process. A dynamically optimized general equilibrium ecosystem model of resource competition in a plant community is used to illustrate the consequences of herbivore predation pressure, plant species competition, the importance of limiting resources and the importance of institutional property rights regimes. The results demonstrate that grazing rates above certain levels can create ecosystem niches that would not have occurred at lower grazing rates. These niches allow invaders to gain a foothold and compete with the otherwise dominant native perennials. Optimizing producers take into account the competition between cattle for forage and changing plant community composition over the planning horizon. As more cattle are stocked, each head impacts all the others through depleting the resource stock which causes the energy cost to forage to increase. In addition, as more cattle are stocked, the composition of the plant community is affected and redundant species may find a niche where none existed before. Further, given limited planning horizons, effects from changes in the plant community composition extend outside of the planning horizon and cause an inter-temporal externality not previously discussed in the literature. This inter-temporal externality is exacerbated the shorter the lease length through the inability of the producer to capitalize on ecosystem investment. [150]

ECONOMIC ASPECTS OF PREVENTION VERSUS CONTROL OF NONNATIVE WEEDS UNDER UNCERTAINTY. Lars J. Olson*, University of Maryland, College Park.

An economic framework for evaluating the tradeoffs between prevention and control of nonnative weeds under uncertainty is developed. Weed damages are determined by the invasion size that results after prevention and control are chosen and that this is influenced by a random environmental disturbance to the rate of introductions or the rate of spread. The goal of the manager is to allocate resources to minimize the expected social costs from prevention, control, and weed damages. Optimal prevention and control policies for invasive weeds are characterized in terms of economic and biological characteristics, including the size of the invasion, the rate of spread, the rate of introductions, and the probability distribution that determines the amount of damages that result given the initial invasion size, and the amount of prevention and control. The optimal combination of control inputs balances the marginal cost of control against the expected marginal damages associated with growth in weed biomass that remains after control. Similarly, optimal prevention balances the marginal costs of prevention against expected marginal damages weighted by the scale of introductions that are prevented. As the size of the weed invasion increases, the optimal amount of control increases, but the amount of prevention and invasion size after control may increase or decrease depending on how sensitive marginal control costs are to the invasion size. When marginal control costs are more sensitive to the invasion size than they are to control, periodic control is optimal. As the rate of spread increases, there is a greater incentive to use more control and more prevention, since the expected marginal damages prevented are higher. The response of prevention and control to shifts in the distribution of the random state of nature is also examined. The response is shown to depend on the elasticity of marginal damages, which can be interpreted in terms of relative and absolute aversion to risk. The economic and biological conditions under which the optimal policy involves only control, only prevention, or a combination of both are characterized in

terms of the biological parameters and the marginal costs of control, marginal costs of prevention, and expected marginal damages. The implications of these results for the management of invasive weeds under uncertainty is discussed. [151]

HORTICULTURAL CROPS

FURTHER INVESTIGATIONS INTO THE UTILITY OF MESOTRIONE IN MINOR CROPS. Christopher G. Clemens*, Venance H. Lengkeek and Michael D. Johnson, Research and Development Scientists and Technical Brand Manager, Syngenta Crop Protection, Greensboro, NC 27419.

Field studies were initiated in 2004 to evaluate mesotrione potential for use in selected minor crops. Crops identified from those studies were: asparagus, blueberry, cranberry, lingonberry, raspberry, flax, grasses grown for seed, millets, mints, okra, sorghum, and sugarcane. The purpose of 2005 trials was to further evaluate the level of crop tolerance to mesotrione under field conditions to these selected crops; and to establish mesotrione use rates, timings, and application methods. The rates and application methods tested varied by individual crop. Data from 2005 confirm the potential for mesotrione labelling on asparagus, the small fruit group (blueberry, lingonberry), cranberry, flax, grasses grown for seed (fine and tall fescue, Kentucky bluegrass, perennial ryegrass, ryegrass, orchard grass, and canary grass), millets (proso and pearle), mints (spearmint and peppermint), okra, sorghum and sugarcane. [98]

WEED CONTROL IN ONIONS PRIOR TO THE SECOND TRUE LEAF. Grant J. Poole*, University of California, Lancaster; Jesse M. Richardson, Dow AgroSciences, Hesperia.

Weed control in onions has traditionally involved the use of oxyfluorfen and bromoxynil applied at the second true leaf. However, by this stage of onion growth weeds are typically large and high rates of these herbicides are needed for effective control. This can result in excessive onion leaf wounds which can lead to bacterial disease problems later in the season. Several soil residual pre-emergent herbicides are available that could potentially be applied prior to the second true onion leaf that would result in minimal onion injury and good weed control. Also GoalTender (41% a.i., oxyfluorfen), a water-based formulation of the traditional Goal 2XL (23% a.i., oxyfluorfen) has the potential to be applied prior to the second true leaf and result in better weed control with less onion injury. Pendimethalin, dimethenamid, oxyfluorfen, and bromoxynil were applied independently and in tank mixes at various onion growth stages prior to the second true leaf. Results proved that 0.6 lbs a.i. of pendimethalin provided the least onion injury of all the treatments in this trial. The next best treatment was the application of oxyfluorfen at 0.12 to 0.19 lbs a.i. per acre applied at the first true onion leaf. [99]

PERFORMANCE OF A NEW OXYFLUORFEN FORMULATION ON EARLY-STAGE ONIONS IN FIVE WESTERN STATES. Jesse M. Richardson, James P. Mueller, Harvey H. Yoshida, Roger E. Gast and Rodrick A. Dorich, Dow AgroSciences LLC, Indianapolis, IN.

Early-season weed competition is a significant problem in onions. The crop competes poorly with weeds commonly found in onion production and few herbicides are registered for weed control. Oxyfluorfen is registered for postemergence weed control in onions, but current labels do not permit application before onions reach the second true leaf stage. A new water-based suspension concentrate of oxyfluorfen was recently evaluated for weed control and crop safety at the first and second true

leaf stages of onions. Studies were established in Oregon, California (high-desert, coastal, central valley), Arizona, New Mexico and Texas. Several rates of the new formulation were compared to the currently registered EC formulation. The water-based formulation provided acceptable crop safety at rates up to 0.188 lb a.i./acre at the first true leaf stage at all locations, but the EC formulation tended to cause more onion damage at this early stage. Effective weed control was achieved at the 0.125 to 0.188 lb a.i./acre rates with both formulations at the early stage. At the second true leaf stage where weeds were more advanced, the same level of crop safety was also achieved, but the new formulation tended to provide less effective postemergence weed control than the EC formulation. Where surfactants were added, weed control with the water-based formulation improved, but crop safety was often reduced. [100]

VOLUNTEER POTATO CONTROL IN SWEET CORN WITH ATRAZINE AND MESOTRIONE COMBINATIONS. Rick A. Boydston* and Dallas Spellman, USDA-ARS, Prosser, WA.

Mesotrione applied postemergence (POST) to volunteer potato, reduces new tuber production more than other POST applied herbicides. Increased control of some broadleaf weeds has been reported with atrazine and mesotrione combinations versus either herbicide applied alone. Studies were conducted in 2004 and 2005 to evaluate volunteer potato control and new tuber production in sweet corn with atrazine and mesotrione combinations applied POST. Atrazine at 0, 0.28, 0.56, and 1.1 kg ai/ha and mesotrione at 0, 0.035, 0.07, and 0.1 kg/ha were applied in all possible combinations in a factorial arrangement of treatments when volunteer potato ranged from 5 to 12 cm tall. Atrazine applied POST provided fair to good control of volunteer potatoes and control increased as rate increased from 0.28 to 1.1 kg/ha. Mesotrione applied POST provided excellent control of volunteer potato at all rates tested. Potatoes treated with atrazine alone at 0.28 or 0.56 kg/ha averaged 3.3 and 1.9 tubers per plant, respectively, which could lead to volunteer potato problems in the next crop. Mesotrione applied alone at all rates, atrazine at 1.1 kg/ha, or mesotrione plus atrazine combinations reduced the number of new tubers produced to≤ 1.1 per plant compared to 11 tubers per plant in nontreated checks. Sweet corn yield was not affected by herbicide treatment in 2004. In 2005, sweet corn yield was equal to hand weeded checks with all herbicide treatments except where atrazine was used alone at 0.28 or 0.56 kg/ha. [101]

POTATO CROP RESPONSE TO PREEMERGENCE-APPLIED SULFENTRAZONE FOLLOWED BY SIMULATED RAINFALL ONE WEEK AFTER APPLICATION. Pamela J.S. Hutchinson*, Daniel M. Hancock, and Oleg V. Alexandrov, University of Idaho, Aberdeen Research and Extension Center, Aberdeen, ID .

Sulfentrazone was labeled for use in potatoes in 2004. Unusual rainfall events with as much as two inches occurred shortly after sulfentrazone preemergence (PRE) application in some Idaho fields, and severe potato injury was often observed in those fields after emergence. Two trials were conducted in 2005 at the Aberdeen Research and Extension Center with sulfentrazone applied PRE to Russet Burbank potatoes at 0, 0.047, 0.07, 0.094, 0.14, 0.21 lb ai/A (0.094 was the lowest 2004 label rate) in a replicated split-plot design. Applications were made in the first trial shortly after planting, and in the second, just prior to emergence. Treatments were sprinkler-incorporated immediately after application. Sub-plots received 1 inch of simulated rainfall via sprinkler irrigation 1 wk after treatment (WAT). Greater injury occurred when rainfall was received 1 WAT, compared with injury in the same sulfentrazone treatments receiving no rainfall. Damage observed on potatoes when sulfentrazone was PRE-applied immediately after planting was mainly stunting. In addition to

stunting, potatoes exhibited leaf burn or deformed leaves when sulfentrazone was PRE-applied just prior to potato emergence. Sulfentrazone PRE-applied immediately after planting with rainfall 1 WAT always resulted in greater injury throughout the growing season than treatments receiving no simulated rainfall. In contrast, sulfentrazone PRE-applied just prior to emergence with rainfall 1 WAT initially caused greater injury compared with sulfentrazone receiving no rainfall, while injury levels in the two treatment sets were more similar later in the growing season. Tuber quality and yields reflected injury levels observed during the season. [102]

EFFICACY OF POSTEMERGENCE AND PREEMERGENCE HERBICIDES IN ARIZONA PECANS. Ryan J. Rector* and William B. McCloskey, University of Arizona, Tucson.

Herbicide efficacy and non-bearing, pecan tree tolerance were evaluated in postemergence (POST) and preemergence (PRE) experiments conducted in 2004 and 2005 near Redrock, AZ. All treatments were applied with a CO2 pressurized, backpack sprayer using a 6 nozzle, 3.0 m boom. Plot sizes were 6.1 by 9.1 m in 2004 and 6.1 by 18.3 m in 2005. In the 2004 POST study, carfentrazone, paraquat, glyphosate and a tank mix of glyphosate plus carfentrazone were applied. Carfentrazone applied alone at 33 or 168 g ai/ha gave better control of little mallow (93% - 33 and 88% - 168 g ai/ha), common purslane (85% and 85%), and spurred anoda (90% and 88%) compared to paraquat at 348 g ai/ha (57% - MALPA, 68% - POROL, and 31% - ANVCR) and was similar to glyphosate at 841 g ae/ha (91%, 85%, and 85%). The best control of these weeds (99%, 97%, and 96%) was achieved with a tank mix of carfentrazone (168 g ai/ha) and paraquat (348 g ai/ha). All three herbicides provided good to excellent control of Wright groundcherry and Palmer amaranth. In the 2004 PRE study, flumioxazin, pendamethalin, and a tank mix of the two herbicides were applied PRE and followed by POST applications of carfentrazone (34 or 70 g ai/ha), glyphosate (841 g ae/ha), flumioxazin (70 g ai/ha), and tank mixtures of flumioxazin (70 g ai/ha) plus glyphosate (841 g ae/ha) or carfentrazone (34 to 70 g ai/ha) plus glyphosate (841 g ae/ha). Pendamethalin (2130 g ai/ha) tank mixed with flumioxazin (420, 631, or 840 g ai/ha) provided good residual weed control throughout the experiment (March to December). Control of common purslane and spurred anoda was better with the use of a PRE (90% versus 70%). The highest weed density in the sprayed plots occurred in the treatment that received only POST applications of glyphosate at 841 g ae/ha (10 plants/plot). In the 2005 PRE study, various rates of flumioxazin (213 or 426 g ai/ha), oxyflurofen (1401 or 2242 g ai/ha), pendamethalin (2130 or 4259 g ai/ha), and tank mixes of oxyflurofen (1401 or 2242 g ai/ha) plus pendamethalin (2130 g ai/ha), oxyflurofen (1401 g ai/ha) plus flumioxazin (213 g ai/ha), or pendamethalin (2130 g ai/ha) plus flumioxazin (213 or 426 g ai/ha) were applied PRE and followed by POST applications of glyphosate (1261 g ae/ha). Weed density and phytotoxicity were determined prior to each POST application. All treatments controlled junglerice, spurred anoda, Wright groundcherry, and common purslane greater than 80% early in the experiment (April to August). Four months after the PRE herbicides were applied, weed control was adequate in the treatments that received a tank mix of pendamethalin with either flumioxazin or oxyflurofen while the treatment that received pendamethalin alone required a POST application of glyphosate to control Wright groundcherry and spurred anoda. A synergistic effect was seen when oxyflurofen (1401 g ai/ha) was tank mixed with flumioxazin (213 g ai/ha). The lowest weed density (40 plants/plot) occurred with a tank mix of flumioxazin (426 g ai/ha) and pendamethalin (2130 g ai/ha) compared to the treatment that did not receive a PRE herbicide (434 plants/plot). In the 2005 POST study, pendamethalin (532 g ai/ha) was applied across all plots at the beginning of the experiment to obtain short-term suppression of grasses because flumioxazin and oxyflurofen don't adequately control these weeds. Oxyflurofen was applied POST after February 15 (the cutoff date in the Goal 2XL label) to evaluate pecan tree damage and weed control. Throughout the experiment, no pecan injury

was noted from oxyflurofen applications (four POST applications at 560 g ai/ha each) indicating that non-bearing, pecan trees exhibit tolerance to this herbicide, rate, and when foliage is present. The weed control obtained from all herbicides in this experiment was similar to that in the 2004 PRE experiment. [103]

CONTROL OF WILD PROSO MILLET IN SWEET CORN: COMPARING TOPRAMEZONE EFFICACY AND CROP TOLERANCE WITH OTHER HERBICIDES AND INTEGRATED STRATEGIES. R. Edward Peachey* and Carol Mallory-Smith, Oregon State University, Corvallis.

Wild proso millet (WPM) continues to spread in the PNW and cause yield losses in sweet corn and other crops. Herbicides registered for control of WPM in sweet corn are marginally effective, expensive, and can injure corn. The objectives of this study were to evaluate alternative herbicide strategies, including use of the recently registered herbicide topramezone, for efficacy and crop tolerance, and to determine the potential of managing WPM seed banks by regulating seed placement in the fall after seed dispersal. Sweet corn tolerance to topramezone was assessed at 4 sites over 3 years with 3 varieties. Sweet corn was extremely tolerant to topramezone at rates as high as 0.64 lbs ai/A. Control of red millet, WPM, and many summer annual broadleaves was good at rates above 0.22 lbs ai/A. However, at the current labeled rate of 0.16 lb/A topramezone, WPM is suppressed but not controlled. Concerns of carryover may limit increases in the labeled rate. The effect of fall tillage system and cover crop on survival of WPM seed was evaluated in a vegetable row crop system. Millet seeds were broadcast on the surface of the soil after corn harvest and tillage/cover crop treatments applied in October. Snap beans were direct-seeded or conventionally planted the following spring. WPM seeds also were buried in seed packets at 0, 5 and 15 cm and seed mortality and dormancy evaluated in May 2005. Seed predation potential was evaluated in October 2004 and May 2005 by placing 3 seed stations in each plot with exclusion fences to regulate predator access. Seed removal by invertebrates averaged greater than 80% during two 7-day evaluations in the fall and spring. Seed removal was greatest in plots that were undisturbed in the fall by tillage or drilling of cover crops. WPM emergence in the bean crop in the spring of 2005 was significantly greater in plots that were direct-drilled in the fall; conventional tillage in the fall before cover crop planting caused the least number of WPM recruits in the bean crop. Cover crop and spring tillage factors had no effect on WPM density. Seed mortality was greater at 5 cm than at 0 and 15 cm because 18% of the seeds germinated at 5 cm before snap beans were planted. [104]

PESTICIDE CLEARANCES FOR SPECIALITY CROPS IN THE U.S. AND EU - AN OVERVIEW.. Dudley Smith*, Texas A&M University, College Station, TX; and Sandra McDonald, Colorado State University, Fort Collins, CO.

Horticultural and other speciality crops present unique challenges in pest management since these crops are inherently unattractive to registrants in seeking labels due to small market potentials, geographic diversity, and the economic risks. While major grain and other agronomic crops are relatively few in number these crops are financially and biologically attractive for commercial pesticide development. In contrast, speciality crops provide 43% or more of the crop revenue in the U.S. and as much as 100% of the crop sales in some states. Horticultural and other speciality crops are essential for dietary fiber, human health, and the economy but lag in pesticide development. This paper summarizes some key factors in obtaining pesticide MRLs (Maximum Residue Levels) for speciality crops in the U.S., compared to the limited number of MRLs for similar crops in the EU. The cooperative program. via the IR-4 program, enables all stake holders to work toward gaining

clearances for horticultural and other crops. However, in the European and other regions there are precious few clearances or the MRLs are so highly variable that production, exports, and trade are seriously hampered. For example, in the U.S., by using Crop Group mechanism, clearance of 6 to 8 herbicides are available for 18 bulb crops. But in the EU, only 1 or 2 herbicides are cleared for use on bulb crops - most commonly, glyphosate, indicating that EU and other growers have few to no herbicides available for commercial production of carrots, radishes, and other bulb crops. Similar comparisons in fungicide and insecticide availability reveal the seriousness of limited pesticide availability for growers in the EU and other countries, with major implications for global trading. Implications and advancements via NAFTA partners will also be reviewed. [105]

DEVELOPMENT OF SULFONYLUREA TOLERANT CHICORY FOR IMPROVED IN CROP WEED CONTROL. Robert G. Wilson, University of Nebraska, 4502 Avenue I, Scottsbluff; Bruno Desprez and Jean-Christophe Tepeltier, Florimond Desprez, BP 41-F59242, Cappelle-en-Pévèle, France; and Michael T. Edwards, DuPont Agricultural Products, 14611 Pecos St., Broomfield, CO.

Summary: Field experiments were conducted in 2004 and 2005 to identify a sulfonylurea herbicide that would provide good weed control, minimal soil residue, and excellent selectivity to sulfonylurea tolerant chicory. The study consisted of nine herbicide treatments applied postemergence to three conventional chicory varieties and three sulfonylurea tolerant varieties. Measurements were taken to evaluate crop stand, injury, root yield and soluble dry matter and weed density and biomass. [106]

TIMING OF APPLICATION OF ALS-INHIBITING HERBICIDES FOR NUTSEDGE CONTROL IN DESERT TURFGRASSES. Kai Umeda* and Gabriel Towers, University of Arizona Cooperative Extension, Phoenix.

Purple nutsedge begins to emerge during the early spring in dormant bermudagrass turfgrass that is overseeded with perennial ryegrass as a winter turf. The newly introduced acetolactate synthase (ALS) inhibiting herbicides selectively control nutsedge in warm-season turfgrasses. Trifloxysulfuron and sulfosulfuron effectively control nutsedge in bermudagrass turf when applied during the summer months. Halosulfuron and imazaquin have been commercial products for nearly 20 years. When ALS-inhibiting herbicide applications were initiated in early May, halosulfuron was safe to use on perennial ryegrass while effectively controlling purple nutsedge with continued monthly applications through the summer. Sulfosulfuron at 0.094 lb ai/A reduced the perennial ryegrass while effectively controlling nutsedge. Applications of halosulfuron, imazaquin, trifloxysulfuron and sulfosulfuron initiated in June and continued monthly through the summer provided very good nutsedge control. Imazaquin, trifloxysulfuron, and sulfosulfuron removed the perennial ryegrass from the treated plots. Herbicide aided transition allowed bermudagrass to emerge from dormancy more effectively than when having to compete with the ryegrass. Perennial ryegrass was tolerant of halosulfuron and gradually transitioned out by early July. Trifloxysulfuron at 0.026 lb ai/A and sulfosulfuron at 0.094 lb ai/A gave better than 96% control of purple nutsedge with three monthly applications during July, August, and September. Most of the ALS-inhibiting herbicides were effective in controlling nutsedge with four applications started in May or June. The ALS-inhibiting herbicides were effective against nutsedge and trifloxysulfuron and sulfosulfuron are effective in aiding spring transition to eliminate ryegrass. Halosulfuron selectively reduced nutsedge in perennial ryegrass. [152]

UTILITY OF PENOXSULAM FOR CONTROL OF ENGLISH LAWN DAISY IN TURFGRASS. Randy L. Smith*, Dow AgroSciences, Indianapolis, IN; and Mark M. Mahady, Mark M. Mahady & Associates, Inc., Carmel Valley, CA.

English lawn daisy (*Bellis perennis*) is one of the most troublesome and difficult to control broadleaf turfgrass weeds in California. English lawn daisy continues to flourish in turf stands and frustrate turf managers due to its ability to adapt to a wide range of cultural practices, and to tolerate many of the presently registered broadleaf herbicides. The objective of this research was to evaluate the influence of seasonal timing, application frequency and application rate on the effectiveness of penoxsulam for postemergence control of English lawn daisy in a mixed stand of cool season grasses maintained under fairway conditions on the central coast of California. Results indicated that penoxsulam is a very efficacious herbicide for control of English lawn daisy in cool season grass fairways. Spring applications at rates up to 0.02 lb ai/A were safe on annual bluegrass, perennial ryegrass, creeping bentgrass or kikuyugrass. Based upon the results of penoxsulam studies conducted during the fall of 2004 and spring of 2005 it appears that fall applications of penoxsulam are somewhat more effective than spring applications for control of English lawn daisy. Sequential penoxsulam applications in the fall at rates of 0.005 and 0.01 lb ai/A provided a very high degree of English lawn daisy control. For spring applications of penoxsulam, a minimum rate of 0.02 lb ai/A applied in sequential treatments at four-week intervals resulted in control levels exceeding 95%. Penoxsulam will provide an important new weed control tool for turfgrass managers to utilize against English lawn daisy. [154]

KENTUCKY BLUEGRASS AND ORNAMENTAL FLOWER RESPONSE TO PROPOXYCARBAZONE. Kirk A. Howatt*, North Dakota State University, Fargo.

Quackgrass presence in Kentucky bluegrass lowers the value of sod and may result in dockage of harvested seed in addition to being an aesthetic nuisance to homeowners. Propoxycarbazone has shown potential for removing quackgrass from Kentucky bluegrass turf in field studies. Greenhouse experiments were conducted to evaluate the response of Kentucky bluegrass sod to propoxycarbazone at 0, 0.12, 0.25, 0.5, 1, 2, 4, and 8 oz/A and the response of several annual ornamental species to propoxycarbazone at 0, 0.06, 0.12, 0.25, and 0.5 oz/A. A difference in sod response was determined between runs and was attributed to a temperature difference in the greenhouse with greater injury occurring with higher temperature. In the first sod experiment run, propoxycarbazone at 0.25 oz/A caused 35% injury 28 d after treatment, but in the second run, propoxycarbazone at 4 oz/A caused 26% injury. The difference in sod response between the two runs indicates that time of application during the growing season may substantially influence the response of bluegrass. Vinca vine, coleus, and carnation were fairly tolerant of propoxycarbazone, showing no effect of propoxycarbazone at 0.25 oz/A 28 d after treatment. Other species were more susceptible to propoxycarbazone. Alyssum, moss rose, and sweet William injury was greater than 70% when treated with propoxycarbazone at 0.06 oz/A. Propoxycarbazone showed potential for managing quackgrass in Kentucky bluegrass but off-target movement to several ornamental species resulted in unacceptable injury. [155]

SELECT HERBICIDES FOR POA ANNUA SEEDHEAD SUPPRESSION ON DESERT GOLF COURSE GREENS. David Kopec*, Jeffrey Gilbert, University of Arizona, Tucson; and Kai Umeda, University of Arizona Cooperative Extension, Phoenix.

Poa annua is one of the most ubiquitous winter annual weeds on golf course greens. It is problematic on both bentgrass and overseeded bermudagrass greens. It has similar growth cycles as bentgrass and cool season grasses that are used for the overseeding of bermudagrass greens. There are only a few products registered for preemergence control, therefore, turf managers try to use some kind of postemergence chemical control program. Several desirable criteria are required in the choice of herbicides and plant growth regulators for seedhead and/or vegetative control of *Poa annua*. These include (1) discoloration potential after application, (2) tolerance to both *Poa annua* and the host grass, (3) vegetative growth reduction differential which may cause a discontinuous surface, and (4) seedhead suppression. The use of paclobutrazol, trinexapac-ethyl, endothal, and mefluidide has shown different degrees of effectiveness in both vegetative and seedhead control of *Poa annua* at greens heights. [156]

INVENTOR Y OF MINOR CROPS IN TEXAS TO ENHANCE PESTICIDE CLEARANCES AND MARKETING. Dudley Smith*, Texas A&M University, College Station; and Juan Anciso, Texas Cooperative Extension, Weslaco.

Since production and economic data are limited on horticultural and other speciality crops, information was complied on 200 crops of economic importance to Texas. Information was gleaned from extension specialists, county data from the USDA Farm Service Agency, crop consultants, private sector commodity and marketing representatives, and others. Narratives for each crop summarized production facts, marketing trends, acreage and economic value, and key weed, insect, and disease pests. Acreages on each crop were established, summarized by regions, aggregated for the state, and summarized by crop group, as used by IR-4 and EPA in speciality crop registrations. Crop coverage included conventional horticultural and agronomic crops, herbs and unique crops, forage grasses and legumes, seed production, industrial and non-food crops, and landscape crops. Crops were ranked by acreages and by cash values to quick reviews of relative importance - help identify special needs and priorities for pesticide clearance requests. Several firms helped support "The Crops of Texas", which was printed in color and also posted at "aggiehorticulture.tamu.edu". Field consultants and extension specialists have found this book helpful in handling inquiries and directing programs in these crops State and federal regulatory people were provided copies for quick facts and perspectives when dealing with section 18 and other registration decisions. Registrant and marketing representatives can use acreage and pest information in determining market priorities and potentials. The background in gathering information, complying and confirming data, publication, and use of data may be discussed. [157]

EVALUATION OF A MACHINE-GUIDED CULTIVATOR IN VEGETABLE CROPS . Steven A. Fennimore, and John S. Rachuy. University of California-Davis, Salinas, CA, Richard F. Smith, University of California Cooperative Extension, Salinas, CA .

Increasing production costs for vegetable crops make the use of labor saving robotic technology very attractive. Virtually all of the lettuce and broccoli acreage on the California central coast is cultivated more than once. Cultivation has always been a tedious and time consuming task which requires a skilled tractor driver. However, commercially-available machine-vision guidance takes the task of guiding the fine movements of the cultivator thus allowing for more rapid and accurate operation.

We tested the Eco-Dan guidance system which uses a digital color camera that takes 25 pictures per second of the green plant row directly beneath it. These pictures are processed by a computer to establish the row centerline. As the row centerline shifts the guidance system signals a control valve to move a hydraulic cylinder right or left to keep the implement in the correct working position over the row. One possible labor savings from this equipment may be to cultivate closer to the seed line so that more weeds are removed and hand weeding costs are reduced. In the Salinas Valley herbicides are typically applied in 5-inch bands centered over the seed line, and growers typically leave a 4-inch uncultivated band centered over the seed line. In this way the herbicide band and uncultivated bands overlap. The objectives of this research were: 1) to evaluate the Eco-Dan guidance system to determine if we could cultivate to within 1 inch from the broccoli or lettuce seed line; and 2) to determine if herbicide band width could be reduced from 5 inches down to 3 inches. Five precision cultivator studies were conducted in 2005, three in lettuce and two in broccoli. Two lettuce studies and one broccoli study were conducted on commercial fields, and one broccoli and lettuce study each was conducted on the Salinas USDA field station. The Eco-Dan guidance system was used to steer the cultivators in all studies. The cultivators were set to remove weeds within 1, 1.5, 2 and 2.5 inches of the lettuce or broccoli seed line (2, 3, 4 and 5 inch uncultivated bands). In the lettuce field station study, pronamide at 1.2 lb/A was applied in a band centered over the lettuce seed line at 0, 3, or 5 inches wide, and in the broccoli study, DCPA at 7.5 lb/A was applied in a band centered over the broccoli seed line at 0, 3 or 5 inches wide. Weed densities and weeding times were measured in all studies. Crop yields were determined at commercial maturity. In both broccoli and lettuce, hand weeding times were reduced by 10 to 35% when the uncultivated bands widths were reduced from 4 to 5 inches down to 2 to 3 inches. We found that the cultivator could be precisely set to leave a 3 inch uncultivated band and that the herbicide band centered on the seed line could be reduced from 5 inches wide to 3 inches wide a 40% reduction in DCPA or pronamide use. [158]

PROJECT 3: WEEDS OF AGRONOMIC CROPS

WEED SEEDBANK DYNAMICS IN NORTHERN GREAT PLAINS CROPPING SYSTEMS.

Kristin Harbuck*, Fabian D. Menalled, Montana State University, Bozeman.

The weed seedbank is often regarded as the “black box” of crop weed life cycles. However, as most crop weeds are annual species, the seedbank is the main source of weed infestations. Our objectives in this study were to 1) assess seedbank composition in representative organic and conventional fields of Montana and 2) characterize seedbank dynamics of common agricultural weeds. Data for our first objective were collected in the summer of 2005 in Big Sandy, Montana. Eight plots were selected in each of three conventional and three organic fields and seedbank samples were taken at two depths. Data for the second objective were collected during the 2005 growing season in Bozeman, Montana. Green foxtail, wild oat, field pennycress, and kochia were planted at two depths and four seeding densities in the fall of 2004. These seedbanks were then sampled in the spring of 2005 and in the fall of 2005 to quantify seedbank decline. During the growing season, weeds were counted and removed as they emerged. Burial depth had significant effects on percent emergence in wild oat ($p < 0.001$) and kochia ($p < 0.001$), with wild oat having higher emergence from greater depths and kochia having lower emergence from greater depths. Green foxtail had higher percentage emergence at lower seeding densities ($p = 0.003$) while field pennycress was not significantly affected by any treatment. This research will continue for a second year. [107]

WEED DYNAMICS IN NO-TILL FACULTATIVE WHEAT PRODUCED IN THE PACIFIC NORTHWEST. Laylah S. Scarnecchia, Frank L. Young, and Joseph P. Yenish, Washington State University, Pullman.

Since the 1900's, winter wheat rotated with dust-mulch summer fallow (WW/SF) has been the dominant production practice in the low-precipitation zone (<12 in) of the Pacific Northwest. Over time, WW/SF has developed several problems including severe wind erosion, increased costs of production, and reduced crop yields and quality caused by weeds and diseases. In 2001, rotations of no-till facultative wheat/chemical fallow (FW/ChF) and no-till facultative wheat/spring wheat (FW/SW) were incorporated into a larger conservation tillage cropping systems study initiated in 1995. Annual spring cereal systems have not been economically comparable to WW/SF, especially under drought conditions. In contrast, production of FW with a late-fall planting date, early spring emergence, and potential to yield as high as WW, may be a viable option for growers in this region. Weed management and weed species dynamics were one of several research components of this study. Dominant weed species and their dynamics within and between the two FW systems, and a long-standing WW/SF rotation implemented in 1995, were determined by collecting weed density and richness data three times each year. Twenty-two weed species were identified, with Russian thistle, downy brome, prickly lettuce, flixweed, and tumble mustard being most prevalent and persistent throughout the crop year. Russian thistle and prickly lettuce were the most prevalent broadleaf weed species in all systems in the study. Downy brome was more prevalent in FW following SW than in FW following ChF. [108]

INFLUENCE OF WINTER ANNUAL WEED MANAGMENT ON THE WEED SEEDBANK AND SOYBEAN CYST NEMATODE DENSITY. J. Earl Creech* and William G. Johnson, Purdue University, West Lafayette, IN.

Soybean cyst nematode (SCN) is a threat to profitable soybean production in Indiana and throughout the soybean growing regions of the U.S. Research has shown that a number of winter annual weed species can serve as alternative hosts for SCN. However, the importance of winter weed management in managing SCN has not been documented. The objective of this research was to evaluate the value of winter annual weed management on SCN population densities, winter annual weed populations, and soybean profitability. Long-term field experiments were established in fall 2003 at the Agronomy Center for Research and Education (ACRE) in West Lafayette, IN and at the Southwest Purdue Agricultural Center (SWPAC) in Vincennes, IN. The winter annual weed management regimes included (1) no control of winter annuals in the fall or spring, (2) control of winter annuals in both the fall and spring, (3) control of winter annuals in the fall but not the spring, (4) control of winter annual weeds in the spring but not the fall, (5) Italian ryegrass (*Lolium multiflorum*) cover crop, and (6) winter wheat (*Triticum aestivum*) cover crop. The SWPAC site has high weed and SCN pressure while the ACRE site has low weed and SCN pressure. No significant treatment effects were detected on SCN population density after two winter weed growth periods. After 1 year, total winter annual weed seed in the soil seedbank was significantly lower in treatments where winter weed management tactics were utilized than the treatment were weeds were allowed to grow uninhibited. No significant soybean yield differences due to winter weed treatments were detected in 2004. [109]

SPATIAL DISTRIBUTION OF WEED COMMUNITIES IN CONVENTIONAL AND ORGANIC SPRING WHEAT SYSTEMS. Fredric Pollnac*, Bruce Maxwell, and Fabian Menalled, Montana State University, Bozeman.

Research and casual observation suggest that weed communities in conventional systems are much less abundant and diverse than those in organic agricultural systems. Although many studies have found that weeds are distributed in aggregated patterns in conventional systems, little is known about the distribution of weeds in organic systems. Furthermore, there is very little information relating to how diversity is distributed in either type of system. Data were collected in 2005 at Big Sandy, Montana. Three organic sites and three conventional sites were sampled on three production farms in early summer. All sites were in spring wheat production. We measured weed percent cover by species within a 33x100cm frame continuously along three 100m transects/site for a total of 300 frames/site. ANOVA analysis confirmed that organic sites had significantly higher weed percent cover ($p < 0.001$) and weed species richness ($p < 0.001$) than conventional sites. Further analysis of the data using bar plots revealed that weed communities at conventional sites were composed of patches of relatively low species richness. Weed communities at organic sites were characterized by a more even distribution of percent cover and higher levels of species richness. Data were also analyzed using Three-Term Local Quadrat Variance, another technique commonly used to examine spatial patterns, and the utility of this method in describing patterns within weed communities was investigated. Further research is being undertaken to determine if these differences in the distribution of weed cover differentially impact crop yields. [110]

COOL-SEASON GRASS WEED INTERFERENCE WITH HARD RED WINTER WHEAT IN OKLAHOMA. Brandon J. Fast*, Case R. Medlin, and Don S. Murray; Oklahoma State University, Stillwater.

Although cool-season annual grass weeds commonly interfere with hard red winter wheat in Oklahoma, very few experiments have quantified the biological effects of this interference. In 2004, experiments were conducted near Altus, Perkins, and Stillwater, Oklahoma to measure cheat (*Bromus secalinus* L.), rye (*Secale cereale* L.), wild oat (*Avena fatua* L.), Italian ryegrass (*Lolium multiflorum* Lam.), and jointed goatgrass (*Aegilops cylindrica* Host) interference with wheat. Weed populations were established by broadcasting and shallowly incorporating seeds of the appropriate species and amount immediately prior to wheat planting. Each plot was seeded with one weed species at a density of approximately 28, 56, 112, or 224 viable seeds per square meter. Measured variables included weed density, weed biomass, wheat biomass, wheat grain yield, wheat grain yield dockage, and test weight (wheat grain density). Weed densities were measured at 30 and 150 days after emergence and wheat and weed biomass was measured at 60, 90, 120, 150, and 180 days after emergence. Wheat grain was harvested and weight, moisture, dockage, and test weight were measured. Preliminary analysis of the data indicated that rye caused the greatest reductions in wheat grain yield, followed by wild oat. Cheat and Italian ryegrass reduced grain yield less than wild oat, and jointed goatgrass interference caused the least yield loss of the weeds included in the experiment. Results also revealed that all weed species caused substantially higher wheat grain yield reductions at the Stillwater location, which received rainfall within four days after planting. [111]

IS DOWNY BROME (*BROMUS TECTORUM* L.) A NOXIOUS WEED OR VALUED COVER CROP IN IRRIGATED CORN?. Randall S. Currie*, Norman L. Klocke, Phillip E. Sloderbeck, Holly N. Davis and Lawrent L. Buschman, Kansas State University Southwest Research and Extention Center-Garden City .

Previous work has shown that a wheat cover crop can improve water-use efficiency (WUE), weed control, and yield of irrigated corn. (Weed Science 53:709-716). Therefore, to reduce the expense of planting the wheat cover crop, we hypothesized that a downy brome cover crop could provide the same benefits. To study the masking of cover-crop effects by herbicide treatments evident in the wheat cover-crop study, and to study the benefits of WUE, a split-plot experiment was established, with irrigation as the main plot and a random factorial 4-way split consisting of two levels of downy brome cover crop and two rates of herbicide were established in 4 blocks. A natural stand of downy brome was allowed to naturally reseed in the fall of 2003. In March of 2004, two of four 49- by 60-ft subplots from within a 120- by 98-ft main plot were treated with 0.75 lb ae/ A of glyphosate. Corn was planted no-till with 26,000 kernels per acre across the whole plot area in May. Two rates of preemergence herbicide, Isoxaflutole+atrazine+S-metolachlor at .05 +1.5+2 lbs/A or half of this rate, were applied on each of the two levels of downy brome cover crop within the larger main plot. Shortly after corn emergence, 8-ft access tubes were installed for bi-weekly soil water monitoring with a neutron attenuation method, as described previously (Weed Science 53:709-716). Irrigation was begun when total available water in the top 4 ft of the soil of the high water treatment was depleted 25 to 40 %. The high-water treatment simulated a medium-capacity 700 gal/min well and consisted of two 1-inch irrigations per week. The low-water treatment simulated the lower end of currently economical well capacity of 300 gal/min. This treatment consisted of a single 1-inch irrigation per week. End-of-season Palmer amaranth biomass was measured. Corn was harvested when grain moisture dropped below 15.5%. Water-use efficiencies were calculated by dividing total corn grain mass by total water used, based on water balance calculated from biweekly soil water measurements, irrigation, and rainfall as described previously (Weed Science 53:709-716). The experiment repeated in 2005 at a separate location. At this location, Johnsongrass was present; therefore, a 0.031 lb ai/A application nicosulfuron, or half this rate, was applied to the high- and low-input herbicide plots, respectively. Summer annual weeds did not differ between treatments in 2004. In 2005, end-of-season Palmer amaranth biomass was 3-fold more in the high-water treatments, compared with the low-water treatments. Further, end-of-season Palmer amaranth biomass was 30% less in the higher-herbicide treatments, compared with the lower-water treatments. The open canopy produced by a severe hail storm in the V-12 growth stage may have increased weed pressure. The downy brome cover-crop treatment reduced corn yield 12.6% in 2004, but caused no significant yield loss in 2005. Despite the yield depression seen in 2004, WUE was not depressed by the downy brome down brome cover crop. In contrast, under the more challenging conditions in 2005, WUE was increased by the presence of a brome cover crop. We conclude that a downy brome cover crop might be an asset under conditions of high rainfall, or with appropriately valued irrigation resources. Under certain conditions, however, it should be considered a weed due to its ability to compete for water resources. [112]

INTERFERENCE OF VENICE MALLOW (*HIBISCUS TRIONUM* L.) AND WILD BUCKWHEAT (POLYGONUM CONVOLVULUS L.) WITH SUGARBEET (BETA VULGARIS L.). Dennis C. Odero*, Abdel O. Mesbah, Stephen D. Miller, University of Wyoming, Laramie.

Field experiments were conducted in 2005 at the Powell Research and Extension Center, Wyoming to determine the influence of various densities and durations of Venice mallow (*Hibiscus trionum* L.) and wild buckwheat (*Polygonum convolvulus* L.) interference in sugarbeet (*Beta vulgaris* L.). Season long competition by Venice mallow densities of 2, 4, 6, 8, and 10 plants per m of sugarbeet row decreased sugarbeet root yield by 8, 14, 15, 29 and 29% respectively. Linear regression analysis showed a weak correlation (R^2 = 0.54) between Venice mallow density and sugarbeet root yield reduction. However, there were no significant differences in the sucrose content for the various Venice mallow densities. There were no significant differences in root yield and sucrose content with 2, 4, 6, 8, 10, and 12 weeks of Venice mallow competition after sugarbeet emergence. Sugarbeet root yields and sucrose content were not influenced by wild buckwheat densities of 2, 4, 6, 8, and 10 plants per m of row. Similarly, there were no significant differences in root yield and sucrose content with 2, 4, 6, 8, 10, and 12 weeks of wild buckwheat competition after sugarbeet emergence. [113]

JOINTED GOATGRASS (*AEGILOPS CYLINDRICA*) VIABILITY LOSSES UNDER DIFFERENT ENVIRONMENTS. Gustavo M. Sbatella*, Stephen D. Miller, David W. Wilson, University of Wyoming, Laramie.

Field studies were conducted from 2003 to 2005 to evaluate jointed goatgrass viability losses in wheat fallow systems. Three locations were selected, North Platte, NE, Sidney NE, and Archer, WY, with two sites at each location. All sites had similar latitude but different moisture regime. In fall of 2003 nylon mesh bags containing 50 joints were buried at four different depths (0, 2.5, 7.5 and 15 cm) in tilled and no-till fields. Seed packages were logged and relocated using GPS and microchip technology. Samples were collected during spring and fall of 2004 and 2005 with high levels of packet recovery at all sample periods. Seed viability was determined with a Tetrazolium test. A general loss of viability was observed with increasing burial depth. No significant differences were observed between tillage systems or sites among locations. The interaction between locations and depth was significant for the first two sampling periods. Packets collected during the first sampling period from Archer had higher viability levels than the Nebraska sites at all depths except for the surface samples. For this period surface packets recovered from North Platte averaged 47% viability resulting in the highest recorded value during the study. Viability values decreased to near 0% for the third and fourth sampling period resulting in no differences among sites or depth. Results suggest a strong influence of environmental factors. Drought conditions during the study period affected jointed goatgrass seed persistence. [114]

GENE FLOW IN WHEAT AND JOINTED GOATGRASS AT THE LANDSCAPE LEVEL. Todd A. Gaines*, Philip Westra, Patrick Byrne, Scott Nissen, Colorado State University, Ft. Collins; Dale Shaner, USDA-ARS, Ft. Collins; and W. Brien Henry, USDA-ARS, Akron, CO.

Pollen-mediated gene flow among crop cultivars and from crops to compatible relatives is an important issue for crops with regulated markets and with traits that may impact non-target organisms. The objectives of this project are to evaluate landscape-level crop-to-crop and crop-to-weed gene flow in wheat. Gene flow was estimated using pollen movement from 'Above,' a non-transgenic, imazamox-resistant winter wheat cultivar, to susceptible wheat and jointed goatgrass.

Wheat and jointed goatgrass samples were collected in eastern Colorado in 2003, 2004 and 2005. Wheat samples from commercial fields were screened for resistance by treating with 44 g ha^{-1} imazamox in field plots. Jointed goatgrass and wheat samples from Nelder wheel plots were screened in the greenhouse. In both the field and greenhouse, hybrids were identified by an injured (tillering) phenotype. Two wheat varieties (Jagger and Prairie Red) were found to have significantly (α=0.05) higher cross-pollination rates in 2003 than the nine other varieties sampled. No significant differences were observed in outcrossing rates among varieties in 2004. Cross-pollination rates of 0.01 percent to 0.5 percent were observed at the farthest sample distance of 37 meters in 2003 and 0.01 percent at 61 meters in 2004. The average cross-pollination rate for jointed goatgrass growing directly in Above winter wheat varied from 0.0 to 1.6 percent. Observed gene flow rates in wheat and jointed goatgrass are consistent with published reports. The data from this research have been used to validate the general wheat model published in Crop Science by Gustafson et al. in 2005. [115]

WEED AND HERBICIDE SHIFTS AFTER 22 YEARS. Richard K. Zollinger* and Jerry L. Ries, North Dakota State University, Fargo.

Pesticide surveys were conducted in North Dakota every four years from 1978 to 2004. Herbicides were applied to 88% to 99% of all tillable acres and acres of most major crops grown. However, herbicides were applied to only 50% of potato acres. The number of times cropland acres were treated increased from 1.2 in 1984 to 1.65 in 2004. The most used herbicides in 1978 were 2,4-D, trifluralin, MCPA, triallate, barban, and EPTC, in 1992 were 2,4-D, MCPA, dicamba, trifluralin, tribenuron, and thifensulfuron, and in 2004 were glyphosate, MCPA, fenoxaprop, 2,4-D, bromoxynil, and dicamba. Reasons for change in herbicide use include availability of herbicide resistant crops, increase in no-till acres, greater use of postemergence herbicides, and broadleaf herbicide premixes that are safe on registered crops and are less antagonistic when mixed with grass herbicides. Weed surveys were conducted in North Dakota in the summer of 1978, 1979, and in the spring and summer 2000 to determine the infestation of weeds and change in population and distribution of weed species over a 22 year period. The weeds were ranked by a weed index which is a calculated value of the abundance of a weed. Green and yellow foxtail was the most abundant weed species in all surveys. Other abundant weeds, in decreasing order, were wild oat, kochia, wild buckwheat, Canada thistle, pigweed species, volunteer cereals and canola, common ragweed, field bindweed, common lambsquarters, quackgrass, Russian thistle, wild mustard, eastern black nightshade, perennial sowthistle, common milkweed, and common cocklebur. The weed index decreased in 2000 compared to 1979 for all weeds except yellow foxtail, kochia, Canada thistle, common ragweed, quackgrass, and common cocklebur. Weeds that were in the top 10 weeds in the 2000 survey but not the top 10 weeds of the 1978/1979 surveys were volunteer cereals, eastern black nightshade, perennial sowthistle, and common milkweed, canola, and eastern black nightshade. Weeds that were in the 2000 survey but not in the 1978/1979 surveys were wild-proso millet, eastern black, hairy, and cutleaf nightshade, biennial wormwood, tall waterhemp, lanceleaf sage, yellow nutsedge, Venice mallow, and swamp smartweed. Weeds that were in the 1978/1979 surveys but not in the 2000 survey were nightflowering catchfly and prairie wild rose. Canada thistle occurred in 12, 21, and 39%, field bindweed in 10, 18, and 13%, perennial sowthistle in 12, 10, and 8%, and common milkweed in 2, 3, and 9% of the surveyed fields in the 1978, 1979, and 2000 surveys, respectively. Density of field bindweed and perennial sowthistle doubled from 1979 to 2000 and tripled for Canada thistle and common milkweed. Above average precipitation beginning in 1993, increase in number of no-till acres, high cost of weed control, lack of winter snow and moderate winter temperatures contribute to the increase of perennial weed infestations. The number of fields that were weed free in all quadrats where weeds were measured increased from 36% in 1978 and 27% in 1979

to 36% in spring 2000 and 54% in summer 2000. The distribution of weed-free fields were higher in eastern North Dakota and lower in western North Dakota. Lower weed indexes, lower weed frequency, and higher number of weed-free fields in 2000 as compared to 1978 and 1979 indicate less weed problems even though the plant species complex across the state has remained similar. [116]

CHICKLING VETCH RESPONSE TO HERBICIDES. Arielle A. Ehli* and Kirk A. Howatt, North Dakota State University, Fargo.

Chickling vetch (Lathyrus sativus L.) is a herbaceous annual legume that shows strong potential in the United States as a forage crop in areas where the drought tolerance and soil amending properties of chickling vetch would be advantageous. The chickling vetch seed production industry needs options to control weeds in seed production fields to maximize yield, but no herbicide currently is labeled in the United States for use on chickling vetch. Field experiments were located at Fargo and Prosper, North Dakota, to evaluate chickling vetch response to sulfentrazone at 0, 140, 210, 280, 420, 560, and 840 g ai/ha or imazamox at 0, 17.5, 26, 35, and 52.5 g ae/ha in separate studies. Visible injury, yield, and germination of harvested seed were recorded for chickling vetch response to herbicides. Visible injury with sulfentrazone was similar at both locations with maximum injury of 2% with 840 g/ha sulfentrazone. Maximum visible injury with imazamox was 11% in Prosper and 17% in Fargo with 52.5 g/ha imazamox. Imazamox at 35 g/ha caused 9% injury in Fargo and 14% injury in Prosper; however, excessive rainfall early in the season may have accentuated the injury observed with imazamox. Germination of the harvested seed was different between locations; however, germination rate did not differ among rates of each herbicide within location. Both sulfentrazone and imazamox show promise for registration and would provide much needed options for weed control in chickling vetch. Additional studies will be conducted to confirm these results. [117]

EFFECTS OF HERBICIDES, STRIP-TILLAGE, AND CROP STATURE ON KOCHIA INTERFERENCE IN SUNFLOWER. Brian L. S. Olson*, Kansas State University Research and Extension, Colby; Phillip W. Stahlman and Jim Lee, Kansas State University Agricultural Research Center-Hays.

Kochia is a highly competitive weed in sunflower production for producers in western Kansas. New herbicide options along with differences in sunflower stature and the introduction of new productions systems may influence kochia interference with sunflowers. Therefore, a two site study located at the K-State Research Stations at Colby and Hays was initiated in the spring of 2005 to determine if herbicides, crop stature, and strip-tillage enhance or suppress kochia interference on sunflower growth and development. A short stature oil seed sunflower (Triumph 675) was compared to a tall stature oil seed sunflower (Triumph 645) and both were planted into a no-till and strip-till production system. Kochia was overseeded on all plots with a hand crank broadcast spreader. Glyphosate was applied just prior to planting to ensure uniformity of sunflower and kochia emergence. Herbicides consisted of the following preemergence applications: Treatment 1 - sulfentrazone plus pendimethalin, Treatment 2 – pendimethalin, Treatment 3 – no residual herbicide. At Colby the study was setup as a factorial in a randomized complete block whereas, at Hays, the study was a strip block with crop stature as the whole plot and tillage by herbicide as the subplot. Percent weed control, number of weed seedlings at Colby, and sunflower yield were taken. At Colby, herbicide treatment affected kochia with 93% control observed 8 WAE for Treatment 1. Kochia number/ft^2 ranged from 23 for Treatment 3, to 5 for Treatment 2, and 0 for Treatment 1. As for yield, a two-way interaction

was apparent between herbicide and crop stature. The short stature sunflowers were more adversely affected by kochia competition than tall stature sunflower with a greater increase in yield observed with the short stature compared with the tall stature as the weed control improved. At Hays, unfortunately the kochia population was sparse. Other weeds were also prevalent at low numbers such as tumble and redroot pigweed. Weed control was higher with Treatment 1. No two or three-way interactions were detected with sunflower yield. In conclusion, a two-way interaction of herbicide by crop stature on sunflower yield at Colby was the only interaction found. Tillage system had no affect on kochia competition. [118]

CONTROLLING VOLUNTEER GLYPHOSATE RESISTANT CORN. Robert N. Klein*, Jeffrey A. Golus; University of Nebraska, North Platte; Brady F. Kappler, Alex R. Martin and Fred W. Roeth, University of Nebraska, Lincoln.

The number of acres of glyphosate resistant corn has increased greatly, especially in rainfed corn in western Nebraska. With low corn populations the crop is less competitive with weeds and with the addition of new cropping practices, such as skip-row, weed management becomes even more important. Weeds such as sandbur are easily controlled in glyphosate resistant corn. Volunteer glyphosate resistant corn plants can be problems in fallow, continuous glyphosate resistant corn, glyphosate resistant soybeans, other glyphosate resistant crops, and many other crops. The best treatment for volunteer glyphosate resistant corn has typically been one of the ACCase inhibiting grass herbicides - clethodim or fluazifop + fenoxaprop. Rather than make two applications across the field, producers prefer to apply glyphosate and the grass herbicides together in the same tank. The additive typically used with glyphosate would be non-ionic surfactant (NIS) while several of the grass herbicides recommend either NIS or Crop Oil Concentrate (COC). Studies of volunteer glyphosate resistant corn control were conducted in 2003 and 2004 across Nebraska at Clay Center, Lincoln and North Platte. Glyphosate products were glyphosate isopropyl amine salt (Glyphomax) and glyphosate potassium salt (Roundup WeatherMax) at 0.84 kg ae/ha. Since there was no difference in performance of the two glyphosates, the results are combined here. Treatments were rated 14 DAT in 2003 and 25 DAT in 2004. At North Platte glyphosate with 2% w/w AMS and 0.1052 kg ai/ha of clethodim with 0.25% v/v NIS gave 92 to 97% control of volunteer corn while replacing the clethodim with 0.1052 kg ai/ha of fluazifop + 0.0347 kg ai/ha of fenoxaprop gave 95 to 98% control. Replacing the NIS with 2.3 L/ha COC gave 97 to 99% control with clethodim and 98 to 99% control with the fluazifop + fenoxaprop. Treatments without glyphosate were 1% less control to 4% more control. Crop oil concentrate may be a little more consistent in control. The key is to control the volunteer corn while it is small. These treatments were applied when the corn was 48 to 56 cm (6 to 7 leaf stage) in 2003 and 30 to 60 cm (6 to 8 leaf stage) in 2004. [119]

WEED MANAGEMENT AND COMPETITION IN ROUNDUP READY FLEX COTTON. William B. McCloskey, University of Arizona, Tucson.

Experiments conducted in 2003 to 2005 at the University of Arizona Maricopa and Safford Agricultural Centers (MAC and SAC) investigated weed management in RR Flex cotton and the consequences of weed competition on yield. A sprayed variety trial was also conducted in 2005 at the MAC. Factors investigated included tillage, preplant incorporated or preemergence pendimethalin applications, rate and sequence of glyphosate applications, and glyphosate application method. The consequences of weed competition due to delaying the first post-planting glyphosate application were also investigated. The preplant incorporated use of pendimethalin provided excellent control of Palmer amaranth and suppression of annual morningglory in terms of both reduced plant density and

slower growing plants. These effects on ivyleaf morningglory resulted in a greater early season postemergence glyphosate application window and improved morningglory control. Results indicated superior weed control resulted from preplant-incorporated pendimethalin applications and earlier topical glyphosate applications at rates greater than 0.84 kg ae/ha (i.e., 1.26 or 1.68 kg ae/ha). Weed competition from ivyleaf morningglory and Palmer amaranth reduced cotton yields when the first post-planting glyphosate application was delayed until after the first post-planting irrigation. Applying glyphosate with a broadcast boom equipped with drop tubes with double swivels in the center of the furrow that sprayed the bottom half of 10 node cotton provided weed control similar to the use of a nozzle arrangement similar to that in Redball 420 layby hoods. Residual herbicide (e.g. prometryn) applied at layby was necessary to protect cotton yield and avoid having morningglory vines on top of the cotton canopy at harvest. In a sprayed variety trial a MAC in 2005, 34 varieties of RR Flex cotton were sprayed topically at the 2 leaf growth stage, sprayed "sloppy" post-direct at the 11 node growth stage and at layby with glyphosate at 1.68 kg ae/ha. No injury symptoms were noted following glyphosate applications and the yield of the RR Flex varieties was superior compared to a cotton variety containing the original Roundup Ready cotton technology, DeltaPine 449BR. [120]

WEED MANAGEMENT IN SEEDLING AND ESTABLISHED ROUNDUP READY ALFALFA. Kwame O. Adu-Tutu* and William B. McCloskey, University of Arizona, Tucson.

Field experiments were conducted to evaluate herbicides for weed control in glyphosate-tolerant and conventional alfalfa at the University of Arizona Maricopa Agricultural Center. In fall-winter 2002-2003, glyphosate at 0.84 and 1.68 kg ae/ha applied at the 3.5 and 9 trifoliate leaf stages were compared with imazethapyr (0.1058 kg/ha) or with imazamox (0.0526 kg/ha) in glyphosate-tolerant alfalfa. The imazethapyr and imazamox treatments were applied alone or tank-mixed with 2,4-DB ester (0.56 kg/ha). The predominant weeds were prostrate knotweed, African mustard, shepherd's-purse, annual bluegrass, annual sowthistle, and littleseed canarygrass. Weed control was better when herbicide applications were made at the 3.5 trifoliate leaf stage than at the 9 trifoliate leaf stage. Glyphosate applications provided better weed control than imazethapyr or imazamox, especially control of canarygrass and bluegrass. Imazamox tank-mixed with 2,4-DB provided broadleaf weed control comparable to that provided by glyphosate at 1.68 kg ae/ha, but caused 69% stunting of alfalfa one month after the 3.5 trifoliate leaf application, and reduced alfalfa yields at the first two harvests. A second experiment was conducted in fall-spring 2003-2004. Glyphosate (0.84, 1.26. or 1.68 kg ae/ha), imazamox (0.0349 kg ae/ha) and imazethapyr (0.07 kg ae/ha), each applied alone, were compared with glyphosate (0.84 kg ae/ha) tank-mixed with imazamox (0.0349 kg ae/ha) or with imazethapyr (0.07 kg ae/ha) and a mixture of imazamox (0.0262 kg ae/ha), imazethapyr (0.0529 kg ae/ha) and 2,4-DB (0.42 kg ae/ha) in glyphosate-tolerant alfalfa. In conventional alfalfa (CUF 101), imazamox (0.0529 kg ae/ha), imazethapyr (0.1058 kg ae/ha), and 2,4-DB (0.42 kg ae/ha), each applied alone, were compared with imazamox (0.0526 kg ae/ha) tank-mixed with 2,4-DB (0.42 kg ae/ha) or imazethapyr (0.1058 kg ae/ha) tank-mixed with 2,4-DB (0.42 kg ae/ha). The herbicide applications were made at the 3 to 5 trifoliate leaf stages. All glyphosate-tolerant alfalfa treatments received follow-up glyphosate applications at the 10 to 12 trifoliate leaf stages (0.8624 kg ae/ha) and the 14 to 16 trifoliate leaf stages (1.68 kg ae/A) in the. In conventional alfalfa, clethodim (0.14 and 0.28 kg ai/ha) was used for the follow-up applications. The predominant weeds were shepherd's-purse, London rocket, slimleaf lambsquarters, common lambsquarters, annual bluegrass, littleseed canarygrass, annual sowthistle, prostrate knotweed, Mexican sprangletop, and common barnyard grass. In glyphosate-tolerant alfalfa, glyphosate provided 81% to 100% weed control, and was better than imazamox or imazethapyr. Weed control by imazamox or imazethapyr was moderate (broadleaf weeds) to poor (grasses, especially annual bluegrass); however, it was substantially improved by

adding glyphosate (up to 92% to 100%) but not by adding 2,4-DB. Glyphosate as a follow-up treatment provided better weed control in glyphosate-tolerant alfalfa than clethodim in conventional alfalfa. All herbicide treatments improved alfalfa yields at the second harvest relative to plants that were not treated at the 3 to 5 trifoliate leaf stage. There were no differences in emergent alfalfa crown counts 232 days after herbicide application. [121]

WEED CONTROL IN FURROW-IRRIGATED CORN (*ZEA MAYS*) WITH KIH-485 AND GLYPHOSATE . Steven R. King*, Montana State University, Southern Agricultural Research Center, Huntley.

Experiments were conducted in 2005 in Montana to evaluate KIH-485 for the control of velvetleaf (*Abutilon theophrasti*), kochia (*Kochia scoparia*), and wild buckwheat (*Polygonum convolvulus*). KIH-485 was applied to glyphosate-resistant corn at three rates (83, 166, and 332 g ai/ha) and two timings (PRE and POST) and compared to standard rates of metolachlor, acetochlor, and pendimethalin. PRE treatments were applied alone, while POST treatments were combined with 1.12 kg ai/ha of glyphosate. A single POST application of glyphosate and a non-treated and weed-free control were also evaluated. At 3 weeks after planting (WAP), all rates of KIH-485 applied PRE controlled velvetleaf 94% or greater and control was equivalent to that provided by metolachlor and acetochlor applied PRE. Velvetleaf control at 13 WAP was 85, 99, and 100% with the three PRE treatments of KIH-485 and 80, 68, and 60% with metolachlor, acetochlor and pendimethalin, respectively. At 13 WAP, velvetleaf was controlled 95% or greater when any POST treatment was combined with glyphosate. Kochia was controlled 95% or greater at 3 WAP with all rates of KIH-485 applied PRE and control was equivalent to that provided by acetochlor and pendimethalin applied PRE. Kochia control at 13 WAP was 93, 99, and 100% with the three PRE treatments of KIH-485 and 50, 96, and 95% with metolachlor, acetochlor and pendimethalin, respectively. All treatments controlled kochia 95% or greater when combined with glyphosate at 13 WAP. At 3 WAP, wild buckwheat was controlled 89, 94, and 100% with the three PRE treatments of KIH-485 and 88, 93, and 93% with metolachlor, acetochlor and pendimethalin, respectively. Wild buckwheat was controlled only 61% at 13 WAP when KIH-485 was applied PRE at 83 g ai/ha compared to 91 and 98% control when KIH-485 was applied PRE at 166 and 332 g ai/ha, respectively. Wild buckwheat was controlled 64, 80, and 85% with PRE metolachlor, acetochlor and pendimethalin, respectively, at 13 WAP. At 13 WAP, wild buckwheat was controlled 93% or greater when any POST treatment was combined with glyphosate. Glyphosate applied alone POST provided equivalent control of velvetleaf and kochia to that provided by KIH-485 applied PRE at 166 and 332 g ai/ha or any KIH-485 treatment applied POST in combination with glyphosate. No difference in corn yield occurred among treatments receiving a herbicide application regardless of the level of weed control. Results indicate that KIH-485 applied either PRE at 166 or 332 g ai/ha or at all POST rates in combination with glyphosate are effective treatments for the control of velvetleaf, kochia, and wild buckwheat. [122]

AN INNOVATIVE FORMULATION OF PARAQUAT . David Vitolo*, Chuck Foresman, David Belles, Thomas H. Beckett, Chris Clemens, Charles A. Pearson, and S. Marty Schraer, Syngenta Crop Protection, Greensboro, NC .

GRAMOXONE INTEON, a soluble liquid (SL) formulation of paraquat that contains 240g/l paraquat coupled with INTEON Technology, delivers the important agronomic and environmental benefits of paraquat in a significantly reduced hazard formulation. Syngenta has undertaken research to reduce the acute toxicity of paraquat through the use of a novel formulation technology based on alginates. The results of this research indicate that GRAMOXONE INTEON represents a significant improvement in acute oral toxicity. The GRAMOXONE INTEON formulation successfully meets the important objectives of reducing hazards while delivering excellent biological performance. GRAMOXONE INTEON was compared to existing paraquat formulations in multi-location field studies conducted across the United States. These studies have demonstrated that GRAMOXONE INTEON offers fast burndown and excellent performance across a wide range of annual dicot and grass weeds. The flexible tank-mixing and reliable spray properties of GRAMOXONE MAX are maintained with GRAMOXONE INTEON. GRAMOXONE INTEON is an improved, reduced-hazard paraquat product that will continue to provide the unique benefits associated with GRAMOXONE, contributing as an important tool in reduced tillage and sustainable agriculture systems as well as for glyphosate resistant weed management. [159]

WEED CONTROL IN WESTERN CORN WITH AE 0172747. Charles Hicks*, John Hinz, John Wollam and Jayla Allen, Bayer CropScience, Research Triangle Park, NC.

AE 0172747 is a new postemergence corn HPPD-inhibiting herbicide from Bayer CropScience. The proposed use rate is 92 grams of the active ingredient per ha. AE 0172474 is very safe to corn. Only, 1% phytotoxicity was observed at 3 times the use rate. AE 0172747 is safer to the crop than mesotrione at use rates. AE 0172747 has comparable weed control to mesotrione for Abutilon theophrasti, Amaranthus retroflexus, Ameranthus rudius, Chenopodium album, Ambrosia elatior, Ambrosia trifida, Polygenum pennsyvanicum, Xanthium strumarium and Digitaria sanguinalis. AE 0172747 had superior weed control compared to mesotrione for Echinochloa crus-galli, Pennisetum glaucum, Setaria faberi and Sorghum vulgare. The label for AE 0172747 has been submitted and registration is expected in 2008. [160]

CROP TOLERANCE WITH AE 0172747 ON SWEET CORN AND POPCORN. Dennis Scott* and Jayla Allen. Bayer CropScience, Research Triangle Park, NC 27709..

AE 0172747 is a 4-HPPD inhibitor that provides post-emergence control of annual broadleaf and grass weeds in field corn, sweet corn, and popcorn. Sweet corn and popcorn hybrids have been shown to dramatically vary in their sensitivity to herbicides. Therefore, field studies were conducted from 2002-2005 to determine the impact of AE 0172747 applications at 1X and 3X rates on crop tolerance with sweet corn and popcorn hybrids. AE 0172747 proved to have excellent crop safety on a number of sweet corn and popcorn hybrids. [161]

RIMSULFURON BASED WEED CONTROL PROGRAMS IN GLYPHOSATE-TOLERANT CORN. Craig M. Alford*, DuPont Crop Protection, Lincoln; Leslie Lloyd and David W. Saunders, DuPont Crop Protection, Johnston.

Studies were conducted in 2005 comparing herbicide systems in glyphosate tolerant corn (*Zea mays* L.). Rimsulfuron was applied pre-emergence, as a setup for glyphosate in a two pass program or in combination with glyphosate in a one pass weed control program. Studies were placed in replicated small-plot trials with university, private contractor and DuPont investigators across the United States. Key weeds included giant foxtail, yellow foxtail, green foxtail, common lambsquarters, velvetleaf, common waterhemp and kochia. The addition of rimsulfuron to glyphosate improved control of several grass and broadleaf weed species compared to glyphosate applied alone. Rimsulfuron based pre-emergence treatments provided similar levels of weed control to current commercial standards. [162]

TOPRAMEZONE: A NEW ACTIVE FOR POSTEMERGENCE WEED CONTROL IN CORN. John E. Orr *, Richard M. Porter, Paul D. Vaculin, and John A. Immaraju, Amvac Chemical Corporation, Newport Beach, CA.

Topramezone; [3-(4,5-dihydro-3-isoxazolyl)-2-methyl-4-(methylsulfonyl)phenyl] (5-hydroxy-1methyl-1H-pyrazol-4-yl) methanone, is a novel 4-HPPD inhibitor herbicide for postemergence weed control in corn. AMVAC Chemical Corporation has licensed from BASF AG exclusive rights for this usage in North America. Topramezone is effective against the major broadleaf weed species, and also active against several grass weed species common to US and Canadian corn production. This compound is formulated as a 336 g/l suspension concentrate (SC). Topramezone has been field tested for several years in numerous industry and university research programs. Topramezone at rates of 12.5 to 18.75 g ai/ha applied with recommended spray additives such as methylated seed oil and nitrogen fertilizer source, provides excellent weed control coupled with exceptional tolerance to all types of corn. Topramezone will be used as a sequential application to preemergence soil applied treatments or in a total postemergence program in mixtures with other herbicides. Topramezone was reviewed as part of a Joint Review with the US Environmental Protection Agency (EPA) and the Canadian Pest Management Regulatory Agency. The agencies concluded that the use of topramezone and its end use product in accordance with the label does not entail an unacceptable risk of harm to man or the environment. The crop tolerances of topramezone and EPA registration for uses in field corn, seed corn, sweet corn and popcorn were received in August 2005. Topramezone will be launched and available for commercial use during the 2006 corn season in the US and Canada. [163]

COMBINATIONS OF MESOSULFURON AND PROPOXYCARBAZONE FOR WINTER AND SPRING WHEAT. Monte Anderson*, Bayer CropScience, Spangle, WA.

Utilizing the registrations of mesosulfuron-methyl and propoxycarbazone-sodium, Bayer CropScience has developed the next generation of products for wheat growers. Two unique combinations of these active ingredients plus the safener-diethyl have been EPA registered and are available for 2006 commercial use. Available in most areas of winter wheat production, Olympus Flex is a specific combination of mesosulfuron and propoxycarbazone that controls a wide spectrum of grass weeds in winter wheat, including annual bromes, wild oat, Italian ryegrass, and windgrass, along with partial control of jointed goatgrass and quackgrass. The targeted rate of 3 to 3.5 oz product/A will also deliver control or partial control of numerous broadleaf weeds. The primary adjuvant requirement for Olympus Flex will be a non-ionic surfactant plus a nitrogen source such as

UAN or AMS, but a methylated seed oil or basic blend are options under certain conditions. In deciding where mesosulfuron, propoxycarbazazone, or the patented combination fits in winter wheat, factors such as rotational crop needs, weed spectrum, fall or spring application, tank mix needs, and resistance strategies will be discussed. In targeted areas of spring wheat production, Rimfire is a specially formulated combination of mesosulfuron and propoxycarbazone with emphasis on control of ACC-ase resistant and susceptible wild oat and activity on numerous additional grass and broadleaf weeds. Flexible adjuvant choices with Rimfire include a methylated seed oil, basic blend, or non-ionic surfactant plus UAN or AMS. Rimfire is labeled for use in MT, ND, SD, and MN. [164]

WILD OAT (*AVENA FATUA*) CONTROL WITH MESOSULFURON-METHYL IN MALT BARLEY (*HORDEUM VULGARE*). . Steven R. King*, Montana State University, Southern Agricultural Research Center-Huntley.

An experiment was conducted in 2005 in Huntley, Montana to evaluate mesosulfuron-methyl for the control of wild oat in malt barley. Mesosulfuron-methyl is the active ingredient in two herbicides produced by Bayer CropScience that are registered for use in wheat. These herbicides, Silverado™ and Osprey™, contain mesosulfuron-methyl and the safener mefenpyr-diethyl at a ratio of 1:6 and 1:2, respectively. Silverado and Osprey were applied alone at two rates (low and high) or in combination with other small grain herbicides that are typically used for broadleaf weed control. These small grain herbicides included thifensulfuron plus tribenuron, clopyralid plus fluroxypyr, and bromoxynil plus MCPA. Silverado and Osprey treatments contained methylated seed oil and ammonium sulfate at 1.5 pints per acre and 3 pounds per acre, respectively. Herbicide treatments were arranged factorially in a randomized complete block design with four replications. These treatments were compared to standard treatments of tralkoxydim and fenoxaprop. At 3 and 8 weeks after treatment (WAT), the main effects of herbicide, rate, and the addition of other small grain herbicides were determined to be significant with respect to barley injury. Silverado applied alone at the low and high rates caused barley injury of 7 and 11% at 3 WAT and 4 and 7% at 8 WAT, respectively. Osprey applications resulted in 9 and 17% greater barley injury at 3 WAT compared to Silverado when these herbicides were applied alone at the low and high rate, respectively. At 8 WAT, barley injury from Osprey applications was 12 and 18% greater than injury from Silverado applied at the low and high rate, respectively. When Silverado was applied alone at the low or high rate barley injury was significantly greater when combined with bromoxynil plus MCPA at 3 and 8 WAT. Greater levels of barley injury were also observed when Osprey was combined with bromoxynil plus MCPA at 3 and 8 WAT. Wild oat was controlled between 89 and 93% at 3 WAT and 92 and 98% at 8 WAT with all Silverado and Osprey treatments regardless of rate or the addition of other small grain herbicides. Wild oat control with Silverado and Osprey were similar to that provided by tralkoxydim and fenoxaprop at 8 WAT. No difference in barley yield was observed between treatments, however, percent plump kernels was lower in plots receiving an application of Osprey in comparison to those that received an application of Silverado. No difference in the percentage of plump kernels occurred between treatments of Silverado, tralkoxydim or fenoxaprop. Results indicate that Silverado applied alone or in combination with thifensulfuron plus tribenuron or clopyralid plus fluroxypyr are effective treatments for the control of wild oat in malt barley and result in barley yield and quality similar to the labeled treatments of tralkoxydim and fenoxaprop. [165]

PINOXADEN PERFORMANCE IN WHEAT AND BARLEY. Stephen M. Schraer*, Donald J. Porter, Henry S. Mclean, Peter C. Forster, Christopher Clemens, Charles Pearson, Syngenta Crop Protection Inc., Greensboro, NC.

Pinoxaden is a new selective herbicide developed by Syngenta Crop Protection for the control of annual grass weeds in wheat and barley. Pinoxaden has received US EPA registration and is marketed as Axial™ Herbicide. Pinoxaden is co-packed with the proprietary additive Adigor™ Adjuvant. Spring wheat, winter wheat, and barley have excellent crop tolerance to pinoxaden when applied in the fall or spring from the 2-leaf stage up to the pre-boot stage. The use rate is 60 g ai/ha pinoxaden or 8.2 fl. oz./A formulated product + 9.6 fl. oz./A AdigorTM Adjuvant. At the labeled use rate, pinoxaden effectively controls wild oat, green foxtail, yellow foxtail, giant foxtail, Italian ryegrass, Persian darnel, barnyardgrass, windgrass, wild proso millet, and canarygrass. Pinoxaden can be tank mixed with many broadleaf herbicides for flexible, one-pass, grass and broadleaf weed control in wheat and barley. The following broadleaf herbicides can be mixed with pinoxaden for effective weed control and crop tolerance: bromoxynil, bromoxynil + MCPA ester, chlorsulfuron + metsulfuron methyl, clopyralid + fluroxypyr, clopyralid + MCPA ester, fluroxypyr, fluroxypyr + MCPA ester, metsulfuron methyl, prosulfuron, thifensulfuron methyl, thifensulfuron methyl + tribenuron methyl, and triasulfuron. Research is on-going to identify additional compatible broadleaf tank-mix partners. Based on its broad grass weed control spectrum, flexibility of use, and excellent crop safety, pinoxaden will become a new standard for grass weed control in wheat and barley. [166]

IMPREGNATING DRY FERTILIZER WITH ETHOFUMESATE IN SUGARBEETS. Abdel O. Mesbah*, University of Wyoming Research and Extension Center, Powell; Stephen D. Miller, University of Wyoming, Laramie.

Field experiments were conducted under furrow irrigation in 2005 at the Powell Research and Extension Center, Wyoming to evaluate weed control and sugarbeet response to ethofumesate applied alone or impregnated on dry fertilizer and soil movements at bedding time. A randomized complete block design with a split plot arrangement was used. Main plot consisted of large or small soil movements and subplots were six rows by 150 ft. and consisted of two rates of ethofumesate (1.25 and 2.5 lb/acre) applied alone or impregnated on dry fertilizer. All treatments were replicated four times. Sugarbeet (var. Treasure) was planted to stand in 22-inch rows on April 26, in a Garland clay loam soil type (40% sand, 36% clay, and 24% silt) with a pH of 7.6 and 1.3% organic matter. Ethofumesate was applied alone with a CO2 pressurized knapsack sprayer delivering 20 gpa. through 8002 flat nozzles or impregnated on dry fertilizer with an 11-ft. wide granular applicator on April 13. All treatments were immediately incorporated with a roller harrow to 2.5-inch depth. The whole experimental site was treated twice with postemergence herbicides desmedipham-phenmedipham-ethofumesate + clopyralid + triflusulfuron using full rate system when sugarbeet plants were at cotyledon and 2-leaf. Visual injury ratings were made on June 10 and weed control evaluations on June 15. The four center rows of each plot were harvested mechanically on October 14. Weed control was excellent with all treatments (more than 95%). Percent sugarbeet injury with small soil movements was lower than that with large soil movements but no effect was shown on sugarbeet root yield. Ethofumesate impregnated on dry fertilizer caused less sugarbeet injury than non-impregnated. Sugarbeet injury with ethofumesate at the rate of 2.5lb/A was higher than with the 1.25 lb/A rate. Root yields were closely related to sugarbeet injury. The highest sugarbeet yield was achieved with 1.25 lb/A of ethofumesate impregnated on dry fertilizer. Percent sugar content among all treatments was similar. [167]

VOLUNTEER POTATO INTERFERENCE AND MANAGEMENT IN SUGAR BEET. Don W. Morishita*, Michael P. Quinn, and Robyn C. Walton, University of Idaho, Twin Falls.

Sugar beet commonly follows potato in southern Idaho crop rotations. Depending on the number of tubers left in the field, tillage practices following harvest, and subsequent environmental conditions, volunteer potato can be a significant plant pest in sugar beet production. A study was conducted over two years to determine the most effective method of controlling volunteer potato in sugar beet currently registered and non-registered herbicides. The experiment was a 6 by 2 factorial in a split block arrangement with four replications. Main plots were the presence or absence of volunteer potato and subplots were herbicide treatments. Individual subplots were 4 rows by 6 m in year 1 and 4 rows by 9.1 m in year 2. Herbicides were applied in a 28-cm band with a CO2-pressurized bicycle-wheel sprayer using 8001 even fan nozzles calibrated to deliver 138 kpa. In a separate study, the competitive effect of volunteer potato in sugar beet was measured with increasing density. Experimental design was a randomized complete block with four replications. Individual plots were four rows by 9.1 m. To determine potato competition, whole potato tubers averaging 60 gm each were planted at seven densities, ranging from 0.7 to 4 plants/m2 in addition to a treatment with no potatoes. One week before sugar beet harvest eight potato plants from the two center rows in each plot were harvested by hand. Harvested tubers were weighed individually, counted, and sorted by size. The two center rows of sugar beet in each plot were harvested mechanically on October 5. Crop injury with applied herbicides was highest with fluroxypyr. In year 1, fluroxypyr injury was minimal, but was severe in year 2. Similarly, wick-applied glyphosate injured sugar beet more in year 2 than year 1. One possible reason for injury with glyphosate was because of the 50% concentration used. Subsequent studies have shown little or no injury with concentrations ranging from 25 to 37.5%. Of the registered herbicides, ethofumesate at 0.83 kg/ha applied sequentially to ethofumesate & desmedipham & phenmedipham + triflusulfuron + clopyralid, controlled volunteer potato best, but control averaged only 44%. In the competition study, volunteer potato yield increased with increasing plant density for all tuber sizes measured. At the highest volunteer potato plant density, total tuber yield was 23,503 kg/ha, which equated to 226,865 tubers/ha. An exponential regression was used to model the response of sugar beet root and extractable sugar yield to volunteer potato densities. Sugar beet root and extractable sugar yield models had R2 values of -0.74 and -0.76, respectively. With no volunteer potato, sugar beet root and extractable sugar yield averaged 33 MT and 11,542 kg/ha, respectively. At the lowest potato density (0.7 plants/m2), sugar beet root yield was reduced 25% and at the highest density (4 plants/m2), root yield was reduced 61%. [168]

WEED RESISTANCE MANAGEMENT: EVALUATING APPROACHES TO PRODUCT STEWARDSHIP. Michelle R. Starke*, Harvey L. Glick and Greg A. Elmore, Monsanto Company, St. Louis, MO.

Product stewardship is a fundamental component of responsible customer service in every business. Glyphosate weed resistance management is a critical element of glyphosate herbicide stewardship, and is important to Monsanto both for customer satisfaction and to sustain the utility of the product. One of the first cases of a glyphosate resistant weed in the U.S. was a horseweed (*Conyza canadensis* (L.) Cronq.) biotype in the year 2000. Monsanto has implemented several management and mitigation strategies to help farmers control glyphosate resistant horseweed. These strategies include continuing education of growers, as well as extensive internal and external research on this weed species. Now, some five years later, we have the ability to take a retrospective look at the occurrence of this resistant weed, and the management and mitigation strategies put in place for it. [175]

WEED SHIFTS IN ROUNDUP READY CROPS OVER 8 YEARS. Phil Westra*, Colorado State University, Fort Collins Dale Shaner, USDA-ARS, Fort Collins, CO.

Roundup Ready corn, sugarbeets, and spring wheat were used in a long-term study to evaluate the effects of four weed control strategies that were fixed in space. The main plot effect entailed a comparison of continuous corn versus a crop rotation where corn is grown every other year. The fixed herbicide treatments consisted of exclusive annual applications of glyphosate at 0.38 or 0.75 kg ae/ha, a strictly conventional, non-glyphosate herbicide program, and a rotating herbicide strategy where annual applications of glyphosate at 0.75 kg ae/ha was rotated every other year with conventional herbicides. The annual exclusive use of 0.75 kg ae/ha of glyphosate has generally provided better and more consistent weed control than the use of conventional non-glyphosate herbicides which were inconsistent in weed control in some years. Use of the reduced rate of 0.38 kg ae/ha of glyphosate has led to a slow but steady increase in the population of certain broadleaf weeds such as common lambsquarter and wild buckwheat. Continuous corn provided higher level weed control than did the crop rotation. Hairy nightshade showed a very strong environmental response in one year of the study. Presence of high weed numbers at harvest of a previous year often let to high weed numbers in the spring of the subsequent year. Use of the full recommended rate of glyphosate did not result in a significant weed shift in this study. [176]

LEAKAGE OF CLEARFIELD WHEAT TO FARMER-SAVED AND CERTIFIED SEED LOTS. Todd A. Gaines*, Philip Westra, Patrick Byrne, Colorado State University, Ft. Collins; Christopher Preston, University of Adelaide; and W. Brien Henry, USDA-ARS, Akron, CO.

Production of certified wheat seed and farmer-saved seed provides potential avenues for gene flow among genetically distinct wheat varieties. Since regulated traits in wheat will require standards to maintain variety genetic purity, the objective of this investigation was to determine what level of a detectable variety can leak into seed lots of different origins. The imazamox-resistant trait in 'Above' Clearfield wheat was used to examine samples of certified seed and farmer-saved seed from growers who either had or had not previously produced Above. Fifty samples of certified seed were obtained from five growers who produced Above along with conventional varieties. Sixteen samples of certified seed were obtained from five growers who had never produced Above. Eleven samples of farmer-saved seed were obtained from farmers who had produced Above and eleven from farmers who had never produced Above. All samples were screened by soaking 150 grams of seed for 24 hours in a 25 μM solution of imazamox. Seeds were then planted in greenhouse flats and grown to the two leaf stage before spraying with 44 g ha^{-1} imazamox to eliminate false positives. Plants that survived both soaking and spraying were considered resistant and a subset of these plants was confirmed as having the Clearfield mutation with PCR-based primers. The total number of seeds screened for each sample was calculated by planting three grams of seed and counting the total number of emerged plants; at least 5000 plants were screened for most samples. Percent resistance in each sample was calculated by dividing the total plants screened by the number of resistant individuals identified. Resistant plants were identified in each of the four seed lot categories. The lowest frequency of occurrence was detected in seed lots of both certified and farmer-saved seed from farmers who had never produced Above. One sample of each type contained 0.02 percent resistant plants. Certified seed producers who also produced Above had detectable levels in other varieties, but at a lower frequency and lower percentage than farmer-saved seed samples. Seven of eleven farmer-saved samples from Clearfield producers contained resistant plants, compared with three out of fifty certified seed samples. Levels of detectable leakage into certified seed samples were

acceptable for current seed production standards, but future regulated traits may require more stringent production practices. [177]

OPTIONS FOR WEED CONTROL IN SOUTHERN GREAT PLAINS WINTER CANOLA. Mark Boyles* and Tom Peeper, Oklahoma State University, Stillwater.

With the development of new winter tolerant varieties (conventional and RR) winter canola offers promise as an excellent rotational crop to winter wheat in the Southern Great Plains. A rotation with winter canola provides an opportunity to control difficult grass weed species found in continuous monoculture winter wheat including cheat, Italian ryegrass, jointed goatgrass, rescuegrass, and feral rye. The objectives of this research was to evaluate available herbicides for the control of winter annual grasses in winter canola and to evaluate the tolerance of winter canola to these herbicides when applied in combination with UAN (28-0-0) and/or insecticides. In the fall of 2004 and 2005 experiments were established to evaluate winter canola tolerance and winter grass control with glyphosate, quizalofop P-Ethyl and clethodim . Basic plot design was 8 by 25 foot plots in a randomized complete block design with four replications. In the fall of 2004 studies were conducted to evaluate the tolerance and yield of winter canola treated with available herbicides applied alone and in combination with liquid fertilizer and lambda-cyhalothrin insecticide. None of the postemergence herbicides applied alone to 4- to 8- leaf canola caused significant injury. All three postemergence herbicides applied with 50% or 100% UAN carrier with 10 GPA carrier volume caused 10 to 30% leaf burn. Adding insecticide to the spray mix increased leaf burn to 30 to 60%. All effects were outgrown in 3 to 4 weeks. In the absence of weed pressure, none of the postemergence herbicides applied alone or in two or three way combinations reduced canola yield . In the fall of 2005 four studies were established to evaluate winter annual grass control in winter canola with labeled rates of trifluralin (PPI), glyphosate, quizalofop P-ethyl (8 oz) and clethodim (5 oz). Trifluralin controlled volunteer wheat 68%, feral rye 58% and jointed goatgrass, and Italian ryegrass 76% at 3 to 8 WAT. At seven WAT glyphosate, quizalofop P-ethyl and clethodim controlled volunteer wheat 99, 90 and 82%, respectively, feral rye 99, 58, and 52%, respectively, jointed goatgrass 99, 60, and 62%, respectively, and Italian ryegrass 90, 58 and 52%, respectively. [178]

BROADLEAF WEED CONTROL IN DRY BEANS WITH PREEMERGENCE FOLLOWED BY SEQUENTIAL POSTEMERGENCE HERBICIDES. Richard N. Arnold*, Michael K. O'Neill, and Dan Smeal, New Mexico State University Agricultural Science Center, Farmington, NM.

Research plots were established on May 26, 2005 at New Mexico State University Agricultural Science Center, Farmington, New Mexico to evaluate the response of dry beans (var. Bill Z) and annual broadleaf weeds to herbicides. Soil type was a Wall sandy loam with a pH of 7.8 and an organic matter content of less than 1%. The experimental design was a randomized complete block with four replications. Individual plots were four, 34 in rows 30 ft long. Dry beans were planted with flexi-planters equipped with disk openers on May 26. Preemergence treatments were applied on May 27, and were immediately incorporated with approximately 0.75 in of sprinkler applied water. Sequential postemergence treatments were applied on June 30 after cultivation and to the beans in the 3rd to 4th trifoliate leaf stage. Postemergence treatments were applied with a crop oil concentrate and 32-0-0 at 0.5 and 1.0% v/v. All treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/A at 30 psi. Preemergence treatments were evaluated on June 29 and preemergence followed by sequential postemergence treatments were evaluated on July 29. On June 29, all treatments except the check gave excellent control of redroot and prostrate pigweed, common

lambsquarters, and black nightshade. Dimethanamid-p alone at 0.56 lb ai/A, or in combination with either pendimethalin H2O or pendimethalin at 0.56 plus 0.8 lb ai/A gave 75% or less control of Russian thistle. However, flumioxazin alone at 0.05 lb/ai/A, or in combination with either pendimethalin H2O or pendimethalin at 0.8 lb ai/A gave 98% or better control of Russian thistle. When treatments of imazamox plus bentazon at 0.032 plus 0.25 lb ai/A were applied postemergence over preemergence treatments of outlook alone or in combination with either pendimethalin H2O or pendimethalin, Russian thistle control increased approximately 61%. [179]

PROJECT 4: TEACHING AND TECHNOLOGY TRANSFER

ENGAGING THE PUBLIC IN SCOTCH BROOM CONTROL IN THE LAKE TAHOE BASIN. Susan Donaldson*, University of Nevada Cooperative Extension, Reno; Kim Melody, Tahoe Resource Conservation District, South Lake Tahoe, CA; and Dawn Rafferty, Nevada Department of Agriculture, Reno.

The Lake Tahoe Basin is in the early stages of infestation by a number of invasive weeds. Scotch broom (*Cytisus scoparius*) is a C-rated noxious weed in California, but is not listed in Nevada, where it is commonly sold and planted as an ornamental. It flourishes in mountain environments such as the basin, and was identified and mapped at 146 locations around the Lake in 2004. With grant funds from Nevada Department of Agriculture, the Lake Tahoe Basin Weed Coordinating Group launched a public education campaign called The Great Broom Sweep to enlist residents in Scotch broom removal and replacement. Three targeted locations around the Lake were selected based on plant densities (South Lake Tahoe, Incline Village and Dollar Point). Homeowners were notified via newspaper ads, direct mailings, and signs that free replacement plants were offered to those removing and turning in Scotch broom plants. The materials discussed the invasive ornamental plants and suitable alternatives. During the swap events, volunteers were present at each site to identify plants, provide control and planting recommendations, and alert the public to the dangers of invasive weeds. Volunteers also loaned out weed wrenches to aid in plant removal. More than 150 people were engaged in face-to-face conversations and 61 Scotch broom plants were removed and replaced with Potentilla varieties during this very successful event. [169]

DEVELOPING COMMUNITY CAPACITY TO ADDRESS INVASIVE WEEDS. Susan Donaldson*, University of Nevada Cooperative Extension, Reno; and Dawn Rafferty and Tina Mudd, Nevada Department of Agriculture, Reno.

Western states are struggling to address the rapid expansion of invasive weed populations. In Nevada, the issue is doubly urgent due to the large percentage of public lands (87%) and the lack of capacity to implement weed management. Many county and area needs assessments conducted since 1998 have identified the issue as a top priority, whether related to agriculture, horticulture, or natural resources. By 2001, it was clear that a sustainable approach to coordinated weed management was needed statewide. Using the Idaho Coordinated Weed Management Area (CWMA) Cookbook as guidance, in 2002, the Nevada Department of Agriculture hired a coordinator to help form CWMAs across the state. CWMAs are groups of individuals that band together to address invasive weeds on a geographical, political, or watershed-wide scale. Members are often volunteers, land managers, and educators. The areas vary from urban to rural. The University of Nevada Cooperative Extension assisted by working with individual groups and providing capacity-building trainings for the groups. These trainings varied from “weed schools” providing information on mapping protocols, plant identification, and approaches to weed management, to specialty trainings on group management

techniques, grant writing, and volunteer motivation. Evaluation data collected at the workshops and trainings was used to determine needs for future workshops. Today, there are 28 CWMAs covering most of the state of Nevada. Of these, 17 are active and accomplishing some level of weed management. Some are high-achieving, and engage in seamless inventory, mapping, control, and public education and outreach. Others require a higher level of assistance and guidance. This talk will focus on the benefits and pitfalls of the CWMA model for invasive weed management, and strategies for group capacity-building. [170]

TEACHING CUSTOM APPLICATION OF CROP PROTECTION CHEMICALS. Robert N. Klein*, University of Nebraska, North Platte.

A two day training is held yearly in Nebraska for custom applicators. The training includes a class survey and overview, followed by presentations on professional application, liquid calibration and calculation, markers, monitors and new developments, dry applicators, compatibility, adjuvants, and mixing order. This is followed by group sessions on group problem solving, maintenance and operation, spray/liquid, and weed identification. They also are given tests in three of the group sessions. The training is concluded with a session on insurance and cost of misapplications. Attendance has been from 100 to 150 each year. The class survey in 2005 showed 54% were with their current employer less than one year, 16% were one year, 10% were two years, 9% were three to five years, 9% were six to 10 years, and 2% more than 10 years. The number of years as an applicator was 62% with no experience to less than one year, 14% with one year, 5% with 2 years, 5% with three to five years, 8% with six to 10 years, and 6% with more than 10 years. From the experienced applicators it was learned on the average they treated 14,500 acres per year. Over one half of the participants had education beyond high school, several had four year college degrees, four had graduate level courses and one had a graduate degree. The training is followed by a third day on pesticide training for commercial applicators for those needing certification. [171]

INTRODUCING WINTER CANOLA INTO SOUTHWEST OKLAHOMA. Deena L. Morley*, Mark Boyles, and Thomas F. Peeper, Oklahoma State University, Stillwater.

Continuous monoculture winter wheat has dominated Oklahoma cropland for decades. The lack of crop rotation has led to increasing problems with winter annual grass weeds and increased dependency on herbicides for their control. In an effort to increase crop diversity, research was initiated with winter canola in 2002, and has expanded each year. In 2003, the OKANOLA Project, designed to rapidly introduce winter canola to northwestern OK wheat growers was launched, and a few selected growers were offered enough glyphosate resistant seed to plant 10 acres each. The following year, with more Roundup-Ready® and conventional seed available, total acreage seeded increased to approximately 17,000. The introduction of a new crop into a region creates a chicken or egg situation, where growers will agree to learn how to seed, manage, and harvest it, if they have a local market, and grain buyers agree to buy it if enough is grown to make it worth their effort to learn how to grade, buy, handle, store, and resell it. Since winter canola harvest coincides with wheat harvest, separate grain dumps and legs are required to simultaneously accept two crops. Thus, extensive coordination with all aspects of the crop production and marketing system were required, beyond the typical activities normally planned by weed scientists. Based on the success of initial efforts and the level of interest shown by growers from southwestern OK, the OKANOLA Project was expanded into twelve major wheat-producing counties in southwestern OK in the fall of 2005. Because of the potential risk associated with producing a new crop, growers who participated were again offered modest financial incentives to help offset input costs. Cooperating growers were

selected by County Extension Educators and were required to attend a canola production meeting in the fall. In each county, an attempt was made to select at least one notill grower. A maximum of four locations per county were allowed into the program. Most growers were successful in getting a good stand. One notill grower experienced wet field conditions that delayed planting until late in October, which was not a problem conventional tillage growers in his county experienced. Another cautious notill grower seeded a small area to test his system, and obtained a good stand which quickly disappeared due to predation by field crickets and blister beetles. He later obtained a good stand. Notill growers have experienced stand loss in small areas with heavy residue, where seed to soil contact is poor. A notill grain drill which does a better job of cleaning trash from the row is needed. Several growers expressed concern as older leaves began dying as the winter progressed, because they failed to understand that situation as normal for winter canola. Another area of concern for us has been the apparent reluctance of some growers to control volunteer wheat and winter annual grasses in a timely fashion. Extremely dry weather this year has led to some canola stand loss in areas where volunteer and weeds were allowed to compete with the crop for several weeks after seeding. Grower applications of glyphosate at labeled rates have controlled all winter annual grass weeds present. Wheat growers often spray their fields only once, topdressing nitrogen, herbicide, and insecticide simultaneously during midwinter. That approach does not seem adequate for winter canola in a dry year. In some fields, aphids became a concern by mid January, and growers often do not recognize that they are present. During April, growers will have the opportunity to attend harvesting clinics to help them adjust their grain combines for direct harvesting of standing canola. [172]

WINTER CANOLA HARVESTING EFFICIENCY WITH DIRECT HARVESTING VERSES SWATHING. Heath Sanders*, and Thomas F. Peeper, Oklahoma State University, Stillwater, OK.

Hard red winter wheat growers in the Southern Great Plains have experienced increasing problems with winter annual grasses, primarily due to lack of crop rotation. Winter canola has been introduced as a rotational crop to help alleviate this problem and is rapidly gaining acceptance because there are several grass control herbicides labeled for canola that will control the winter annual grasses common in wheat fields. However, little is known about harvesting efficiency of winter canola in Oklahoma or the magnitude of harvesting loss expected with various harvesting methods. Harvest losses could create a new weed problem for growers rotating back to winter wheat. Thus, harvesting loss was determined for 16 growers' combines during harvest in June 2005. Average harvest losses from swathed canola picked up by a combine were 162 lbs/ac (from the swathing operation) and 35 lbs/ac from combining. Harvesting losses averaged 172 lbs/ac from14 fields harvested without prior swathing. Variation among grain combines was quite wide, ranging from 25 lbs/ac to 319 lbs/ac. Much of the variation was assumed to be the result of farmer inexperience in setting their machines. Winter canola was found to germinate soon after seed fell to the ground and rain fell, suggesting that most of it would be killed by herbicide application in notill or tillage before fall seeded wheat was sown. [173]

MILTON FREEWATER DRIFT TASKFORCE: A CASESTUDY FOR SOLVING DRIFT ISSUES LOCALLY. Mary K. Corp, Thomas Darnell, and Daniel A. Ball, Oregon State University, Pendleton, OR.

Milton Freewater Drift Task Force was created in 1999 to address herbicide drift concerns by vineyard owners/mangers in the Walla Walla Valley. The primary issue was reoccurring phenoxy-like symptoms on grape plants. A diverse group of 20-30 individuals was selected to represent a cross section of agricultural and natural resource interests. Task Force members were comprised of producers, crop consultants, Extension faculty, and public, private and commercial applicators. Their task was to address how local efforts could mitigate herbicide drift problems faced by a diversifying agriculture in the area. An evaluation survey was conducted in January, 2006 to evaluate the effectiveness of the Task Force over its 7 year history. Task Force members (30% responded) stated that communication between the different interests was good (80%) to excellent (20%). Eighty-nine percent (89%) indicated that communication had improved over the seven years. When asked if herbicide use and applications had changed because of Task Force efforts, 67% stated changes have been made, 22% indicated only slight changes and 11% believed no changes had occurred. Examples of changes listed on the surveys were targeting specific spray windows, hooded sprayers, drift control agents, non-phenoxy herbicides, and use of less volatile formulations. These changes also represented additional costs in some cases. Vineyard managers indicated increased costs for increased fertilizer in the spring to increase vine vigor. Respondents (75%) indicated that they believed herbicide drift has decreased slightly while 25% believed that no improvements have been seen. When asked if the Task Force should continue, 100% agreed it should continue. Reasons given to continue is ongoing education and awareness, communication especially during critical crop growth periods (i.e. bud break and bloom of grapes), and vineyard mapping. Results of the survey indicate that the Task Force has been beneficial in addressing local drift issues and continues to serve a purpose for the Walla Walla Valley agricultural interests. [174]

EXPERIENCES AND REFLECTIONS ON THE PATH TO AN ACADEMIC CAREER. J. Anita Dille*, Kansas State University, Manhattan.

The perfect “position announcement” was just posted on the WSSA WeedJobs Page; a tenure-track research/teaching faculty position at a major land grant university. Will your application package end up in the “keep” pile by the Search Committee? Will you get a call for an on-campus interview? I will reflect on my experiences during my job search (3 different interviews) before becoming an assistant professor in the Department of Agronomy at Kansas State University in November 1999. Recommended experiences to obtain while in graduate school so that you are more prepared and competitive for a faculty position: serve on a faculty search committee, be a teaching assistant and give guest lectures, take a course or two on teaching / learning / methods, ask to attend regional and national professional conferences, field days, and workshops, get your MS and PhD research published, and write a grant proposal. Those are elements for a CV that would help keep your application package in the “keep” pile. The all important cover letter is your opportunity to personally express how excited you are about the position, why you have the right experiences to fill the needs of the position, and to show that you know something about the issues in the state or region. You cannot let your CV highlight your personality! Seek advise from your major professor (who had to go through the same experience for his/her job). You've had an energizing experience during your interview and, Congratulations, you’ve been hired as an assistant professor! That perfect “position announcement” is now your job description! Depending on the institution, you now have up to six years to prove yourself as a competent researcher, teacher, and member of the University

community, before becoming a tenured faculty member. Whew, I received tenure in July 2005, and would like to reflect on the previous 5 years on my path as an assistant professor. In graduate school, and maybe even during a post-doctoral assignment, you have developed the research and teaching skills that are the base for your job. During the first six months, you may already be teaching your first course, writing a grant proposal, and trying to recruit one or two graduate students. But you don't have to do this alone, as more senior colleagues in your department are excited to have new energy and collaborators. Set up a formal or informal mentoring committee with individuals that you are comfortable bouncing ideas off (an assistant professor supervisory committee). Prepare your Promotion and Tenure document for review by the mentoring committee or your department head, every year. This way faculty in the department knows who you are and what you've been doing from the first day rather than three years down the road at mid-tenure review. By the time I was up for P&T review, my document was ready with only recent updates necessary. Take care in the choice of committee assignments (if possible) and selection of graduate students. As my department head commented, a tenure-track faculty position is like a marathon, not a sprint; take time for coffee and lunch breaks with other faculty (you learn a lot more about your colleagues in such an informal session), take time to be with family, which means leaving work at the end of the day, and have fun. Celebrate all the successes: awards won by graduate students, a successful grant proposal, another publication, and last class of the semester. [180]

A CAREER IN EXTENSION. Ralph E. Whitesides*, Utah State University, Logan.

Abstract not submitted. [181]

PUBLIC SERVICE CAREER OPPORTUNITIES IN INVASIVE PLANT MANAGEMENT. Eric Lane, Colorado Dept. of Agric., Lakewood, CO.

Opportunities for public service careers in invasive plant management are diverse and abundant. Positions are available at all levels of government: local (municipal and county), state, and federal. While the specific set of skills required to succeed in different positions may vary or the emphasis placed on certain skills may be greater in some positions than in others, there are some skills that many jobs and careers share in common. Specifically, useful talents for many public service careers include strong communication skills (especially oral), a foundation in the natural sciences (especially ecology), and a knack for strategic planning. The utility of these skills will be examined in light of a variety of specific public service careers to be discussed. [182]

THE INS AND OUTS OF A CAREER IN INDUSTRY. Vanelle Carrithers, Dow AgroSciences, Mulino, OR.

Abstract not submitted. [183]

THE PRIVATE CONSULTANT'S PERSPECTIVE. Celestine A Duncan*, Weed Management Services, Helena, MT.

The role of a private agricultural consultant is multi-faceted. The person can function as a specialist, expert, or advisor, which usually requires a narrow field of specialization. The most typical role for a consultant is that of auxiliary staff. Outside consultants are most useful on non-recurring or unfamiliar problems, or in meeting high seasonal demands for technical work. Consultants in Weed Science have multiple opportunities to provide services. These include but are not limited to

conducting training programs, invasive plant inventories, herbicide efficacy/residue trials, developing environmental documents and management plans, providing advice to producers and land managers, serving as an expert witness, and investigating complaints. Skills needed to be a successful consultant include a strong technical background and the ability to: 1) Identify and define problems; 2) develop a concept, analyze, research, and produce a final product in the clients terms; 3) transfer results to the client efficiently; 4) assist clients in addressing problems and/or recognizing opportunities; 5) assist clients in implementing opportunities; and 6) complete projects within a framework of the time and cost constraints imposed by themselves or the client. The effective consultant must have the courage and the initiative to state their convictions, or risk commitment to an undoable task. This often requires defining a complex problem in the client's terms with inadequate information. Thus a consultant must be an excellent communicator, task-oriented, and have the ability to gather and analyze information quickly. [184]

PROJECT 5: WEEDS OF WETLANDS AND WILDLANDS

EFFECTS OF FUNCTIONAL DIVERSITY ON RIPARIAN INVASION BY *ARUNDO DONAX*. Lauren D. Quinn* and Jodie S. Holt, University of California, Riverside.

Arundo donax (Poaceae) is a large statured, rapidly growing invader of riparian plant communities in areas with a Mediterranean climate. *A. donax* typically establishes following flood-mediated disturbance. A small-scale restoration experiment was conducted to test the hypothesis that riparian community composition can determine susceptibility to invasion by exotic plant species. Three riparian species (*Salix gooddingii*, *Baccharis salicifolia*, and *Scirpus americanus*), differing in their physiognomy (tree, shrub, grass, respectively), were planted into experimental plots in all possible combinations in 2002. Half of the plots were planted with *A. donax* rhizomes in the spring of 2003 and the other half in late winter 2004. Both groups were followed for one growing season to evaluate *A. donax* establishment. Establishment for the 2003 planting group differed between the resident plant community types, with *A. donax* plants senescing more quickly in plots that contained *B. salicifolia* alone or *B. salicifolia* in combination with one other species. By 2004, colonization of some of the experimental plots by surrounding riparian plants had begun to occur and was measured at the time of planting. *A. donax* was more successful overall in 2004 and did not depend on the original community type, but was influenced by colonizer cover. Extent of colonization was decreased in plots that originally contained any number of *B. salicifolia* plants. These data suggest that species identity or functional type rather than diversity can contribute to the exclusion of *A. donax* and other colonizers in riparian communities. [185]

PREDICTING GIANT REED (*ARUNDO DONAX*) SUCCESS AND CONTROL BASED ON ESPONSE TO CLIMATE. Scott Steinmaus, California Polytechnic State University, San Luis Obispo, CA.

Giant reed(*Arundo donax*)is an invasive plant in riparian habitat throughout California. Removing this species is problematic because of the sensitive riparian habitat within which it typically grows. A growth simulation was developed for giant reed in DYMEX based on climatic preferences and constraints to investigate the timing, frequency, and magnitude of control efforts required to remove it. The growth parameters were assessed in controlled growth chamber and irrigated field trials. Four modules were parameterized to simulate the critical lifestages: rhizome, sprout, 4-tiller, and >10 tiller adult stages. Any parameter not assessed directly was taken from the literature. An 18 year daily climatic database was generated from the DAYMET spatial convolution model for -120.4 deg. W

35.2 deg. N (San Luis Obispo, California), which was formatted for use in the DYMEX simulation. The Goff-Gratch formulation and Penman-Monteith equation were utilized to estimate soil moisture availability from vapor pressure deficit and relative humidity. Simulation results demonstrate that giant reed may be close to its ecoclimatic margin as it takes several years for small populations (<100 rhizomes) to become established. Simulation results also demonstrate the effects of using actual weather variation on population growth which cannot be seen in models relying on multiyear averages. Efficacy for various control methods was tested. Model results predict that repeated shoot removal during spring can drain rhizome reserves to levels when stochastic climatic events could suppress or even kill the population. The model predicts that removing rhizomes by a systemic approach in the fall is more efficient if a greater than 80% kill rate is achieved. [186]

MANAGEMENT OF CAMELTHORN ALONG THE VIRGIN RIVER. Mark J. Renz*, New Mexico State University; Curt Deuser, National Park Service; Brian Hamilton, SWEAT; Christina Nelson, BLM, Las Vegas; and Maria Ryan University of Nevada Cooperative Extension, Las Vegas.

Camelthorn is an invasive herbaceous perennial weed that can establish large dense stands throughout the western United States. Several populations of camelthorn have been recently discovered within Clark County Nevada along the Virgin River. The objectives of this project were to quantify the effectiveness of various herbicide treatments on camelthorn and document the response of resident plant populations to these treatments along the Virgin River. Experiments were a randomized complete block design with five replications. Plants were applied at the flower bud stage in the spring (4/26/03) and to resprouting tissue in the fall just prior to plant senescence (11/25/03). Applications were applied to all foliage and stems until visibly wet with a SP1 backpack sprayer with an adjustable tip. None of the treatments eliminated camelthorn, but camelthorn density was reduced by 87% with an application of imazapyr at 0.226% ae and 82% with an application of 2,4-D at 0.389% ae in combination with dicamba at 0.40% ae one year after treatment (YAT). Triclopyr at 0.318% ae, 2,4-D at 0.389% ae, and glyphosate at 0.598% ae did not significantly reduce camelthorn density 1 YAT. Although herbicides were spot treated, nonselective herbicides (imazapyr and glyphosate) were expected to have a greater impact on vegetation present compared to the untreated control and selective herbicides. However, 1 YAT, only camelthorn cover differed between treatments. Plant species richness did not vary across all treatments with values averaging from 7-11 plants/100 m^2. This emphasizes that spot application to establishing infestations, if applied correctly, can have minimal impact to non-target species. Major species present were arroweed (*Pluchea sericea*) with 25-45 % cover, saltcedar (*Tamarix* spp.) with 4-10 % cover, and saltgrass (*Distichlis spicata*) with 2-6 % cover. This project demonstrated that two consecutive applications of imazapyr or 2,4-D and dicamba applied in the spring and fall can provide large-scale reductions to camelthorn without harming other plant species present. This suggests that early detection and rapid response of new infestations can be successful and potentially avoid the need for active restoration. [187]

MANAGING HERBACEOUS PERENNIALS IN SENSITIVE HABITATS. Jennifer A. Erskine-Ogden*, University of California, Davis; Mark Renz, Justin Norsworty, New Mexico State University, Las Cruces; and Sue Donaldson, University of Nevada, Reno.

Several weedy herbaceous perennial species have recently established within the Tahoe Basin and surrounding areas. While control methods exist for these species, they cannot be implemented in sensitive areas within the Tahoe Basin. We compared a new herbicide delivery method that deposits herbicide on the lower side of a stem's cut surface with cutting only and spot spraying in both greenhouse and field trials on specific herbaceous perennials. In greenhouse studies we evaluated the effectiveness of several herbicides applied in two different growth stages of perennial pepperweed (PPW), at the flowerbud and flowering stages. Results showed that applications made to PPW reduced pepperweed belowground biomass by 79, 82 or 42 % if plants were treated with glyphosate (25 % solution of Roundup), chlorsulfuron (0.14 oz Telar/gallon water) or cut only respectively 45 days after treatment compared to untreated controls. No differences were found between herbicides used, method of application, or phenology of plants. Field studies were also initiated to evaluate the effectiveness of this method under field conditions on PPW, diffuse knapweed (DKW) and dalmation toadflax (DT). Excessive rainfall occurred in the winter/spring of 2005 reducing densities 29, 37 and 27 % in untreated treatments for PPW, DKW and DT respectively compared to the previous year. Cover of plants treated with this new method was reduced 76-81, 90-99, and 63-81 % for PPW, DKW and DT respectively. In all cases, adding glyphosate at 10 % (25 % solution of Roundup), chlorsulfuron (0.11 oz Telar/gallon water), or clopyralid (0.25 fl oz of transline/gallon water) (for DKW & DT only) in a cut stem method improved control compared to cutting stems exclusively (reduced cover 24, 53, and 56% for PPW, DKW and DT respectively). We are currently analyzing species changes as a result of this method and if any differences exist compared to a spot spray application. This new method provides land managers with an effective management option for the eradication of establishing infestations of herbaceous perennial weeds in/near sensitive areas. [188]

NEW APPLICATION OPTIONS USING THE JKINJECTIONTOOL TECHNOLOGY. Ron P. Crockett, Monsanto Co., and Phil Burgess, Clark Co. Weed Management, Vancouver ,WA.

New Application Options Using the JKinjectiontool™ Technolgy. Ron P. Crockett, Monsanto Co., and Phillip Burgess, Clark Co. Weed Management, Vancouver, WA The JKInjectiontool has been recently commercialized and is being used primarily for control of Japanese Knotweed (Polygonum cuspidatum) using 4or 5 mls/stem of concentrated glyphosate solution per stem. The JK Injectiontool is a unique and innovative method of delivering precise concentrated herbicide solutions via a needle into the base, or cut-top of hollow-stem species. A brief update on control efforts of J. Knotweed spp. commercial work will be presented along with 2005 field testing results on: Yellow Flag Iris, (Iris Psuedocorus), Poison Hemlock, (Conium maculatum), Canada Thistle, (Cirsium arvense), Field Horsetail, (Equisetum arvense)and Giant Hogweed, (Heracleum mantegazzianum). Herbicide rates of 0.5 to 5mls/stem were tested to determine efficacious rates. Additional rates of 5mls of a 5% concentrate solution were also tested. [189]

HORSES AS VECTORS OF INVASIVE PLANT DISPERSAL IN CALIFORNIA'S NATIONAL PARKS: THE PROMISE OF WEED FREE FEED. Lauren Quinn*, Mietek Kolipinski, National Park Service and Dominican University; and Sibdas Ghosh, Dominican University .

Invasive plants cause widespread damage to the native ecosystems in California's National Park Service Units (NPSU's). Chemical and mechanical control of exotic populations is extremely costly, so determining potential prevention measures is key. We are investigating the role horse manure may have on introduction and spread of non-native plants in California NPSU's and other natural areas of California. Non-native plants germinated after passing through horse digestive systems, identifying these animals as potential vectors for introduction of non-native plants. In an initial study using manure samples collected in the San Francisco Bay and other Central California areas, six out of the seven plants that emerged were non-native. A larger follow-up study involving horse manure samples from several California National Parks is currently underway, and of eleven emerging species whose identity has been confirmed, eight are introduced. To avoid barring access to horses in California NPSU's, we suggest an intensive, public educational program concerning the spread of non-native species via contaminated hay and potential benefits of using certified weed free feed. NPS and other federal and state agencies have been developing strategies to decrease spread of non-native plants, and addition of such programs would strengthen the role of prevention in minimizing further invasion. [190]

COMPARING EFFICACY, EFFICIENCY AND RATES OF IMAZAPYR AND GLYPHOSATE ON KNOTWEEDS. Joseph G. Vollmer, BASF, Laramie, WY.

Bohemian, Japanese and Himalayan knotweeds are aggressive invaders of North American wetlands. Trials were conducted along the Naches River in Washington and wetland sites near Parkdale and Cascade Locks, Oregon. Three application methods were compared. Low-volume foliar individual stem treatments, low-volume foliar broadcast and stem injection. Total number of knotweed stems in each plot was counted prior to application and again one year after application to provide an accurate measure of control. Imazapyr applied as a foliar spray, regardless of individual stem or broadcast treatment, provided as high as 98% control of Japanese knotweed and 99% control of Bohemian and Himalayan knotweeds while glyphosate provided 80% control. The amount of time to treat each plot as well as the total amount of chemical used was documented. Broadcast treatments, not influenced by stem density, provided the best time efficiency averaging 1.9 seconds to treat 100 square feet, followed by the low volume individual stem treatment averaging 27.8 seconds per 100 square feet. The most time burdening treatment was the stem injection, which took greater than an hour depending on stem density. The total amount of herbicide used per treatment varied greatly with imazapyr ranging from 0.4 to 1.5 lbs a.i. per acre and glyphosate ranging from 10 to 1553.6 lbs a.i. per acre with respect to stem densities of the knotweed. Imazapyr can efficiently be used to low volume foliar spray knotweeds with minimal impact to desirable vegetation and reduce overall active ingredient load into the environment. [191]

HERBICIDAL CONTROL OF JAPANESE KNOTWEED (*POLYGONUM CUSPIDATUM* SYN *FALLOPIA JAPONICA*) USING SELECTED POST-EMERGENCE HERBICIDES. Andrew Z. Skibo* and M.A. Isaacs, University of Delaware, Lasher Laboratory.

Japanese Knotweed (*Polygonum cuspidatum* SYN *Fallopia japonica*, USDA- POLCU) is an invasive, herbaceous rhizomatous perennial plant that has become a major weed in riparian areas throughout Delaware. Field experiments were conducted over 2003-2005 to evaluate selected postemergence applied, systemic herbicides. Twenty seven treatments with multiple modes of action were evaluated alone and in combination. Plots were 10 by 25 feet in length and cut back in July to normalize Knotweed heights. Treatments were applied 30 days after cutting. The experimental design was a randomized complete block design with three replications. Herbicides were applied with a CO_2 backpack sprayer delivering a spray volume of 25 GPA at 30 psi through flat fan nozzles. Data collected included percent visual control based on a scale of 0-100% injury at 7, 14, 21, and 28 DAT. Data were subjected to analysis of variance (ANOVA) and treatment means separated using Fisher's Projected LSD Test at 5% level of significance. The herbicide treatments of Mesotrione (.094, .166, and .20 lb ai/A) in combination with Dicamba (0.5 and 0.75 lb ai/A) plus Atrazine (1 lb ai/A) provided very good control (Avg. 93%) 28 DAT. The herbicide Triclopyr (0.5 and 0.25 lb ai/A), in combination with Carfentrazone (0.083 lb ai/A), provided an average of 90% control of Japanese Knotweed when compared to the high rate of Triclopyr alone (Avg. 71%) 28 DAT. The herbicide F-4113 (0.2 lb ai/a Carfentrazone plus 5 lb ai/a IPA salt of Glyphosate, FMC.) provided greater control of Japanese Knotweed (74%) 28 DAT, as compared to Glyphosate (potassium salt of Glyphosate 3.25 lb ai/a) alone, (34%) 28 DAT. [192]

APPLICATION OF SIMPLE SEQUENCE REPEAT (SSR) MICROSATELLITE MARKERS IN CONDUCTING A POPULATION GENETICS SURVEY OF JAPANESE KNOTWEED S.L. (*POLYGONUM CUSPIDATUM* SYN *FALLOPIA JAPONICA*) ACROSS THE STATE OF DELAWARE. Andrew Z. Skibo* and M.A. Isaacs, University of Delaware, Lasher Laboratory.

Japanese Knotweed (*Polygonum cuspidatum*, syn. *Fallopia japonica*, USDA - POLCU), is an invasive herbaceous perennial species that is steadily gaining a foothold on the agricultural and riparian lands of Delaware, and is found in all three counties. Japanese Knotweed is known to form hybrids with other members of the family Polygonaceae. Genetic analysis via Simple Sequence Repeats (SSR), have enabled the differentiation of both parent species and hybrid direction within Japanese Knotweed sensu lato. Total genomic DNA was extracted from 37 Polygonum cuspidatum individuals collected across the state of Delaware using Qiagen DNEasy extraction kits. Inter-SSR regions within the genome were amplified by Polymerase Chain Reaction (PCR) on an MJ Research thermal cycler, using nine, *inter*-SSR primers. Sequence polymorphisms were visualized in 1.6% agarose gels and assigned single primer phenotypes based on sequence polymorphism presence or absence. Compilation of SSR-based phenotypes allowed the assignment of a multi-primer genotype. All plants sharing the same genotype were considered clonally identical. Preliminary results of a population genetics survey conducted in the UK from samples collected across Delaware indicate the majority of Japanese Knotweed found within the state is clonally identical to that found across the UK. Furthermore, the first samples to be tested from Tasmania also came up as a match to the Japanese Knotweed in the UK and here in Delaware. Presently, laboratory experiments are underway to examine Japanese Knotweed population genetics in greater detail. [193]

PROJECT 6: BASIC SCIENCES

ACETOLACTATE SYNTHASE ACTIVITY AND WHOLE PLANT RESPONSE TO IMAZAMOX IN SELECTED SPRING WHEAT LINES. Lynn Fandrich*, Scott Nissen, Philip Westra, Colorado State University, Ft. Collins; and Brad Hanson, USDA-ARS, Parlier, CA; and Dale Shaner, USDA-ARS, Ft. Collins, CO.

Commercial release of imidazolinone-resistant (IR) wheat occurred in 2003 in the United States. Although IR-winter wheat cultivars exhibit safety to US labeled rates of imazamox under most circumstances, crop injury occasionally occurs. IR-spring wheat cultivars appear to be more sensitive to imazamox than IR-winter wheat cultivars. Greenhouse and laboratory studies investigated the recovery of growth rates and acetolactate synthase (ALS) enzyme activity of spring wheat plants treated with imazamox. Spring wheat advanced breeding lines with the herbicide-resistance gene on the B-, D-, and BD-genomes were studied. Biomass accumulation in the two-gene spring wheat lines was not reduced by 105 g ai ha-1 imazamox compared to the untreated control. However, both single-gene spring wheat lines were stunted from 7 DAT through 21 DAT. Genome location and copy number of the herbicide-resistance gene affected the level of ALS inhibited by imazamox. Approximately 30 to 40% of ALS remained active in the presence of 50 uM in-vitro imazamox in the single-gene spring wheat lines, and 55 to 65% of ALS remained active in the two-gene spring wheat line. Foliar application of 105 g ai ha-1 inhibited the extractable ALS activity in all spring wheat lines. However, ALS enzyme activity in the D- and BD- spring wheat lines recovered from the foliar application by 14 DAT. There was no recovery in the B- spring wheat line. Greater herbicide-resistance is observed when the gene is located on the D-genome compared to the B-genome. Multiple copies of the resistance gene will minimize the risk of injury in US spring wheat. Future research should evaluate differences in expression for genes which code the ALS enzymes. [123]

WEEDS: ADAPTED GENOTYPES OR PLASTIC PHENOTYPES?. William E. Dyer* and Elena Kalinina, Montana State University, Bozeman, MT.

In the 1960s, Herbert Baker formulated the concept of the “ideal weed,” a hypothetical species that would possess twelve characteristics enabling it to successfully colonize and compete in most habitats. One of these characteristics, the “general-purpose-genotype,” refers to the ability to flourish under a broad range of environmental conditions and stresses. More specifically, such a genotype is considered to possess high levels of phenotypic plasticity, or the ability to express multiple phenotypes in response to changing environmental conditions. This is an attractive concept, and has been widely invoked to explain the success of many weedy species in multiple environments. A contrasting hypothesis is that only specific genotypes within populations are adapted to various environments, and must be acted upon by selection before they become prevalent. This idea is often invoked to explain the lag phase of populations after their introduction into a new environment. However, neither hypothesis has been rigorously confirmed, in spite of their broad appeal. We tested these ideas in regard to the ability of kochia (*Kochia scoparia*) plants to inhabit saline seeps, localized areas of groundwater discharge containing high soil concentrations of salt and other toxic ions. Our hypothesis was that strong environmental stress should select for only those genotypes able to withstand the highly saline habitat. In contrast, the suspected plasticity of kochia may allow any genotype to persist under such conditions. AFLP analysis was used to randomly sample the genomes of adapted versus adjacent, nonadapted plants and thus estimate within- and between-population differentiation and genetic identity. [124]

GREENHOUSE DETERMINATION OF JOINTED GOATGRASS VERNALIZATION REQUIREMENTS. Lynn Fandrich*, Colorado State University, Ft. Collins; and Carol A. Mallory-Smith, Oregon State University, Corvallis.

Quantification of jointed goatgrass vernalization requirements is necessary to predict the conditions under which jointed goatgrass plants can establish and be available for crossing with wheat. Jointed goatgrass seedlings from five Washington and Oregon populations were exposed to seven vernalization intervals between 0 and 8-wk at 4, 7, and 10 C. Tiller production and reproductive growth stages were recorded for plants grown over 13-wk in the greenhouse. Greater than 80% of jointed goatgrass plants from all populations vernalized for 6-wk or longer reached the joint stage by the end of the experiment. However, populations were polymorphic for this reproductive response at shorter vernalization durations. Jointed goatgrass populations collected from winter (W) and spring (S) wheat fields extended the period of time between the joint and anthesis stage such that these plants jointed, but failed to reach the anthesis stage by the end of the experiment. Conversely, plants of a roadside (R) population required a longer vernalization period to reach the joint stage, but these plants consistently reached anthesis. Jointed goatgrass populations differed in the minimum vernalization treatment required to produce reproductive tillers: WA-R plants required 6-wk vernalization at 7 C, WA-W plants required 6.5-wk at 7 C, and WA-S plants required 7-wk at 4 C. Plants from OR-W and -S populations required 7-wk vernalization at 4 C. Our results confirm the quantitative vernalization requirement of jointed goatgrass and assert that polymorphism exists among jointed goatgrass populations for differing vernalization requirements. [125]

INFLUENCE OF SELECTED WINTER TEMPERATURE REGIMES ON SOYBEAN CYST NEMATODE DEVELOPMENT ON PURPLE DEADNETTLE. J. Earl Creech* and William G. Johnson, Purdue University, West Lafayette, IN.

Some soybean cyst nematode (SCN) juveniles have been documented to infect purple deadnettle roots too late to reach maturity in the fall. However, the fate of these juveniles is unknown. These purple deadnettle plants could be serving as a trap-crop for SCN if freezing winter temperatures kill the juveniles. On the other hand, if SCN enters a diapause as soil temps drop, growth and maturation could resume in the spring as soon as soil temperatures permit. The objective of this research was to assess the ability of SCN to survive cold temperatures then complete a lifecycle when favorable temperatures return. Purple deadnettle was planted in SCN infested soil and placed in a 20°C growth chamber for 20 days to allow SCN to penetrate and establish a feeding site inside the root. After the infection period, pots were transferred to 20, 15, 10, 5, and 0°C growth chambers where they were maintained for 10 or 20 days. Pots were then returned to the original 20°C growth chamber for 0 or 20 days of post-treatment growth. Plant and nematode development was measured following the completion of each post-treatment growth period. The experiment was arranged as a randomized complete block with 5 replications and was repeated twice. Nematode reproduction and purple deadnettle growth were reduced by cold temperature regimes. However, SCN development and cyst production was able to proceed to completion once pots were returned to a favorable temperature level. Thus, weed management programs that disrupt the purple deadnettle lifecycle in either the late fall or early spring may be necessary to prevent over-wintering SCN to reproduce in the spring. [126]

EFFECT OF EARLY SEASON IRRIGATION AND HEAT UNIT ACCUMULATION ON YELLOW NUTSEDGE, PURPLE NUTSEDGE, AND ROOT-KNOT NEMATODE DEVELOPMENT. Sonia C. Nunez*, Jill Schroeder, Stephen H. Thomas, and Leigh W. Murray, New Mexico State University, Las Cruces..

Yellow nutsedge (*Cyperus esculentus*), purple nutsedge (*Cyperus rotundus*), and southern root-knot nematode (RKN) (*Meloidogyne incognita*) are problems throughout irrigated regions of New Mexico. They have a beneficial relationship that must be managed concurrently. A study was initiated on March 1, 2005 to determine if pre-plant irrigation will affect nutsedge emergence and growth or RKN reproduction, and if heat unit accumulation based on soil temperature can predict initial nutsedge and RKN development. This study was a two (nutsedge species) by two (with or without pre-plant irrigation) factorial conducted in RKN-free microplots (sixteen per nutsedge species). Three nutsedge tubers were planted in eight locations per microplot after surface sterilization on March 1. Eight microplots per nutsedge species were irrigated on March 3. All microplots were then watered as needed after the pre-plant irrigation. The plant sampling-plan was designed to account for both emergence date and potential range of heat unit accumulation. Data included emergence, daughter tuber and basal bulb count and dry weights, root-extracted RKN egg counts, hourly soil temperature and moisture. Purple nutsedge began to emerge twelve days after planting, regardless of irrigation treatment. A positive linear relationship between basal bulb development and heat unit accumulation was found with no irrigation effect. However, daughter tuber numbers and RKN egg production were higher after pre-plant irrigation. Yellow nutsedge began to emerge seventeen days after planting. Basal bulb and daughter tuber development were not related to accumulated heat units. Pre-plant irrigation increased daughter tuber numbers, while overall RKN egg production was poor. [127]

EFFECTS OF FUNCTIONAL DIVERSITY ON RIPARIAN INVASION BY *ARUNDO DONAX*. Lauren D. Quinn* and Jodie S. Holt, University of California, Riverside.

Arundo donax (Poaceae) is a large statured, rapidly growing invader of riparian plant communities in areas with a Mediterranean climate. *A. donax* typically establishes following flood-mediated disturbance. A small-scale restoration experiment was conducted to test the hypothesis that riparian community composition can determine susceptibility to invasion by exotic plant species. Three riparian species (*Salix gooddingii*, *Baccharis salicifolia*, and *Scirpus americanus*), differing in their physiognomy (tree, shrub, grass, respectively), were planted into experimental plots in all possible combinations in 2002. Half of the plots were planted with *A. donax* rhizomes in the spring of 2003 and the other half in late winter 2004. Both groups were followed for one growing season to evaluate *A. donax* establishment. Establishment for the 2003 planting group differed between the resident plant community types, with *A. donax* plants senescing more quickly in plots that contained *B. salicifolia* alone or *B. salicifolia* in combination with one other species. By 2004, colonization of some of the experimental plots by surrounding riparian plants had begun to occur and was measured at the time of planting. *A. donax* was more successful overall in 2004 and did not depend on the original community type, but was influenced by colonizer cover. Extent of colonization was decreased in plots that originally contained any number of *B. salicifolia* plants. These data suggest that species identity or functional type rather than diversity can contribute to the exclusion of *A. donax* and other colonizers in riparian communities. [185]

PREDICTING GIANT REED (*ARUNDO DONAX*) SUCCESS AND CONTROL BASED ON RESPONSE TO CLIMATE. Scott Steinmaus, California Polytechnic State University, San Luis Obispo, CA.

Giant reed(*Arundo donax*)is an invasive plant in riparian habitat throughout California. Removing this species is problematic because of the sensitive riparian habitat within which it typically grows. A growth simulation was developed for giant reed in DYMEX based on climatic preferences and constraints to investigate the timing, frequency, and magnitude of control efforts required to remove it. The growth parameters were assessed in controlled growth chamber and irrigated field trials. Four modules were parameterized to simulate the critical lifestages: rhizome, sprout, 4-tiller, and >10 tiller adult stages. Any parameter not assessed directly was taken from the literature. An 18 year daily climatic database was generated from the DAYMET spatial convolution model for -120.4 deg. W 35.2 deg. N (San Luis Obispo, California), which was formatted for use in the DYMEX simulation. The Goff-Gratch formulation and Penman-Monteith equation were utilized to estimate soil moisture availability from vapor pressure deficit and relative humidity. Simulation results demonstrate that giant reed may be close to its ecoclimatic margin as it takes several years for small populations (<100 rhizomes) to become established. Simulation results also demonstrate the effects of using actual weather variation on population growth which cannot be seen in models relying on multiyear averages. Efficacy for various control methods was tested. Model results predict that repeated shoot removal during spring can drain rhizome reserves to levels when stochastic climatic events could suppress or even kill the population. The model predicts that removing rhizomes by a systemic approach in the fall is more efficient if a greater than 80% kill rate is achieved. [186]

MANAGEMENT OF CAMELTHORN ALONG THE VIRGIN RIVER. Mark J. Renz*, New Mexico State University; Curt Deuser, National Park Service; Brian Hamilton, SWEAT; Christina Nelson, BLM, Las Vegas; and Maria Ryan University of Nevada Cooperative Extension, Las Vegas.

Camelthorn is an invasive herbaceous perennial weed that can establish large dense stands throughout the western United States. Several populations of camelthorn have been recently discovered within Clark County Nevada along the Virgin River. The objectives of this project were to quantify the effectiveness of various herbicide treatments on camelthorn and document the response of resident plant populations to these treatments along the Virgin River. Experiments were a randomized complete block design with five replications. Plants were applied at the flower bud stage in the spring (4/26/03) and to resprouting tissue in the fall just prior to plant senescence (11/25/03). Applications were applied to all foliage and stems until visibly wet with a SP1 backpack sprayer with an adjustable tip. None of the treatments eliminated camelthorn, but camelthorn density was reduced by 87% with an application of imazapyr at 0.226% ae and 82% with an application of 2,4-D at 0.389% ae in combination with dicamba at 0.40% ae one year after treatment (YAT). Triclopyr at 0.318% ae, 2,4-D at 0.389% ae, and glyphosate at 0.598% ae did not significantly reduce camelthorn density 1 YAT. Although herbicides were spot treated, nonselective herbicides (imazapyr and glyphosate) were expected to have a greater impact on vegetation present compared to the untreated control and selective herbicides. However, 1 YAT, only camelthorn cover differed between treatments. Plant species richness did not vary across all treatments with values averaging from 7-11 plants/100 m^2. This emphasizes that spot application to establishing infestations, if applied correctly, can have minimal impact to non-target species. Major species present were arroweed (*Pluchea sericea*) with 25-45 % cover, saltcedar (*Tamarix* spp.) with 4-10 % cover, and saltgrass (*Distichlis spicata*) with 2-6 % cover. This project demonstrated that two consecutive applications of imazapyr or 2,4-D and dicamba applied in the spring and fall can provide large-scale reductions to camelthorn

without harming other plant species present. This suggests that early detection and rapid response of new infestations can be successful and potentially avoid the need for active restoration. [187]

MANAGING HERBACEOUS PERENNIALS IN SENSITIVE HABITATS. Jennifer A. Erskine-Ogden*, University of California, Davis; Mark Renz, Justin Norsworty, New Mexico State University, Las Cruces; and Sue Donaldson, University of Nevada, Reno.

Several weedy herbaceous perennial species have recently established within the Tahoe Basin and surrounding areas. While control methods exist for these species, they cannot be implemented in sensitive areas within the Tahoe Basin. We compared a new herbicide delivery method that deposits herbicide on the lower side of a stem's cut surface with cutting only and spot spraying in both greenhouse and field trials on specific herbaceous perennials. In greenhouse studies we evaluated the effectiveness of several herbicides applied in two different growth stages of perennial pepperweed (PPW), at the flowerbud and flowering stages. Results showed that applications made to PPW reduced pepperweed belowground biomass by 79, 82 or 42 % if plants were treated with glyphosate (25 % solution of Roundup), chlorsulfuron (0.14 oz Telar/gallon water) or cut only respectively 45 days after treatment compared to untreated controls. No differences were found between herbicides used, method of application, or phenology of plants. Field studies were also initiated to evaluate the effectiveness of this method under field conditions on PPW, diffuse knapweed (DKW) and dalmation toadflax (DT). Excessive rainfall occurred in the winter/spring of 2005 reducing densities 29, 37 and 27 % in untreated treatments for PPW, DKW and DT respectively compared to the previous year. Cover of plants treated with this new method was reduced 76-81, 90-99, and 63-81 % for PPW, DKW and DT respectively. In all cases, adding glyphosate at 10 % (25 % solution of Roundup), chlorsulfuron (0.11 oz Telar/gallon water), or clopyralid (0.25 fl oz of transline/gallon water) (for DKW & DT only) in a cut stem method improved control compared to cutting stems exclusively (reduced cover 24, 53, and 56% for PPW, DKW and DT respectively). We are currently analyzing species changes as a result of this method and if any differences exist compared to a spot spray application. This new method provides land managers with an effective management option for the eradication of establishing infestations of herbaceous perennial weeds in/near sensitive areas. [188]

NEW APPLICATION OPTIONS USING THE JKINJECTIONTOOL TECHNOLOGY. Ron P. Crockett, Monsanto Co., and Phil Burgess, Clark Co. Weed Management, Vancouver ,WA.

New Application Options Using the JKinjectiontool™ Technolgy. Ron P. Crockett, Monsanto Co., and Phillip Burgess, Clark Co. Weed Management, Vancouver, WA The JKInjectiontool has been recently commercialized and is being used primarily for control of Japanese Knotweed (Polygonum cuspidatum) using 4or 5 mls/stem of concentrated glyphosate solution per stem. The JK Injectiontool is a unique and innovative method of delivering precise concentrated herbicide solutions via a needle into the base, or cut-top of hollow-stem species. A brief update on control efforts of J. Knotweed spp. commercial work will be presented along with 2005 field testing results on: Yellow Flag Iris, (Iris Psuedocorus), Poison Hemlock, (Conium maculatum), Canada Thistle, (Cirsium arvense), Field Horsetail, (Equisetum arvense)and Giant Hogweed, (Heracleum mantegazzianum). Herbicide rates of 0.5 to 5mls/stem were tested to determine efficacious rates. Additional rates of 5mls of a 5% concentrate solution were also tested. [189]

HORSES AS VECTORS OF INVASIVE PLANT DISPERSAL IN CALIFORNIA'S NATIONAL PARKS: THE PROMISE OF WEED FREE FEED. Lauren Quinn*, Mietek Kolipinski, National Park Service and Dominican University; and Sibdas Ghosh, Dominican University .

Invasive plants cause widespread damage to the native ecosystems in California's National Park Service Units (NPSU's). Chemical and mechanical control of exotic populations is extremely costly, so determining potential prevention measures is key. We are investigating the role horse manure may have on introduction and spread of non-native plants in California NPSU's and other natural areas of California. Non-native plants germinated after passing through horse digestive systems, identifying these animals as potential vectors for introduction of non-native plants. In an initial study using manure samples collected in the San Francisco Bay and other Central California areas, six out of the seven plants that emerged were non-native. A larger follow-up study involving horse manure samples from several California National Parks is currently underway, and of eleven emerging species whose identity has been confirmed, eight are introduced. To avoid barring access to horses in California NPSU's, we suggest an intensive, public educational program concerning the spread of non-native species via contaminated hay and potential benefits of using certified weed free feed. NPS and other federal and state agencies have been developing strategies to decrease spread of non-native plants, and addition of such programs would strengthen the role of prevention in minimizing further invasion. [190]

COMPARING EFFICACY, EFFICIENCY AND RATES OF IMAZAPYR AND GLYPHOSATE ON KNOTWEEDS. Joseph G. Vollmer, BASF, Laramie, WY.

Bohemian, Japanese and Himalayan knotweeds are aggressive invaders of North American wetlands. Trials were conducted along the Naches River in Washington and wetland sites near Parkdale and Cascade Locks, Oregon. Three application methods were compared. Low-volume foliar individual stem treatments, low-volume foliar broadcast and stem injection. Total number of knotweed stems in each plot was counted prior to application and again one year after application to provide an accurate measure of control. Imazapyr applied as a foliar spray, regardless of individual stem or broadcast treatment, provided as high as 98% control of Japanese knotweed and 99% control of Bohemian and Himalayan knotweeds while glyphosate provided 80% control. The amount of time to treat each plot as well as the total amount of chemical used was documented. Broadcast treatments, not influenced by stem density, provided the best time efficiency averaging 1.9 seconds to treat 100 square feet, followed by the low volume individual stem treatment averaging 27.8 seconds per 100 square feet. The most time burdening treatment was the stem injection, which took greater than an hour depending on stem density. The total amount of herbicide used per treatment varied greatly with imazapyr ranging from 0.4 to 1.5 lbs a.i. per acre and glyphosate ranging from 10 to 1553.6 lbs a.i. per acre with respect to stem densities of the knotweed. Imazapyr can efficiently be used to low volume foliar spray knotweeds with minimal impact to desirable vegetation and reduce overall active ingredient load into the environment. [191]

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APPLICATION OF SIMPLE SEQUENCE REPEAT (SSR) MICROSATELLITE MARKERS IN CONDUCTING A POPULATION GENETICS SURVEY OF JAPANESE KNOTWEED S.L. (*POLYGONUM CUSPIDATUM* SYN *FALLOPIA JAPONICA*) ACROSS THE STATE OF DELAWARE. Andrew Z. Skibo* and M.A. Isaacs, University of Delaware, Lasher Laboratory.

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EDUCATION AND REGULATORY SECTION

Topic: The Shadow of 9-11 – Agricultural Bioterrorism in North America

OVERWIEW OF THE AGRICULTURAL BIOTERRORISM THREAT. Timothy Miller, Washington State University, Mount Vernon, WA

Abstract not sumbitted. [137]

SAFEGUARDING FACILITIES AGAINST AGRICULTURAL BIOTERRORISM. Pete Jacoby, Associate Dean Washington State University, Pullman, WA.

Abstract not sumbitted. [138]

US REQUIREMNTS FOR INTERNATIONAL STUDENTS AND VISITING PROFESSORS. Susan Bender, Director, International Students and Scholars, Univesity of Nevada, Reno, NV

Abstract not sumbitted. [139]

AFTER THE EVENT: TRACING BIOTERRORISM AGENTS. William T. Cobb, Cobb Consulting Services, Kennewick, Washington

The events of 9/11 displayed the determinism, ingenuity and ruthlessness of terrorists desiring to inflict harm on our citizens and the infrastructure within our national borders. The potential threat to American agriculture and the safety of our food supply by terrorist entities cannot go unaddressed. Obviously, the national goal is to predict and prevent a bioterrorism event in general, but also specifically on American agriculture. The bioterrorism threat to agriculture and our food supply may be overt or covert. If a bioterrorism event directed at agriculture or our food supply occurs, then the emphasis shifts to identification of the event, mitigation of the affects of the event and then tracing the nefarious event back to and identifying its perpetrators. To accomplish this, forensic science will have to be adapted and applied to agriculture. Dictionaries define the word *forensic* as “for the courts”; indicating the application of a particular subject to the law, as in forensic medicine, forensic plant pathology or perhaps forensic weed science. The application of the many facets of agricultural science to a courtroom setting is something that most of us have had no training for and probably little, if any, experience with. A number of federal agencies including the FBI, FDA, USDA, DHS and others have recognized the potential bioterrorism threat to agriculture and the need to adapt forensic techniques to those areas of science within agriculture. So should a segment of agriculture endure a pernicious bioterrorism attach, then through the application of agricultural science forensic techniques, those planning, funding and executing the event can be identified and involvement verified. [140]

PROJECT 1: WEEDS OF RANGE AND FOREST REPORT
Chairperson: Matt Rinella

Topic: The Value of Prevention in Large-Scale Weed Control

The Weeds of Range and Forest Section discussed the value of weed prevention as it relates to the value of large-scale weed control at the 2006 meetings. Many participants expressed their belief that weed prevention efforts deserve more attention. We also discussed the value of monitoring a small number of new weed patches (instead of treating all new patches) in order to determine if particular species are invasive in particular habitats. Many participants think this kind of monitoring is far too risky, while others believe the knowledge gained outweighs the risks. Dr Cynthia Brown from Colorado State University was chosen to be the section chair for the 2007 meetings. The section's discussion topic will be restoring weed-infested rangelands and forests. There was talk of developing a special workshop devoted to the topic of restoration.

Linda Wilson was elected to serve as chair-elect for Project 1 in 2007.

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PROJECT 2: WEEDS OF HORTICULTURAL CROPS
Chair person: Pat Clay

Topic 1: Herbicide Resistant Weeds.

Chair and moderator Pat Clay initiated a discussion of herbicide resistant weeds, by presenting his observations from Arizona regarding resistance development and grower and crop consultant perceptions of resistant weeds. Dale Shaner explained that herbicide resistance is not easy to define because of varying degrees of resistance. From a grower's standpoint, weeds that require more than a 1X rate of herbicide to control are resistant. From an analytical standpoint, weeds that require a 3 to 4X rate of herbicide to control are resistant. Growers and consultants are not concerned with the difference between resistance and tolerance. Sandra McDonald indicated that the lack of a consistent message on what weeds are called resistant complicates labeling and confuses regulatory people.

Topic 2: The Potential for Developing Herbicide Resistance in Horticultural Crops.

Pat Clay also asked, to what extent do horticultural crop managers need to be concerned about herbicide resistant weeds? The majority of the discussion outlined below developed from this question.

- Diversity in rotation is the greatest asset in resistance prevention.
    - Some perennial horticultural crops lend themselves to developing resistant weeds. Examples given were from simazine use in Christmas tress, glyphosate use in filberts, *Poa annua* in grass seed production, and goosegrass in turf.
    - In much of the western United States, horticultural crops are often not rotated with agronomic crops because of specialized equipment and farm size.
- The availability of a variety of management practices, such as cultivation and hand hoeing, are important in resistance prevention. However, several trends could diminish the use of these practices and lead to more resistant weeds.
    - An increase in no-till, which leads to an increased dependence on herbicides.
    - Increasing costs for hand-labor, this also leads to an increased dependence on herbicides.
- Specialty crops grown on a small number of acres present different circumstances for resistance to develop than large scale agronomic crops.
    - Based on gene frequency, specialty crops should have a lower probability for developing resistant weed populations.
    - The ability to rotate herbicide mode of action can prevent resistance. However, specialty crops often have few things registered, which can contribute to population shifts and resistant weeds.
- Proper herbicide rates and application timings are equally important in horticultural crop as in agronomic crops to prevent resistance.
- Historically, as resistance problem develop, management practices are modified. An example given was the use of chain drags along irrigation canals.
    - An overwhelming amount of resistant weeds will probably force management practices to utilize more tillage.
- Adopting stewardship practices for resistance management is not an easy sell to growers in terms of their return on investment. It appears that for most operations it is more cost effective in the short-term to let resistance develop. Don Morishita indicated that over the course of his career in Idaho resistance management has become much more important to growers.
    - Including herbicide group number (for the mode of action) on the label could simplify resistance management decisions by growers and crop consultants.

Topic 3: Detection and verification of herbicide resistance.

Detection of and response to herbicide resistant weeds is often handled on a case by case basis. There is no special money available for this effort. In most states, detection of herbicide resistant weeds is accomplished through Extension with support from commodity groups. It was noted that this approach can overestimate the amount of resistant weeds in a region. Identifying resistant populations is important because if effects section 18 registrations. Identifying mechanisms of resistance is often helpful in developing resistance management practices and has furthered our understanding of plant physiology.

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PROJECT 3: WEEDS IN AGRONOMIC CROPS REPORT
Chairperson: Edward Davis

Topic: Sustainability of No-till and Conventional Tillage Farming Systems

The Weeds of Agronomic Crops discussion session was held on Wednesday, March 15th. Approximately 40 – 60 people were in attendance over the course of the session.

To lead off the discussion Joe Yenish (WSU) provided a presentation titled "Weed Control in a Direct Seed System". Joe discussed advantages and disadvantages of no-till systems and its impacts on weed populations and herbicide use. He mentioned that no-till systems tend to lead to more perennial weeds and shifts in annual species, requiring different weed control tactics. These shifts also lead to more reliance on post herbicides as apposed to soil residual herbicides.

At the conclusion of Joe's presentation a general discussion session was held. Much of the discussion included participants sharing their no-till experiences across the various western geographies and cropping systems. There was some debate on the reasons for slower no-till adoption rate in the U.S. compared to Canada. Many agreed that downside yield risk and conversion costs were significant impediments for U.S. farmers to switch to no-till systems in small grain/row crop systems. Annual rainfall and levels of crop residue produced were also sited as key considerations in adoption rate. It is more difficult to successfully implement no-till systems in higher moisture areas with associated higher crop residues. There was also discussion on the relative success of various no-till equipment brand and types. The "Cross-Slot" drill was brought up being particularly useful in dealing with heavy residues but availability of parts is an issue. Discussion on weed control practices indicated that no-till systems rely heavily on postemergence products, especially glyphosate. Soil residual products are utilized to much lesser extent. The discussion was excellent among the attendees resulting in a good exchange of ideas to bring back to their respective areas.
Steve King, Montana State University was named to serve as chair-elect for project 3 in 2007.

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Pro**ject 4: TEACHING AND TECHNOLOGY TRANSFER**
Chairperson: Ralph Whitesides

Topic: Ethics in Agriculture

The annual meeting of the Western Society of Weed Science **Project 4: Teaching and Technology Transfer** convened at 1:30 PM in the Ponderosa "A" Conference Room of John Ascuaga's Nugget Hotel in Reno, Nevada on March 15, 2006. The topic for the discussion session (scheduled from 1:30 – 3:30 PM) was "Ethics in Agriculture." Ralph E. Whitesides, Extension Weed Specialist at Utah State University was the Chair and Moderator of the Session.

During the discussion session there were two presentations.

Ralph Whitesides provided an overview of "Agricultural Ethics" as outlined in the Council for Agricultural Science and Technology (CAST) issue paper number 29 published in February 2005. The issue paper and the presentation discussed a definition of ethics, how ethics relates to agriculture, and then explored three prominent ethical theories. The theories discussed included:

1. Rights theory
2. Utilitarian theory
3. Virtue theory

After introducing some theories related to ethics, nine ethical issues related to agriculture were proposed. They were:

1. Farm Structure
2. Animal Ethics
3. Food Safety
4. Environmental Impacts
5. International Trade
6. Food Security
7. Agricultural Biotechnology
8. Research Ethics
9. Trust in Science

After the list of ethical issues in agriculture was outlined, there was a presentation about the need for land-grant universities to take the lead and teach ethics because these institutions provide the human, technological, and informational input into the food system. Concluding remarks stated that our responsibility as scientists is to make every effort to understand and contribute to the resolution of ethical issues. After all, the word "ethics" means "way of life."

Robert L. Zimdahl, Colorado State University was the next presenter. Dr. Zimdahl has just published a new book titled "Agriculture's Ethical Horizon" and he was able to outline some of the chapter headings in the new book. After his brief introduction of the book, Bob talked about the ethical considerations of simply being good at production. He asked the question, "Is it good enough to be good at production?" The presentation that followed included discussion about:

- Different cultures have different moral codes and thus apparently different ethics.
- Ethics is a debate about what ought to be done.
- Most scientists use scientific value to judge ethics, however, we should judge based on the power of our reasoning and not on the facts.

- Ethical debates should be won on the basis of reason, not on the basis of data.
- It is essential to be true to your science and maintain an impartial and unbiased attitude.
- Is it ethical to take money for research work from major companies? If science is done well is it unethical? If you take money to conduct work does it move your work in a specific way?
- Is organic farming ethically better for the environment? Is the present system sustainable? If we backed away from the system in use today would society be willing to pay the cost?
- Is it ethical to till the soil instead of using pesticides if it causes more erosion?
- It appears that food on the table isn't the issue any longer, now it is the quality of the food on the table.
- Are we trying to guide agriculture from the bottom up?
- In modern society most of us are mostly utilitarian, we are looking for a net increase in happiness versus unhappiness.
- For many actions the consequences are the same but the intent is different. We should be intent on discovering why we act the way that we do and asking ourselves the question "Is somebody else doing the thinking? If so, who?"
- Ethically we should try to answer all of the questions.
- There is little money for research in production agriculture but plenty of funds to support biotechnology. If the money is used to conduct basic research is it ethical to use the funds to conduct any other work that you want to evaluate?
- GMO foods came about and it appears that if the cost goes up to produce that is fine.
- Why not label the food? It seems easiest to label food (similar to Kosher Food) and let society pay the price for non-GMO or organic foods.
- In a democratic society you should have the right to choose the kind of food you would like to consume. Why not label the food and let the people choose?
- "Sustainability" is the key to the entire discussion on food production.
- Ultimately, agricultural professionals should be able to adopt the same motto as the medical profession – Do no harm.

After the presentations by Drs. Zimdahl and Whitesides the audience was encouraged to participate in discussion about issues related to ethics and agriculture. Many of the topics that had been discussed came up for comment and debate.

The discussion session concluded at 3:30 PM.

During the course of the discussion session for Project 4: Teaching and Technology Transfer there were 27 people present (9 women and 18 men).

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2008 Chair for Project 4 will be: Dr. J.A. "Anita" Dille
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After the conclusion of the discussion session, Project 4 reconvened from 3:45 -5:15 PM for the presentation of 6 oral papers.

Project 4: Teaching and Technology Transfer adjourned at 5:20 PM.

PROJECT 5: WEEDS OF WETLANDS AND WILDLANDS

Chair: Stephen F. Enloe, University of Wyoming, sfenloe@uwyo.edu

Topic: Is current research on IWM in riparian areas meeting the needs of land managers or are we missing the boat?

Discussion Leaders: Stephen Enloe, University of Wyoming, Laramie, WY
Lars Baker, Fremont County Weed and Pest, Lander, WY
Tim Damato, Boulder County Weed and Pest, Boulder, CO

Participants: Approximately 40 with several flowing in from other sessions during the discussion.

A brief discussion was held concerning the overlap with the Project 1 paper session. It was recognized that many participants really wanted to attend both sessions. A proposal to merge the discussion sections for Projects 1 and 5 was discussed but the consensus was that this was not a good direction for the future. No clear solution emerged from the discussion regarding the overlap.

Lars Baker initiated discussion with a presentation on his thirty plus years of experience managing weeds on the county level in Wyoming. Lars pointed out his difficulties in attempting to extrapolate small plot research findings to large scale use. He also discussed how agronomic crop trials focus on controlling all species except the target crop that is being grown, while the rangeland focus is directly opposite – how to control a single or limited number of species allowing the remaining diverse species to grow. Lars pointed out several areas of research that he felt were very important to large scale weed management. These included larger-scale herbicide off-site movement and degradation studies, perennial weed biology and control with late fall treatments, tolerance of native plants to weed management, non-agronomic planting techniques for perennial grasses, and more integrative grazing management studies. Lars also expressed the frustration of too much applied research being locked up in scientific language which is not well understood by most land managers.

Tim Damato then presented a perspective on weed management for public “open spaces” from Boulder County, Colorado. Tolerance of native species to different herbicides was a key problem he faces in implementing weed management. Suggestions were made to develop a database of native species tolerance to herbicides used on range and wildlands and made web accessible. Planting methods for rugged areas was also a concern as much of the areas managed are equipment limited. Tim also discussed plant restoration issues when prairie dogs are present as they are a significant problem to successful restoration. Research ideas included screening species for tolerance to prairie dog herbivory.

Discussion followed that entailed restoration in high saline riparian areas (both natural and induced by saltcedar and other invasives). A general consensus was that rapidly restoring a diverse community following saltcedar control in often impossible. Planting monocultures of the most salt tolerant grasses such as alkali sacaton and inland saltgrass were discussed. The issue of episodic recruitment and restoration was also discussed in terms of being a serious limiting factor to success. Invasion of saltcedar across upland landscapes via stockponds was also presented as a major vector of saltcedar dispersal.
The issue of successfully establishing diverse plant communities repeatedly arose throughout the discussion. High failure rates were common when late seral species were immediately planted. However, policies that dictate immediate success and short term funding often force this strategy.

The session finished with a lengthy discussion on the apparent frequent disconnect between weed management decisions made simply based on policy and those made based upon science. It was made abundantly clear that Weed Scientists need to serve more as science advocates in order to help direct policy towards better weed management. Stakeholder input to granting agencies and more involvement in NIWAW was proposed as ways to do so. A web-based alert system to better inform the weed science community on upcoming legislation and measures was also proposed. Comments were made by Phil Westra who related the success of the National JGG initiative and Team Leafy Spurge Initiative to getting the right stakeholder groups involved. This allowed a better backing to push for more funding.

Finally, an October 2006 Saltcedar meeting in Fort Collins, CO was announced. (See http://www.tamarisk.colostate.edu/ for details). Overall, the discussion was very lively, with considerable input from most of the room.

Chair –elect: Mike Edwards, Dupont, michaeltedwards@usa.dupont.com
Chair –elect for 2007: Scott Steinmaus , ssteinma@calpoly.edu

PROJECT 6: BASIC SCIENCES
Chairperson: Bill Dyer
2006

Topic: Gold mine closure and reclamation: Water, weeds, and acid.
Led by Prof. Glenn Miller, University of Nevada, Reno

Basic Sciences Project 6 met Tuesday afternoon, March 14 with an attendance of approximately 8 people.

Glenn Miller led an interesting discussion on the current status of gold mine technology and reclamation in Nevada. The discussion provided an excellent opportunity for the few participants to expand their knowledge beyond traditional weed issues earn more about this extractive technology and its significant environmental and ecological impacts from an internationally recognized expert.

Gold Mining: The Technology

The state of Nevada provides 82% of the gold mined in the United States. Most mines are of the 'open pit' design, in which overburden is removed and the gold-containing ore is crushed and transferred to leach fields. These large piles of crushed rock are then sprinkled with cyanide, which leaches through the ore and solubilizes gold and other heavy metals. The leachate is collected, the gold precipitated, and the remaining water with dissolved metals is discarded.

Environmental Considerations

Open pit mining is by design a very destructive process and reclamation was not a priority or even a consideration until recent years. Many of the current environmental problems associated with mining were exacerbated in the late 1970's when the price of gold plummeted, several smaller mining companies went bankrupt, and abandoned mines.

Most open pit mines extend well below the groundwater table, requiring constant pumping to allow further excavation. For example, the large Gold Quarry mine pumps 70,000 gallons of groundwater per minute from the pit, a rate of extraction that most predict will have serious long-term impacts on water wells, springs, and surface waters. Mine closure results in the filling of open pits with groundwater and the creation of 'pit lakes.' Water quality of these lakes depends largely on the local mineral and heavy

metal constituents, and can range from good to very poor. Pit walls are often at 40º or greater, resulting in a high probability of instability and failure after mine closure.

In addition to solubilized gold, leachate from leach fields contains a number of other heavy metals including mercury, arsenic, lead, chromium, and selenium. Of these, mercury is the focus of most environmental concern, since it is volatilized during the roasting or extraction processes and is contained in dust that often blows offsite. Mercury emissions from Nevada gold mining operations are the suspected source of contamination in Idaho rivers and the Great Salt Lake in Utah.

The pH of leachate from gold-containing ore is usually at or below pH 3.0. This profoundly acidic water with dissolved heavy metals is one of the major contaminants from gold mines and is the focus for remediation concerns. Even after the pits are closed, rainfall events through leach fields release significant quantities of highly acidic leachate that must be contained or remediated.

Reclamation

Reclamation of open pit mines is a relatively recent phenomenon. After closure, 'artistic bulldozing' of leach heaps is often conducted in an attempt to simulate natural topography. Efforts are usually made to landscape using removed topsoil or at least soil from a silt-containing lower soil horizon. Revegetation models vary widely and are often based more on availability of seed than on restoration priorities. Plant species such as barley and alfalfa are sometimes planted along with perennial grass and legume mixes, in an attempt to establish some ground cover. Companies have learned that irrigation and fertilization are not desirable even in the year of establishment, since most planted species will die when these inputs are removed. Weed invasion during revegetation is usually not considered to be a problem, since the top priority is to get any plant species established on these sites. Reclamation standards usually require revegetation that is of equivalent quality to the surrounding unaffected habitat. Dr. Miller's informal survey showed that successful revegetation is more often the exception than the rule, and many supposedly reclaimed sites remain barren and highly erodable.

Even if revegetation of leach heaps is successfully accomplished, the continuous discharge of highly acidic leachate must be monitored 'in perpetuity.'

Project 6 Officers for 2007

Chairperson: Cheryl Wilen
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Chairperson-elect: Lynn Fandrich
Dept of Bioagricultural Sciences and Pest Management
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SUMMER BOARD MEETING
Western Society of Weed Science
29-30 July, 2005
John Ascuaga's Nugget Hotel
Sparks, NV

Members Present: Dirk Baker, Phil Banks, Janet Clark, Ron Crockett, Joe DiTomaso, Wanda Graves, Nelroy Jackson, Kasim al Khatib, Tom Lanini, Rod Lym, Tim Miller, Corey Ransom, Jill Schroeder, Phil Stahlman, Vince Ulstad, Kai Umeda, Joe Yenish

The meeting was called to order at 12:21 PM on Friday, 29 July, 2005 by President Phil Banks. Phil thanked everyone for their attendance, especially in light of making it perfect board attendance.

Phil Banks presented the meeting agenda for review and update. Committee reports which do not request any board action have been placed on a consent agenda and can be voted on as a block, unless specific questions or discussions arise. Nelroy Jackson moved and Phil Stahlman seconded to accept the agenda.

All members introduced themselves.

Previous board minutes were reviewed, as well as the process for capturing email discussions and votes on issues which arise between board meetings. Phil Stahlman moved and Nelroy Jackson seconded to accept the minutes as summarized and sent out to board members earlier for the March 7, 2005 board meeting, the business breakfast on March 10, 2005, and the post conference board meeting of March 10. 2005. Motion passed on a voice vote.

Financial Report. Wanda Graves.

The current financial report, through July 27, 2005, was circulated. The society's tax year is April 1 to March 31 of each year.
Discussion was held on the income and expenses for the Noxious Weed Short Course. Phil Banks mentioned that the society may want to consider a service contract with Celestine Duncan in the event of a tax audit.
Phil Banks reviewed the separate accounting process for each of the society's functions, yet the proceeds are commingled for efficiency purposes. Nelroy Jackson suggested that, as new members come on the board, it may be useful to have a short review process/orientation of society finances and other functions.
Phil Stahlman moved to accept the financial report, Kassim Al-Khatib seconded. Passed on a voice vote.

Immediate Past President's Report. Phil Stahlman.

Involved in developing a slate of candidates for WSSA positions. Bill McCloskey and Jesse Richardson were selected for the upcoming WSSA ballot.

Phil has brought back up the mission and vision statement development, which will be discussed later at this meeting.
Office or Committee Name: Past-President
Officer or Chairperson Name: Phil Stahlman
Date of Preparation (include year): July 7, 2005

Committee Activities during the Year:
Immediate Past Presidents of the NEWSS, NCWSS, SWSS, WSWS, CWSS, APMS, and WSSA are members of the WSSA Nominations Committee. Each is asked to nominate at least one consenting

individual from their organization and to rank all of the nominees for elected offices of the WSSA. Names of the top two ranked individuals for each office were submitted to the WSSA Board of Directors for final approval at their Summer Board meeting. Nominees from the WSWS were:

Vice President - four year term: Rod Lym
Member-at-large- four year term: Peter Dotray
Secretary - two year term: Bill McCloskey
Treasure - three year term: Jesse Richardson

Recommendations for Board Action: None
Budget Needs: None
Suggestions for the Future: None
Suggested Changes in Operating Guide: None
Current Committee Members: Phil Stahlman
Name of Person Preparing This Report: Phil Stahlman

Nelroy moved and Kassim Al-Khatib moved to accept the report. Motion passed on a voice vote.

Program Committee Report. Kassim Al-Khatib

Kassim reviewed the progress to date of the program for the upcoming annual meeting, including the general session, workshops, and possible symposia. Several speakers of local interest may be available. The Japanese knotweed symposium approved last year by the board has been postponed until the Portland meeting in 2007 due to more local interest in the weed at that meeting.

Four potential symposia were presented, one concerning conventional agriculture and three on invasive weed topics. Nelroy Jackson moved to accept the Program Committee report, giving the committee the authority to choose which symposia topics and speakers are selected. Motion died for lack of a second. Phil Stahlman moved to accept the report and that the program committee select the symposia. Rod Lym seconded the motion. The motion passed on a voice vote.

Office or Committee Name: Program Committee Report
Officer or Chairperson Name: Kassim Al-Khatib
Date of Preparation (include year): 7/18/2005
Committee Activities during the Year:

General Session:

The General Session will be scheduled for Tuesday morning of the meeting. Proposed speakers are: announcements and introduction of speakers by Kassim Al-Khatib; welcome remarks by James Young; presidential address by Phil Bank; keeping lake Tahoe healthy and blue by Dr. Charles Goldman; invasive species by Joseph DiTomaso.

Possible symposia:

The Board had approved last year a symposium on Japanese knotweed. However, the organizing committee decided to delay the symposium until Portland meeting because there is more interest in the weed in the Pacific Northwest.

Four symposia and one workshop have been proposed:

Symposia

1. Dr. Bob Wolf with Kansas State University. The title of this proposal is "What a Weed Scientist Should Know about Application Technology - Now and in the Future". Time requested 3 hours (speakers with discussion). This could be placed in the Education & Regulatory Section.

2. Dr. Lincoln Smith of the Exotic Invasive Weeds Research Unit/USDA-ARS Western Research Center. The proposal title is "Status of Biological Control of Knapweeds and Yellow Starthistle". Eight presentations at 20 min each with a 15 min. break in the middle (3 hours total).

3. Dirk Baker graduate student at Colorado State University. The title of this proposal is "Life after Graduate School". Time requested 2.5 to 3 hours for five presentations

4. Dr. Matthew Rinella (USDA/ARS) and Dr. Cynthia Brown (Colorado State University). The proposal tile is “Prevention or Large-Scale Management? Optimal Allocation of Weed Management Budgets”. Initially they requested full day for the symposia, however, they are open to cut it down to 3 to 5 hours.

Workshop

1. The only request for workshop came from April Fletcher. The workshop would be focus on riparian woody invasive plants, including Salt Cedar, Athel, Russian olive, Tree-of-Heaven, Siberian Elm, and possibly others. The workshop would follow the WSWS meeting, with a half-day overlap, beginning the morning of the last day of the WSWS meeting, and would continue until noon of the following day. There would be only one registration fee for WSWS and the Workshop. However, when people registered for WSWS meeting, they would indicate on the registration form if they planned to attend the Workshop. The workshop focus would be on practical, field application. Presenters would include primarily people who are, or have been, actively involved in, or who advise others on, field control of at least one of the species of concern. For topics where pertinent information varies from state-to-state (such as certification requirements, state weed laws), or agency-to-agency (e.g. BLM, Forest Service, FWS, etc.) hand-outs would be provided rather than try to address all the different variations. (Handouts would also be provided on the species and control methods, though those would be discussed in some detail.).

Research and Education & Regulatory Section Reports will be made by Corey Ransom and Tim Miller

The call for papers will go out with the September newsletter. Instructions for abstract submission and requirements for electronic format of the presentations will be included.

Recommendations for Board Action:
Since we have several proposals for symposia and workshop and the program time does not allow accommodating all proposals, our recommendation to approval three symposia including What a Weed Scientist Should Know about Application Technology, Status of Biological Control of Knapweeds and Yellow Starthistle, and Life after Graduate School. In addition, we would like to have the symposia Prevention or Large-Scale Management? Optimal Allocation of Weed Management Budgets as alternate symposia to replace any withdrawn proposal.

Budget Needs:

$500 honorarium and room and board for one night for Dr. Charles Goldman.

Suggestions for the Future:

Need to have ad-hoc committee to explore the possibility of organize a workshop at the end of the meeting to address the needs of our membership

Suggested Changes in Operating Guide:
None

Current Committee Members:
Kassim Al-Khatib

Name of Person Preparing This Report:
Tim Miller, Regulatory Section
Corey Ransom, Research & Education Section

Research Section Report. Presented by Corey Ransom.

Corey Ransom has contacted research section chairs and reminded of their responsibilities. Tim Miller moved to accept the report, Kassim Al-Khatib seconded the motion. Passed on a voice vote.

Office or Committee Name: Research Section Chair

Officer or Chairperson Name: Corey Ransom

Date of Preparation (include year): 18 July 2005

Committee Activities during the Year:
Chairs and chairs-elect for 2005 research projects were contacted in July via Email to verify contact information. The chairs and chair-elects were reminded of their responsibilities and asked to begin thinking about discussion section topics.

Chairs and chair-elects will be contacted in August and in October to encourage development of discussion section topics. Additional contacts will be made as needed to complete the research section program.

Recommendations for Board Action: None

Budget Needs: None

Suggestions for the Future: None

Suggested Changes in Operating Guide: None

Current Committee Members:

Project #	Title	Chair	Chair-Elect
1	Weeds of Range and Forest	Matt Rinella USDA-ARS 701 South 5th St. Miles City, MT 59301 406.853.2358 mrinella@larrl.usda.ars.gov	Cynthia Brown Colorado State University Bioag Sciences & Pest Management Ft. Collins, CO 80523-1177 970.491.1949 csbrown@lamar.colostate.edu
2	Weeds of Horticultural Crops	Pat Clay Univ. of Arizona 4341 E. Broadway Rd. Phoenix, AZ 85040-8807 602.470.8086 x313 pclay@ag.arizona.edu	Rich Affeldt Oregon State University 107 Crop Science Bldg. Corvallis, OR 97331-3002 541.737.9108 rich.affeldt@oregonstate.edu
3	Weeds of Agronomic Crops	Edward Davis 334 Leon Johnson Hall Montana State University Bozeman, MT 59717 406.994.7987 edavis@montana.edu	Roger Gast Dow AgroSciences 9330 Zionsville Rd. Indianapolis, IN 46268 317.337.3004 regast@dow.com
4	Teaching & Technology Transfer	Ralph Whitesides Plants, Soils, & Biometeorology UMC 4820 Logan, UT 84322-4820 435.797.8252 ralphw@ext.usu.edu	Scott Steinmaus Biological Sciences Department California Polytechnic State University San Luis Obispo, CA 93407 805.756.5142 ssteinma@calpoly.edu
5	Wetlands & Wildlands	Stephen Enloe Department of Plant Sciences University of Wyoming Dept. 3354 1000 E. Univesity Ave. Laramie, WY 82071 307.766.3113 sfenloe@uwyo.edu	Michael Edwards DuPont Agricultural Products 14611 Pecos Street Broomfield, CO 80020 303.280.3830 michael.t.edwards@usa.dupont.com
6	Basic Sciences	Bill Dyer Department of Plant Sciences Montana State University Bozeman, MT 59717 406.994.5063 wdyer@montana.edu	Cheryl Wilen University of California Coop. Extension UC Statewide IPM Program 5555 Overland Ave., Suite 4101 San Diego, CA 92123 858.694.2846 cawilen@ucdavis.edu

Name of Person Preparing This Report: Corey Ransom

Education and Regulatory Section Report. Presented by Tim Miller.

Tim discussed the proposed topics to date. Many are of key current interest and could serve as attendance draws for the meeting. Phil Stahlman moved to accept the report. Motion was seconded. Motion passed on a voice vote.

Office or Committee Name: Education and Regulatory
Officer or Chairperson Name: Tim Miller
Date of Preparation (include year): July 8, 2005
Committee Activities during the Year:

Planning for the 2006 Education and Regulatory section is beginning. I have visited with outgoing chair, Charlie Hicks, and incoming chair, Joe Yenish about potential topics. I think a Bioterrorism focus might be of interest to the membership, with speakers on the following subjects:

1. Overview of the Agricultural Bioterrorism Threat (weeds, pathogens, insects)
2. Requirements of the Agricultural Bioterrorism Protection Act of 2002
3. Safeguarding Laboratories, Pesticide Storage Sites, etc.
4. Visa Issues for International Students, Visiting Professors
5. Genetically Engineering a Bioterrorism Agent
6. Others?
7. Discussion

I anticipate a session of 2.5 to 3 hours will be adequate for the topic.
Recommendations for Board Action:
Budget Needs:

I may need to request travel funds for somebody from USDA, APHIS, FDA, or a university to discuss the Ag Bioterrorism Act as well as providing an overview of the threat.

Current Committee Members: Tim Miller, Charlie Hicks, Joe Yenish
Name of Person Preparing This Report: Tim Miller

Member at Large Report. Presented by Janet Clark.

Janet reviewed her interview with Tom Whitson on the history of *Weeds of the West.* She has submitted a written account of these discussions and points. It was strongly suggested by Tom and Janet that a memorandum of understanding be drawn up between WSWS and the University of WY. Janet recommended that the current relationship between these two organizations be continued, a memorandum of understanding drawn up, and the issue of insurance on the printed stock be explored. Discussion was held on options to increase sales and profitability from the book. Phil Banks asked Janet to follow up on the insurance aspects of current inventory and if necessary, obtain a bid on insuring such. Phil also asked Janet to draft a memo of understanding between WSWS and the University of WY.

Phil Stahlman complimented Janet on the thoroughness of her report. It is very helpful to have this information in hard copy. Kassim Al-Khatib moved to accept the report, seconded by Phil Stahlman. Motion passed on a voice vote.

Office or Committee Name: Member at Large
Officer or Chairperson Name: Janet Clark
Date of Preparation (include year): July 14, 2005

Committee Activities during the Year:

- Interview Tom Whitson regarding *Weeds of the West*
- Compile report on the history of *Weeds of the West*, including pricing rationale
- Request alternative pricing quote from Allen Press (Joyce Lancaster)
- Prepare income/expense analysis by year

Recommendations for Board Action:

- Write a Memorandum of Understanding between UWyo and WSWS regarding *Weeds of the West* copyright, scope of duties, pricing, ownership of materials, responsibility for updates, etc.

Budget Needs: $ 0

Suggestions for the Future:

- Continue current *WotW* printing arrangement with UWyo.
- Investigate whether/how *WotW* inventory is insured at UWyo.
- Investigate the likelihood of increased shipping costs in 2005-2006 and, if necessary, begin planning a price increase for 2007.
- Work with UWyo on a marketing plan. (UWyo conducts marketing, but perhaps WSWS can assist and broaden the scope. WSWS efforts should be coordinated with UWyo efforts.)
- Sales receipts for *Weeds of the West* should be kept in a separate account so funds are available for reprinting as needed. Once expenses (or projected expenses) are covered, the "profit" could go into the general fund for other uses.

Suggested Changes in Operating Guide:

None.

Current Committee Members: N/A
Name of Person Preparing This Report: Janet Clark

Local Arrangements Committee. Presented by Tom Lanini.

Tom pointed out that the hotel has in the contract that we will be assessed a $25 charge per room if we bring our own projectors. Tom will check with the hotel on that point.
The hotel will give us a tour of the facility today.
Corey Ransom asked whether a provision needs to be added to the Site Selection process regarding audiovisual equipment clauses in contracts.
The report was accepted by voice vote.

Office or Committee Name: Local Arrangement Committee
Officer or Chairperson Name: Tom Lanini
Date of Preparation (include year): July 18, 2005
Committee Activities during the Year:

The Local Arrangements committee (for the 2006 Reno meeting) has had limited activity up to this point in time. The committee has coordinated with Wanda Graves, in order to obtain a copy of the contract that had been agreed upon with the hotel (Nugget in Reno). The hotel staff have been prompt and very accommodating in meeting our needs for the summer board meeting.

Recommendations for Board Action: None at this time.
Budget Needs: None
Suggestions for the Future: None at this time.
Suggested Changes in Operating Guide: None

Current Committee Members: Tom Lanini. Tim Tripp, Jesse Richardson, Tim Miller, Jed Colquhoun, and Carol Mallory-Smith
Name of Person Preparing This Report: Tom Lanini

Constitution and Operating Procedures Report. Presented by Kai Umeda.

Kai will be reviewing the constitution and operating guidelines and report back at the March meeting. Phil Banks asked all officers to review their positions and get any suggestions for changes to Kai.

Office or Committee Name: CONSTITUTION AND OPERATING PROCEDURES REP.
Officer or Chairperson Name: Kai Umeda
Date of Preparation (include year): July 29, 2005
Committee Activities during the Year: nothing to report, will be assessing recommendations from committees and officers
Recommendations for Board Action: none
Budget Needs: none
Suggestions for the Future: none
Suggested Changes in Operating Guide: none
Current Committee Members: Kai Umeda
Name of Person Preparing This Report: Kai Umeda

WSSA Report. Presented by Nelroy Jackson.

Nelroy reviewed his report with the board. A key issue with WSSA now is development of the website and the relationship of this function and site with the regional societies.

Kassim Al-Khatib moved to accept the report, seconded by Tim Miller. Motion passed on a voice vote.

Office or Committee Name: WSWS representative to WSSA
Officer or Chairperson Name: Nelroy E. Jackson
Date of Preparation (include year): July 18, 2005
Committee Activities during the Year:

Here are the major decisions from the summer (July 9/10) WSSA Board meeting.

1. Declared that filling the DSP position was vital for the future of WSSA. Approved the total DSP Funding Plan of $164,379 level for 5 years (until 2011). There is a need for a memorandum of understanding between WSSA and ht regional societies with respect to the DSP. Donn Thill to work with WLC to update the MOP on the DSP position.

2. The BOD agreed to raise registration fees for the annual meeting by $55 per category, effective for the 2006 meeting.

3. The BOD approved the ACG contract for co-publication of WSSA journals. This should result in increased revenue to WSSA due to the formula and better marketing of the journals.

4. The BOD approved a new 3-year contract with AM&M for business management of WSSA. The 2006 fee will be $62,000, increasing by 5% per year.

5. The BOD approved a new 3-year contract with AM&M for meeting management of WSSA. The per attendee fee will be $32 in 2006, and increase by $1 each year.

6. The BOD approved appointment of a paid Technical Webmaster and a paid Content Editor, based on the recommendations of the ad hoc Website committee. The committee is further charged with evaluating the content of the website and making suggestions for design, maintenance and content of the website.

7. The nominations for the fall election were disclosed and the BOD approved of on-line voting this year. The nominees are:-

Vice-President:	Jeff Derr and Clarence Swanton
Member-at-Large:	Chris Hall and Joe Neal
Secretary:	Bill McCloskey and Tom Mueller
Treasurer:	Jesse Richardson and Dave Gealy

8. The BOD approved a new schedule of annual membership dues - $135 for regular members and $40 for students, with an additional $20 in each category for those who wish to receive print versions of the journals.

9. There was a suggestion that EPA (Don Stubbs) appoints a WSSA member to work with EPA on terrestrial issues like how Kurt Getsinger has worked with EPA successfully on aquatic issues.

10. Jim Kells was announced as the new WSSA Rep. to CAST.

11. Rob Hedberg's report covered NIWAW 6, NGO Alliance, Curt Deuser's detail, chlorosulfuron work with EPA and USDAS, the June congressional briefing on the interaction between Invasive species and Endangered species, research funding issues, weed science job series. He said that WSSA needs more input to EPA at early stages of Risk Assessment, and that WSSA should consider participation in the AAAS fellowship program at a possible cost of $50,000. This could be done through CAST.

12. The BOD reviewed the strategic plan and then broke out into small groups and decided on specific Action Items to be accomplished by Feb. and July 2006.

13. The board interviewed 2 candidates for the DSP and chose Lee Van Wychen who subsequently accepted the position and started work on July 18, 2005.

Recommendations for Board Action:
None

Budget Needs:
DSP position contribution of $15,000 annually

Suggestions for the Future:
None. A WSSA Rep. has to be appointed for a 3 year term starting in February 2006

Suggested Changes in Operating Guide:
DSP language after it has been agreed to.

Current Committee Members: None
Name of Person Preparing This Report: Nelroy E. Jackson

CAST Report. Presented by Rod Lym.

Rod reviewed his written report with the board. CAST has hired a new executive vice-president. His goal is to increase the recognition and visibility of CAST. Two new societies were voted in as members of CAST. A motion was made and seconded to accept the report. Motion passed on a voice vote.

CAST Report to WSWS

Rod Lym, CAST Representative
July 29, 2005

1. At the spring meeting in April the CAST board of directors met with three candidates and selected Dr. John M. Bonner to serve as its new Executive Vice President (EVP). Dr. Bonner assumed his duties on July 1, 2005. He succeeds Dr. Teresa A. Gruber, who tendered her resignation December 1, 2004. Dr. Bonner is particularly suited for the responsibilities required of CAST's EVP. He is proficient in both development and implementation of successful, profitable agricultural programs and altogether demonstrates broad, articulate leadership and initiative.

For the past 15 years Dr. Bonner has been employed by Land O'Lakes Purina Feed (LOL) LLC, first as Beef Production Manager and then as Beef Production and Marketing Manager. Most recently, he has served as LOL Training and Marketing Manager and Eastern Sales Manager. Dr. Bonner will be located in the CAST office in Ames, Iowa.

On 1 July Dr. Bonner told the membership "I have discussed this organization with many people in the past month; a common comment is that CAST is a very credible source of technical information. But, a great number of people that should know about CAST don't know what it is or what it does. Increased "market'" awareness will be my major initial focal point of my work here. I also will focus on understanding funding opportunities and then will work with all of our resources to assure a strong and growing future. I will coordinate closely with President Stanley Fletcher to learn about and expand our visibility and effectiveness in Washington, D.C."

2. Also in April, CAST met with Dr. Eric Sachs of Monsanto who is helping to organize an new enterprise---the Consortium for Science and Society (CSAS). The CSAS has a vision for an integrated, cooperative network of institutions, societies, associations, non-governmental organizations, federal agencies, and foundations that would work together as an advocate for scientific communication. The group plans to increase public understanding of science and technology by sparking societal interest in new advancements in engineering, medicine, nutrition, agriculture, food biotechnology, and other rapidly expanding areas of science. The consortium would be a national program that would work with existing entities to coordinate and facilitate, but not replace or compete with them.

Goals of CSAS include creating a science and information website; implementing a rapid, peer-reviewed, on-line journal; building functional linkages and a partnership between organizations; identifying and developing programs that will prepare scientists to communicate; and engaging the journalism community by offering science education programs and building a topical directory of scientists who will engage and work with journalists on topical and emerging issues. The CAST National Concerns Committee passed a motion stating that "CAST should stay engaged in the development of the Consortium for Science and Society" and plans to monitor the organization's progress.

3. Dianne Russell with the Institute for Conservation Leadership (ICL) and Peter Bloome along with Dick Stuckey gave an update on the CAST-ICL CLCA (Cultivating Leadership for a Changing Agriculture) program during the April meeting. Following discussion, a decision to continue the

relationship with ICL and the CLCA program was agreed on in general. Several proposals to continue this program are under discussion with potential funding again by Kellogg.

4. Two societies were voted in as members of CAST in April. They are the American Association of Pesticide Safety Educators, an organization that supports pesticide risk-reduction programs to protect human health and the environment. AAPSE trains and certifies 500,000 pesticide applicators. The second was the Council of Entomology Department Administrators which is affiliated with the Entomological Society of America. The ESA has been a member of CAST in the past, but dropped membership due to financial constraints.

5. An issue paper of interest to WSWS members titled "Postcommercialization Gene Flow from Biotechnology-derived Crops" is in the writing stage. A symposium is in development and an issue paper will come out of that effort.

A break in committee reports was taken to discuss the position of Treasurer/Business Manager position. Wanda Graves was asked to review the position from her perspective.

Key Points Made by Wanda:

- Began her position in June 1989, with the March 1990 annual meeting being her first annual meeting (held at the same hotel as the upcoming annual meeting.)
- Few responsibilities have changed in this position in the 40 years in which it has been held by 2 individuals. If the society is changing, does the business manager position need to change as well?
- Estimates she spends about 20 hours per week conducting business for the society, with the majority of that being financially related. Duties have included record keeping, tax management and filing, working with all committees, especially local arrangements and sustaining membership, proceedings and research editor interaction and coordination of printing, delivery and filling orders, label preparation, receiving monies for meeting support (breaks, meal functions, etc.), newsletter and other print activities for bulk mailings, preparation for upcoming annual meetings, relationship with facilities management, etc.
- Observes that having a person to talk to seems to be important to society membership. Having an individual who has a heart for the WSWS is important.

Jill Schroeder facilitated a discussion on the Treasurer/Business Manager position. Breakout sessions were conducted, with each of three groups asked to define their perception of the duties of the position, with a written list of essential and desired duties, and their perception on the qualifications of the person to fill those duties and responsibilities, with a written list of essential and desired qualifications. Discussion was held on these results. A large degree of similarity existed between the groups, which was encouraging.

From these lists of duties and qualifications, Ron Crockett agreed to draft an overall list of duties and responsibilities from which a job description could be drafted. Phil Stahlman agreed to draft an overall list of candidate qualifications for the job.

Upon presentation of these master lists, discussion was held on drafting a specific job description. Discussion was held on members who could make up the search committee. The search committee needs to be the initial screening mechanism, thus should be efficient in size. Phil Stahlman will chair the committee, with Kassim Al-Khatib, Joe Yenish, Jesse Richardson also on the committee. The committee

will draft the job description and submit to the board for review and approval. Phil Stahlman will also contact Paul Ogg about serving on this committee.

Phil Stahlman reviewed the essential and desired qualifications of the successful hire.

Essential Qualifications:

- Energetic and self-motivated individual with training and/or experience in accounting, budgeting, and business management.
- Proficient in the use of computers, electronic communication such as word processing, spreadsheet, database and accounting software.
- Skilled in time management and organization.
- Strong written and spoken communication skills in English, and good telephone etiquette to convey a warm and friendly, professional image.
- Ability to work independently and with a diverse constituency.

Desired Qualities:

- Background or familiarity and appreciation for weed science, natural resource preservation and management, or biological sciences.
- Skilled in public speaking, leadership, and consensus building.
- Experience in marketing and promotion, public relations, and/or fund raising.
- Experience in editing and design of promotional literature and website content.
- Knowledge of regulatory and policy dynamics.

The committee will seek to draft and circulate the job description to the board by August 10, so the job announcement can be included in the next newsletter and released for posting. Utilizing WSSA and regional society list serves and other job posting sites were discussed. A general discussion was held on the timeline and interview process, and the transition from Wanda to the new person. The search committee will have the flexibility to suggest a hire date and the overlap period for the current and new business manager.

Nelroy Jackson moved to authorize the three constitutional officers - president, president-elect, and secretary to have authority to develop and negotiate the contract for the position. The motion was seconded by Tim Miller. Motion passed on a voice vote.

Returning to the committee reports, Phil Stahlman moved to approve all committee reports as presented, Ron Crockett seconded the motion. The motion passed on a voice vote.

Finance Committee Report. Presented by Janet Clark.

The committee has suggested increasing meeting registration by $25. Discussion was held on the overall society finances and income sources. Rod Lym moved to increase annual preregistration fees to $150 for regular members and on-site registration fees to $200. Nelroy Jackson seconded the motion. Discussion was held on how this may influence attendance. The favorable room rates for this next meeting will help offset an increase in registration fees on overall meeting costs for attendees. Question was called. The motion passed on a voice vote.

Phil Stahlman moved to raise the annual membership fee to $35, having it included in the new registration fees. Tim Miller seconded the motion. Members not registering the annual meeting would be billed this fee. Question was called. The motion was defeated on a voice vote.

Discussion was held on the distribution of investments. The Finance Committee does not need further approval from the board to bring the distribution of investments in line with previously authorized guidelines of 65% stocks:35% bonds.

Discussion was held on creating a separate account for managing funds of the *Weeds of the West*. Nelroy Jackson reminded the board that this discussion has been held at least two previous times as to the reasoning for not creating a separate account. The Finance Committee is responsible for following these previously provided guidelines.

Office or Committee Name: Finance Committee
Officer or Chairperson Name: Jesse M. Richardson
Date of Preparation (include year): July 26, 2005
Committee Activities during the Year: The Finance Committee met at the annual WSWS meeting in March to audit the Treasurer's records and accounting books. It is the Finance Committee's opinion that both the Treasurer and the Investment Advisor are operating according to the WSWS Investment Policy Guidelines and Objectives.

As of June 30, 2005 the RBC Dain Rauscher mutual funds and fixed asset account balances were $168,188 posting a net gain of $934, or 0.55%, since Dec. 31, 2004. Current asset allocation is 74% stocks and 26% bonds, which is out of line with the society's target allocation of 65% stocks and 35% bonds. This is largely due to the excellent performance of our stock fund in 2004 (see recommendations below).

As of June 30, 2005, the money market savings account (Newark) had a balance of $79,016.47 and the checking account (Newark) $2153.16.

The present balance in the Newark money market savings account represents an excess of approximately $49,000.00, when considering what is required by the Treasurer to run the fiscal needs of the society ($30,000).

The Finance Committee was charged with determining if registration fees should be increased to keep up with expenses. Upon evaluating the income versus expenses of running the annual conference from 2001 to 2005, we found that the society generated an average excess of $3657. Upon reviewing our investments in the RBC Dain Rauscher funds over the same period, however, it is apparent that those funds are shrinking as we have been withdrawing more money than is being created by the growth of the investments. This has been necessary to cover the costs of running the society (see recommendations below).

In the past, the Weeds of the West income and expenses have been run through the general funds of the society. When funds for reprinting the book have been required, it has been necessary to liquidate society assets. This has made it somewhat difficult to track our actual fiscal health, depending on when those funds were needed. If the reprinting payments are made immediately before a financial report is prepared, it gives the impression that we are losing ground. In contrast, if we receive proceeds from the sale of the book immediately before preparing a report, it gives the opposite impression (see recommendations below).

Recommendations for Board Action:

1.) Annual meeting - we recommend that the cost for pre-registration and registration at the door be increased by $25. This would increase pre-registration from $95 to $120, and registration at the door from $125 to $150. For pre-registration, this represents an increase of 26.3%. The board raised the cost

of pre-registration before the 2004 meeting from $75 to $95, a 26.7% increase. If the present recommendation is approved, it will mean a combined increase in the cost of pre-registration of more than 50% in two years. We feel this increase is necessary to keep up with expenses. We do not recommend an increase in student registration costs.

2.) Investment distribution – we recommend that funds be moved from stocks to bonds to bring our distribution into conformity with the 65%-35% target.

2.) Weeds of the West – we recommend that a separate account be created for managing funds of the Weeds of the West, one that combines quick liquidity with interest-bearing features. To open this account, the $49,000 excess which we presently enjoy in the Newark money market savings could be utilized.

Budget Needs: none
Suggestions for the Future: covered in recommendations
Suggested Changes in Operating Guide: none
Current Committee Members: Phil Munger, Rick Boydston, Jesse Richardson, Steve Eskelsen
Name of Person Preparing This Report: Jesse M. Richardson

Nominations Committee Report. Presented by Phil Stahlman.

Ron Crockett was asked whether he would stand for nomination for president-elect. He agreed to having his name put in nomination.

Phil Stahlman indicated that Kirk Howatt could be contacted to stand in nomination for secretary. Phil will talk to Jeff Koscelny about contacting Kirk.

Rod Lym moved to accept the current nominees for the election ballot. The motion was seconded by Phil Stahlman and the motion passed on a voice vote.

Office or Committee Name: Nominations Committee

Officer or Chairperson Name: Jeffrey Koscelny

Date of Preparation: July 26, 2005

Committee Activities during the Year:

The committee has been actively preparing a slate of nominees from the active membership of the Society for the offices of President-Elect, Secretary, Chair-Elect of the Research Section and Chair-Elect of the Education-Regulatory Section.

Recommendations for Board Action:

1. The committee formally requests the action of the Board of Directors at the summer business meeting concerning nominees to be placed on the ballot to be circulated to the membership by October 15, 2005:
   <u>President-Elect</u>:
   - An extensive list of individuals have been contacted and declined the opportunity to run for this position at this time. Those contacted include: Jesse Richardson, Neal Hageman, Vince Ulstad, Monte Anderson, Vanelle Carrithers, Celestine Duncan, Nelroy Jackson and Bill

Kral. Charlie Hicks has accepted the offer to be a nominee for this office. Other individuals being considered include: Peter Forster (out of country until next week), John Orr and Bill Cobb.

- Board action requested:
  - Approve Charlie Hicks as a nominee for this position.
  - Provide list of additional individuals in the Private sector for this position.
  - If Chair is unsuccessful in finding Private sector nominees, consider having a Public sector candidate on the Ballot.

Secretary:

- Pam Hutchinson, University of Idaho, ID - ACCEPTED
- Drew Lyons, University of Nebraska, NE – Hesitant due to other society commitments but willing to accept if unsuccessful in finding another nominee.
- Board action requested:
  - Approve Pam Hutchinson as a nominee for this position
  - Provide list of additional individuals in the Public sector for this position or request Drew Lyons to accept.

Chair-Elect Research:

- Tim Prather, University of Idaho, ID - ACCEPTED
- Rick Boydston, USDA-ARS, WA – ACCEPTED
- Board action requested:
  - Approve Tim Prather and Rick Boydston as nominees for this position.

Chair-Elect Education and Regulatory:

- Mike Edwards, DuPont, CO
- Vint Hicks, Monsanto, AZ
- Board action requested:

  Approve Mike Edwards and Vint Hicks as nominees for this position.

2. It is also requested that the board consider the feasibility of electronic ballots for those members with email addresses. Preliminary conversation with website editor Tony White resulted in the following response:

   "Sounds like a good plan to me. Programming should only take a week or two to complete. I would require members to log in to the site and then vote. This would allow us to track votes and prevent multiple voting from some of the spammers that visit the site from time to time. Just give me a timeline as to when it needs to be completed and how many voting segments are required so I can start setting things up."

Budget Needs:
- Standard mailing costs for mailing ballots. Postage cost could be reduced if electronic ballots were employed.

Suggestions for the Future:
None at this time.

Suggested Changes in Operating Guide:

- Operating guide currently states:

(1) Present a slate of nominees from the active membership of the Society for the offices of President-Elect, Secretary, Chair-Elect of the Research Section, Chair-Elect of the Education-Regulatory Section, and the WSSA Representative (on appropriate years) to the Board of Directors for their approval at the Summer Business Meeting.

(2) Contact the approved nominees regarding their willingness to serve and obtain a written resume of the candidate's employment, title, educational activities, and awards.

- **Suggested change:**

(1) Committee shall prepare a list of nominees from the active membership of the Society for the offices of President-Elect, Secretary, Chair-Elect of the Research Section, Chair-Elect of the Education-Regulatory Section, and the WSSA Representative (on appropriate years).
(2) Committee chair shall contact nominees regarding their willingness to serve.
(3) Nominees will be presented to the Board of Directors for their approval at the Summer Business Meeting.
(4) Committee chair will obtain a written resume of the candidate's employment, title, ~~educational~~ activities, and awards.

- **If electronic ballots are implemented, changes may be required in the following operating guide entry:**

(3) Compile the list of nominees in ballot form and resumes and it forward to the Treasurer-Business Manager for mailing to the membership by October 15. The ballot should contain Committee Chair's address for return mailing. Ballots are due at the discretion of the Chair, generally by January 15.

- **Suggested change:**

(3) Compile the list of nominees in ballot form with resumes and forward to the website editor for electronic mailing to the active membership with valid email addresses. For those members without email accessibility, the Treasurer-Business Manager will mail a paper ballot. Ballots will be issued by October 15. In either case, completed ballots will be returned to the Committee Chair. Ballots will due at the discretion of the Chair, generally by January 15.

Current Committee Members:

- **Jeffrey Koscelny (Chair)**
- **William McCloskey (Past-Chair)**
- **Robert Parker (first-year member)**
- **Phillip Stahlman (Immediate Past-President and board contact)**

Name of Person Preparing This Report:

- **Jeffrey Koscelny**

Membership Development Report. Presented by Corey Ransom.

The future direction and activities of this new adhoc committee was discussed.

Office or Committee Name: Membership/Recruitment committee
Officer or Chairperson Name: Lisa Boggs
Date of Preparation (include year): June 15, 2005
Committee Activities during the Year: We are a newly formed committee and haven't had a lot of time to do a whole bunch. Currently, sub-committees are working on different angles for membership numbers and recruitment in areas we seem to be lacking members in. Hopefully, these sub-committees will yield information we can turn into action plans during the meeting in Reno in 2006.

Name of Person Preparing This Report: Lisa Boggs
Phil,
Since my report was sent, some ideas have come in from some committee members and I wanted to pass these along. It seems like everyone is using the Colo Springs meeting as their "prime" meeting example that will help us attract more participants. Some reasons for this include the price of the motel and food

in the area (economical seems to be an important factor for many of the extension people) and the program that was conducted. Issues that deal with practical weed control methods instead of the DNA and intracacies of the plant chemistry. Some of my committee members say they understand the importance of the DNA research but it doesn't help them much in the field and I agree with that. Several have mentioned a weed tour would be a nice addition as well. Realizing that this may be difficult in some areas we meet in in March, could we modify this to include a tour of a university facility or something similar that may generate some interest? Hope this gives you more to take to the committee meetings. I am slowly getting some response in but not a lot. This does give us a few things to think about, and I think they are all good points. Have a successful meeting!!

Smiles, Lisa

Site Selection Committee Report. Presented by Phil Banks.

Phil indicated the committee has not worked extensively on potential sites for the 2009 meeting. A general recommendation has been made to consider the Denver vicinity. The committee requests that the board indicate if they do not want to pursue the Denver area. The committee needs to determine where the WSSA is considering for their 2009 meeting location. The committee needs to be aware that the board had earlier turned down the Denver venue under consideration.
No board action was taken on the committee suggestion to select a set of 4 permanent sites for the annual meeting.

Site Selection Committee – Summer 2005 report

2009 Meeting Site

1. Propose we select the Denver Tech Center for 2009 site since we did the site review last fall

City	Hotel	Date	Rates & fees	Comments
Denver, CO	Denver Marriott City Center	March 8-14, 2008	$149, 75 rooms at prevailing per diem (currently $112)	627 guest rooms and suites, and 25,000 sq. ft. of meeting space. Onsite restaurants, full business center, high-speed Internet access, pool, sauna, valet and self-parking . Located downtown, walking distance to shopping, dining, entertainment. http://www.denvermarriott.com

2. If the Denver site is not acceptable, the board needs to decide if the Southwest cities proposed are acceptable to get Allen Marketing to initiate a search.

Locations that have been discussed are Albuquerque, Tucson, Phoenix (so New Mexico or Arizona).

3. Propose the board consider changing the way we select sites. The constant shuffle of new cities and new hotels creates workload issues for everyone, and does not do anything to improve the meeting or attendance.

Proposal

1. Have a permanent set of 4 locations and hotels that we rotate to all the time. Potential sites – Denver (Marriott Tech Center), Portland, Reno (John Ascuaga Nugget Hotel), Tuscon

2. Have 1 site every 5th year that is a new site
3. We would only change the permanent sites if the hotel no longer met our needs – price, condition, etc. We would focus on finding a new hotel in that permanent city.
4. If a set of cities is not acceptable, we should consider a relationship with one hotel chain similar to NCWSS relationship with Hyatt. Hyatt also provides a scholarship due to this meeting relationship. This would greatly simplify the selection process and would allow easy sharing of facilities needs and setup between each years sites – since the same chain of hotels tend to have the same facilities.

Education: Distance Education (Adhoc) Committee Report. Presented by Tim Miller.

The report was presented and discussed in general.

Office or Committee Name: Education (Adhoc) Committee – Distance Education Sub-Group
Officer or Chairperson Name: Tracy Sterling
Date of Preparation (include year): June 30, 2005
Committee Activities during the Year: The Education subgroup for Distance Education has met its long-term goal of developing web-based Weed Science educational materials for multiple type learners. Many lessons have been developed (see list from WSWS web site) through funding from the American Distance Education Consortium (ADEC). Ten of these lessons have been published in the peer-reviewed, on-line journal, *Journal of Natural Resources and Life Science Education* (JNRLSE). The funding provided by WSWS was used to set up the WSWS website as a sibling site to the http://croptechnology.unl.edu website and showcase those lessons specific to Weed Science.

Tony White did a wonderful job of summarizing the current Lessons at the WSWS website (http://www.wsweedscience.org/Lessons/lessons.asp). Please see the list that follows.

The Basic Sciences (Project 6) Discussion Section began a dialog with anyone teaching MOA/herbicide resistance management at the graduate or undergraduate level. About six individuals discussed the potential of offering students distance courses in herbicide MOA even though student numbers might be low. Bill Dyer queried the WSSA listserve and received a positive response that such a course is needed. He then set up a listserve hosted by Ed Lushei (UW-Madison at http://forum.weedecology.net where one can self-register to access the bulletin board/discussion group). From these discussions, Bill Dyer, Scott Nissen, and Tracy Sterling are partnering to offer an MOA course at a distance. We are in the initial planning stages, trying to understand the technology issues as well as the academic issues. Our goal is to offer a semester course at the Graduate level with multiple instructors where students would rely on materials at the croptechnology site. Our current time-line is to offer the course in Fall 2006.

Recommendations for Board Action:

Budget Needs: We will use the remainder of the original $5000 from WSWS to edit animations as per JNRLSE recommendations.

Suggestions for the Future:
Suggested Changes in Operating Guide: none
Current Committee Members: Tracy Sterling, Chair, Distance Education; Carol Mallory-Smith, Distance Education; Scott Nissen, Distance Education; Bill Dyer, Distance Education; Kassim Al-Khatib, Distance Education

Name of Person Preparing This Report: Tracy Sterling

http://www.wsweedscience.org/Lessons/lessons.asp

Crop Technology Lessons

Several online lessons, developed in part by several members of the Western Society of Weed Science, are available through the **University of Nebraska** to help users learn more about specific areas dealing with crop technology. Some of these areas include weed biology, herbicide resistance, genetically engineered crops, and pesticide mode of action. The lessons provide detailed information about the given topic with animation and graphics to complement what is being taught.

A complete list of available online lessons can be viewed through the **Library of Crop Technology Lesson Modules**

Check out the following lessons related to Weed Science:

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1. **What Types of Herbicides Exist and How Can They Be Used?**
   a. Herbicide Classification
   b. Practical Applications of Herbicide Physiology

2. **How Do Herbicides get into Plants and Then Move Throughout?**
   a. Transpiration: Water Movement in Plants
   b. Phloem Transport - *Under construction*
   c. Foliar Absorption and Phloem Translocation
   d. Root Absorption and Xylem Translocation
   e. Mechanisms of Cellular Absorption - *Under construction*

3. **How do Plants Make Herbicides Less Toxic?**
   a. Metabolism of Herbicides or Xenobiotics in Plants

4. **How Do Herbicides Kill Plants?**
   a. **Light-dependent Herbicides**
      i. The Interaction of Light with Biological Molecules
      ii. Plant Pigments and Photosynthesis
      iii. Herbicides that Act through Photosynthesis
      iv. **Lipid Peroxidation**
         1. Lipid Peroxidation Animation
         2. Lesson - *Under construction*

   b. **Amino Acid Synthesis Inhibitors**
      i. Inhibitors of Aromatic Amino Acid Biosynthesis
      ii. Branched Chain and Glutamine Inhibitors - *Under construction*

   c. **Lipid Synthesis Inhibitors**
      i. ACCase Animation
      ii. Lesson - *Under construction*

   d. **Microtubule Disruptors**
      i. Spindle Fiber Disruption Animation
      ii. Lesson - *Under construction*

e. Auxinic Herbicides

i. Auxin and Auxinic Herbicide Mechanism(s) of Action – Part 1
ii. Auxin and Auxinic Herbicide Mechanism(s) of Action – Part 2

f. Cell Wall Biosynthesis Inhibitors - ***Under construction***

5. Herbicide Resistance in Weeds and Crops

a. Appearance of Herbicide Resistance in a Weed Population
b. Herbicide Resistance: Mechanisms, Inheritance and Molecular Genetics
c. Overview of Plant Genetic Engineering

Publications Report. Presented by Kassim Al-Khatib.

Kassim presented each of the subcommittee reports and general discussion was held.

Office or Committee Name: Publications Committee Report
Officer or Chairperson Name: Kassim Al-Khatib
Date of Preparation (include year): 7/18/2005
Committee Activities during the Year:

Separate reports have been submitted by Proceedings, Research Report, Website, and Newsletter Editors.

Weeds of the West

One request was received to use photos from Weeds of the West and it fits under the guidelines for non-profit use and was granted. The committee would like to thank and support Janet Clark efforts to develop procedure and guideline for management of the book Weed of the West.

Recommendations for Board Action: None
Budget Needs: None
Suggestions for the Future: None
Suggested Changes in Operating Guide: None
Current Committee Members:

Kassim Al-Khatib, Chair
Joan Campbell-Proceedings Editor
Traci Rauch-Research Report Editor
Tony White-Website Editor
Pat Clay-Newsletter Editor

Name of Person Preparing This Report: Kassim Al-Khatib

Office or Committee Name: Publications (Newsletter)
Officer or Chairperson Name: Kassim Al-Khatib (Pat Clay – newsletter editor)

Date of Preparation (include year): 7/15/2005
Committee Activities during the Year:

One newsletter (post annual meeting) has been prepared since the annual meeting report. Submissions for the standard information (President's report, Washington report, etc) have been consistent, however, there has not been consistent information for general news such as events, new hires, etc. Submission deadlines are posted on the web site but an email to the membership prior to the deadline may help.

The deadline for the post board meeting issue will be August 10.

Recommendations for Board Action: None
Budget Needs: None from the editor standpoint. Copying and postage for mailing hardcopy
Suggestions for the Future: Consider email and web posting versions if budget warrants
Suggested Changes in Operating Guide:
Current Committee Members: Kassim Al-Khatib, Chair: Joan Campbell, Proceedings; Traci Rauch, Research Progress Report; Pat Clay, Newsletter; Tony White, Web Site

Name of Person Preparing This Report: Pat Clay

Office or Committee Name: Proceedings Editors
Officer or Chairperson Name: Joan Campbell and Traci Rauch
Date of Preparation (include year): July 2005
Committee Activities during the Year:

The 2005 Proceedings book is 160 pages. 240 books were printed by Omnipress, the printer we have used since 2003.

The abstracts, title, authors, and indexing information for the Proceedings was in a format similar to what we had before online submission began. In 2000, the deadline was moved from December 1 to February 1 since we had everything entered in a database. The data base output allowed for quick assembly of the volunteered papers portion of the Proceedings. In 2005, the information was not in this format.

Recommendations for Board Action: Possibility of moving the abstract deadline back to December 1 if we continue with the current format.

Budget Needs: Approximately $2000 for printing.

Suggestions for the Future: Webmaster and Proceedings Editor need to work cooperatively on data output for the Proceedings.
Suggested Changes in Operating Guide:
Changes made will depend what happens with online submission. The Webmaster should be discussing this with the editors in August.

Current Committee Members: Joan Campbell and Traci Rauch, co-editors
Name of Person Preparing This Report: Joan Campbell

Office or Committee Name: Research Progress Report
Officer or Chairperson Name: Traci Rauch
Date of Preparation (include year): July 18, 2005
Committee Activities during the Year:

Currently, the 2006 Call for Research Progress Reports is being updated. Changes will be made to clarify directions that may have caused problems in 2005. We will continue with the author and keyword indices. Call will be included in September Newsletter and be posted online in September. Increase member participaton in the Research Progress Reports by encouraging report submission in the WSWS Newsletter and on the WSWS website.

Recommendations for Board Action: None
Budget Needs: approximately $2000
Suggestions for the Future:
Suggested Changes in Operating Guide: Editorial committee chair should rotate through the different committee members and not be chaired by the President-Elect (who has too many other responsibilities such as the Program) but be the contact Board member.

Current Committee Members: Traci Rauch and Joan Campbell
Name of Person Preparing This Report: Traci Rauch

Office or Committee Name: Publications
Officer or Chairperson Name: Tony White
Date of Preparation (include year): July 2005
Committee Activities during the Year:

Several changes regarding the online registration and title/abstract submission are slated to be implemented for the 2006 Annual Meeting. Suggested online title and abstract submission changes for 2006 include:

1. Integrating the title and abstract submission sections into the same page on the website (eliminates the uploading feature).
2. Restructure some of the text boxes on the submission page to make the process easier and clearer to new members.
3. Make the overall page layout easier to follow.

Other Website Activity.

1. With the help of Tracy Sterling, the layout of the Online Lessons was updated to facilitate easier navigation and add newly developed lesson plans were added. A section devoted to Spanish version lessons is also being developed.
2. Pam Hutchinson requested a job posting section be added to the WSWS website. The decision was made to simply make a link to the WSSA website job posting page instead of designing and maintaining our own page. In addition, a link to jobs posted on the American Society of Agronomy website was also added to provide users with more job search options.
3. Phil Westra has requested posting presentation slides from the 2004 Salt Cedar Symposium. The file size of the presentations is large and requires a new page to be created and set up to allow the user to know file sizes before downloading a particular presentation slide set. This section remains under development.
4. Credit card payment through PayPal is currently being set up and will be available for users to pay for registration fees, annual dues (if not attending the annual meeting), or other payments due

to the society using a credit card. The secure site is slated to be tested and fully operational by September 1, 2005.

Recommendations for Board Action: None at this time.
Budget Needs: None at this time.
Suggestions for the Future: Provide more feedback regarding the site (positive or negative). To date, little outside input has been provided regarding the website content, layout, design, etc. Additional suggestions are always welcome to make the site better and more appealing to all.

Current Committee Members: Ad Hoc Website Committee Formed in 2004. Tony White, Chair; Joan Campbell; Neal Hageman; Mike Edwards; Brian Jenks; Margaret Rayda.

Name of Person Preparing This Report:

Kassim has received a request from a group in Canada to use some of the photos used in *Weeds of the West* in a training session. The photos would be destroyed after the session was completed. Phil Banks has also received a request for photo use. Discussion was held on how consistent this was with WSWS stewardship of our intellectual property. Phil Stahlman moved to deny the requests for use of the images. Kassim Al-Khatib seconded the motion. The motion passed on a voice vote.

Kassim presented the Poster Committee report, which summarized number of poster entries over the past years and how it relates to our number of owned easels. The membership prefers having all posters up and available for both days of the annual meeting, rather than half each day. Phil Banks will check into purchasing additional easels.

Office or Committee Name: Poster Committee
Officer or Chairperson Name: Cheryl Fiore
Date of Preparation (include year): July 5, 2005
Committee Activities during the Year: The easels and foam boards were packed up and transported from the meeting as arranged by Tim Miller. Transportation for the easels and foam boards to the March 2006 meeting has not been finalized.

Recommendations for Board Action: Last years "suggestions for future" asked the board to consider the purchase of additional easels and foam board to accommodate the increase in the number of posters presented at the annual meetings. The following numbers of posters have been presented at the annual meetings since 2000:

Year	Meeting Location	# of posters presented
2000	Tucson, Arizona	54
2001	Coeur D'Alene, Idaho	50
2002	Salt Lake City, Utah	66
2003	Kauai, Hawaii	87
2004	Colorado Springs , CO	72
2005	Vancouver, BC	63

During the early 90's only 20 to 24 posters were being presented at the meetings. At the 1996 meeting the numbers started to increase. We have been averaging approximately 65 posters since the late 90's. According the WSWS Operating Guide, the society owns 48 easels. Forty-eight easels would be adequate if the numbers have leveled out **and** two poster sessions are acceptable. The cost of a meeting room for an additional day vs. the cost of the additional easels, transportation costs and additional boxes for transportation and storage of easels and foam boards should be considered. The cost of additional easels, range from $18.00 to $40.00 a piece.

Budget Needs: None at this time.
Suggestions for the Future: None at this time.
Suggested Changes in Operating Guide: None at this time.
Current Committee Members:
Tony White (2006)
Cheryl Fiore, Chair (2007)
Linda Wilson (2008)

Name of Person Preparing This Report: Cheryl Fiore

Student Educational Enhancement Committee Report. Presented by Phil Banks.

The lack of industry representatives available to host graduate students has severely curtailed the functioning of this committee and program. Bill Kral has conducted a survey of industry on this issue. Phil Banks suggested discontinuing this committee, which is constitutionally directed.

Phil Stahlman moved to accept the committee recommendations to disband the committee. Rod Lym seconded the motion. Motion passed on a voice vote. The membership will be notified for a vote pursuant to constitutional guidelines. Phil Banks will consider formation of a new committee to combine some of the student activities which are still requested and of value to the society and its membership.

Phil Banks requested Dirk Baker draft a list of responsibilities for the Graduate Student representative to the board. Kai will add some wording to the Operating Guide regarding Member-at-Large coordination of the Student Night Out activity.

Office or Committee Name: Student Enhancement Committee
Officer or Chairperson Name: Bill Kral
Date of Preparation (include year): July 1, 2005
Committee Activities during the Year:
None
Recommendations for Board Action:
Discontinue this committee or place it in hiatus
Budget Needs:
None
Suggestions for the Future:
In a quick industry rep survey, it appears that increased territory size and responsibilities has taken away the energy and desire to have a student travel with the industry rep. While having a student see what industry does has value, the efforts required vs. internal needs makes it a chore rather than a joy in the work place.
Suggested Changes in Operating Guide:
Current Committee Members: Bill Kral, Kelly Luff
Name of Person Preparing This Report: Bill Kral
Herbicide Resistant Plants Committee Report.

Rod Lym moved and Kassim Al-Khatib seconded to allow the committee to post the definitions presented in the report on the WSWS website. The motion passed on a voice vote.

Office or Committee Name: Herbicide Resistant Plants Committee
Officer or Chairperson Name: Kirk Howatt
Date of Preparation (include year): July 8, 2005

Committee Activities during the Year:

A list of basic herbicide resistance terms per suggestions from the committee at the annual meeting was prepared in a one-page format. Definitions were formulated to provide fundamental meaning of each term. The list is intended to supplement resistance discussions and should allow regional application of the terms to specific issues because of the superficial nature of the definitions. Feedback from committee members has been incorporated in the draft provided with this report.

Recommendations for Board Action:

Approve Basic Resistance Terms for dissemination through the WSWS web page.

Budget Needs:

None

Suggestions for the Future:

Consider a second installment of herbicide resistance terms.

Suggested Changes in Operating Guide:

None

Current Committee Members:

Kirk Howatt, Mary Corp, Jim Harbour, Tom Beckett, Steve Seefeldt, and Monte Anderson

Name of Person Preparing This Report:

Kirk Howatt

Herbicide Resistance Terms for the Beginner:
What are they talking about?

Herbicide-resistant weeds cause concerns in crops and rangeland. While weed science professionals have been addressing weed resistance to herbicides for several years, clarity in terminology is important as new individuals join the discussion. A list of basic terms used in resistance discussions follows. For more information about herbicide-resistant plants, visit http://www.weedscience.org/in.asp or http://www.plantprotection.org/HRAC/.

Susceptible – A plant that is affected by a herbicide, typically resulting in the death of the plant when applied at the appropriate herbicide rate and plant growth stage.

Tolerant – A plant with the inherent ability to survive a herbicide and produce seed.

Resistant – A plant with the inherited ability to survive a herbicide rate that is normally lethal to the wild-type and produce seed.

Wild-type – A population of plants that responds to a herbicide similar to the original population. Plants are not resistant to any herbicide but may be tolerant to certain herbicides.

Biotype – A population of plants having a unique hereditary characteristic that separates it from the original population. Wild oat that survives fenoxaprop is a specific biotype of wild oat.

Species Shift – A gradual change in the weed species present in an area because of control practices that are implemented. Repeated application of one herbicide encourages weeds that tolerate or escape that herbicide to dominate the weed spectrum.

Mode of Action – The general method of herbicide activity, typically referring to the enzyme or protein affected. Herbicides are often defined and categorized by their modes of action.
Site of Action – The specific binding site of a herbicide, which is genetically determined.

Dominant Trait – A hereditary trait that is expressed completely with one copy of the genetic code. If either parent provides the resistance trait the offspring will be resistant.

Recessive Trait – A hereditary trait that is only expressed with two copies of the genetic code. Both parents must provide the resistance trait for the offspring to survive.

Resistance Mechanism – The specific method that enables plants to survive a herbicide.

Cross-Resistance – One resistance mechanism results in resistance to more than one herbicide.

Multiple-Resistance – More than one resistance mechanism results in resistance to more than one herbicide.

The following reports were accepted as a group by consent vote and not presented for individual discussion:

Office or Committee Name: Fellow and Honorary Members

Officer or Chairperson Name: Carol Mallory-Smith

Date of Preparation (include year): June 20, 2005

Committee Activities during the Year: Nominations have been requested in the WSWS Newsletter. We will ask that the nomination packages that are being carried over be updated. We will make some personal contacts to encourage nominations of deserving members.

Recommendations for Board Action: None

Budget Needs: None

Suggestions for the Future: None

Suggested Changes in Operating Guide: None

Current Committee Members: Carol Mallory-Smith, Vanelle Carrithers, Jeff Tichota

Name of Person Preparing This Report: Carol Mallory-Smith

Office or Committee Name: Necrology Committee

Officer or Chairperson Name: Amber Vallotton

Date of Preparation (include year): July 11th, 2005

Committee Activities during the Year:
* July 11, 2005: Submitted a notice for the upcoming August newsletter soliciting any names and information related to those who have passed on

Future activities:
* In winter of 2005, will contact the web master and place a notice on the list serve to obtain any information for colleagues of the society who have died

* As 2006 meeting approaches, will prepare the necrology report for the morning business meeting

Recommendations for Board Action: None

Budget Needs: None

Suggestions for the Future: I will document my activities, so as to have a readily available record that might aid the next chair of this committee (these records will be placed in the necrology packet to be passed on to the next chair)

Suggested Changes in Operating Guide: None

Current Committee Members: Amber Vallotton (Chair), Carol Mallory-Smith, Lisa Boggs

Name of Person Preparing This Report: Amber Vallotton

TO: WSWS Executive Committee

FR: Celestine Duncan, chairman

The Noxious Weed Short Course sponsored by the WSWS was held at Chico Hot Springs Resort located in Pray, MT, April 25th through 28th, 2005. We are only offered one session this year because of conflicts with instructor and conference center schedules. There were 40 people that attended including USFS, BLM, National Park Service, Fish and Wildlife Service, Dept. of Transportation, and County Weed Coordinators.

Instructors include: Dr. Rod Lym, Dr. Steven Enloe, Dr. Steve Dewey, Dr. Jim Jacobs, Dr. Fabian Menalled, and Celestine Duncan representing the Western Society of Weed Science. Gilbert Gale (USFS), Dr. Bret Olson (MSU), Gary Adams, USDA APHIS, Mary Mayer USDA, ARS, Melissa Brown, will also assist with the course.

Registration fees were increased from $425 per person to $450 for the 2005 course to cover additional facility costs. Balance in the NWSC budget is $24,465.78. Please give me a call if you have questions.

Office or Committee Name: Placement Committee
Officer or Chairperson Name: Bill Kra**l**
Date of Preparation (include year): July 1, 2005
Committee Activities during the Year:

Past chair, Pamela Hutchinson, was instrumental in coordinating with Tony White the website for job placement. This website ties into the national association's job postings.

Recommendations for Board Action:

Recommend discontinuing this committee. However, it is important to have a person (on the board) check on the website from time to time.

Budget Needs:

Suggestions for the Future:

Make a motion to disband this committee**.**

Suggested Changes in Operating Guide:

Current Committee Members:

Bill Kral

Name of Person Preparing This Report:

Bill Kral

Office or Committee Name: Public Relations
Officer or Chairperson Name: Brian Olson
Date of Preparation (include year): July 11, 2005
Committee Activities during the Year:

A press release discussing the events and activities at the 58th Annual Conference in Vancouver was compiled. The press release was sent to the WSSA and then to an e-mail list of farm magazines that had been compiled to Kai Umeda. The press release is below. Kai Umeda completed submitting the Continuing Education Units for Commercial Pesticide Applicators to the corresponding state organizations.

Vancouver, British Columbia was the host to 290 WSWS members who presented 63 scientific posters during two sessions and 93 scientific papers in seven research project sections. A highlight of the conference was a special symposium about herbicide chemistry versus genetically modified crops, and how these two will interact to provide management of future weed problems. In a second symposium, estimation of dose-response functions for pesticides were discussed. Additional sessions included developing strategies for weed control in specialty crops by maximizing limited resources, interpreting pesticide regulatory changes, understanding the ecological impact of invasive plant management, utilizing remote sensing as a tool for weed control in agronomic crops, and a discussion of managing weeds in riparian areas.

Students representing many universities of western states contributed 8 poster displays and 18 oral presentations. Outstanding poster displays and presentations were recognized for demonstrating excellence in basic and applied research. For a third consecutive year, students were given an opportunity for a "student night out" hosted by individual WSWS members who allowed them to informally discuss their future career options in weed science.

Roland Schirman of Washington State University and Nelroy Jackson of Monsanto Company (retired) were two members designated as WSWS Fellows. Kassim Al-Khatib from Kansas State University received the Outstanding Weed Scientist for the public sector, whereas Kelly Luff from Bayer Crop Science received the Outstanding Weed Scientist for the private sector. The Presidential Award of Merit was presented to Tony White for his tireless and dedicated efforts in developing and maintaining the WSWS website. At the conclusion of the business meeting, newly elected president Phil Banks of Marathon Agricultural and Environmental Consulting received the ceremonial hoe from outgoing president Phil Stahlman of Kansas State University and adjourned the meeting. Pictures of the graduate student winners, WSWS board of directors, society fellows, and award recipients can be viewed at the web site: http://www.wsweedscience.org/meeting/photos.asp .

The WSWS will reconvene in Reno, Nevada during March 14-16, 2006 for its 59th annual meeting. Contact Wanda Graves, WSWS Business Manager, at 510-790-1252 for more information.

Recommendations for Board Action:
NONE
Budget Needs:
Currently, there are no needs.
Suggestions for the Future:
NONE
Suggested Changes in Operating Guide:
NONE
Current Committee Members:
Brian Olson, Chair; Mark Ferrell; Milt McGriffen; Brad Hanson; Bill Cobb; Erin Taylor
Name of Person Preparing This Report:
Brian Olson

Office or Committee Name: Sustaining Membership
Officer or Chairperson Name:
Date of Preparation (include year): June 17, 2005
Committee Activities during the Year:
Neil Harker was added to the committee. The list of contacts for companies contacted in 2005 was forwarded to the committee chair, Lynn Fandrich, from previous chair Dennis Tonks. The committee chair received also from Wanda Graves copies of the 2005 request letters for new and continuing sustaining members. The committee is well positioned to send letters to request support in early September, 2005. The committee has also received input for additional names and companies to contact in September.
Recommendations for Board Action: None.
Budget Needs: None – requests will be sent electronically.
Suggestions for the Future: None.
Suggested Changes in Operating Guide: Sample letters for new and continuing membership support and a copy of the invoice could be added to the guide.
Current Committee Members: Dennis Tonks, Lynn Fandrich, Neil Harker
Name of Person Preparing This Report: Lynn Fandrich

Office or Committee Name: Awards Committee
Officer or Chairperson Name: Ron P. Crockett
Date of Preparation (include year): 19 July 2005

Committee Activities during the Year: There have been limited activities to this point. We encourage board members and others to solicit names for awards this year, and look to have those nominated but not awarded in previous years, to have sponsors reapply, and to encourage members to step forth and support those deserving of recognition.

Recommendations for Board Action: Encourage all board members to be aware of outstanding efforts on the part of Society membership and solicit or support the nomination packages, and resubmitting packages for those whose names were nominated previously, and who have continued to deserve recognition through continued excellence in their work responsibilities.

Budget Needs:
Not anticipated aside from cost of awards themselves. Use historical references.

Suggestions for the Future:
Continue to look at member's actions and recognize those most deserving of our admiration and praise.

Suggested Changes in Operating Guide: No changes anticipated.

Current Committee Members: Marv Butler, Past Chair, Ron P. Crockett, Don Morishita.

Name of Person Preparing This Report: Ron P. Crockett

Office or Committee Name: Legislative
Officer or Chairperson Name: Eric Lane
Date of Preparation (include year): 7/12/05
Committee Activities during the Year:

Thus far, the Legislative Committee has not met via conference call to discuss matters since the March annual meeting – largely an oversight on my part. Legislation appears to be moving forward in DC on several fronts:

1. There appears to be legislative agreement to proceed with tamarisk and Russian-olive legislation. Action may occur in the House before the August recess.
2. Congressional appropriations subcommittees are concluding their efforts for the session but more remains to be done to secure appropriations for the Noxious Weed Control and Eradication Act of 2004 as well as agency annual appropriations for noxious weed management and research.
3. Senate legislation has been introduced that would permit the National Park Service to offer its technical, personnel, and financial resources to surrounding communities. The U.S. Forest Service and BLM already have this authority and it has been used successfully to manage noxious weeds. NPS seeks authority for its units. Companion legislation in the House of Representatives is still forthcoming.

Recommendations for Board Action: None at present
Budget Needs: None at present
Suggestions for the Future: None at present
Suggested Changes in Operating Guide: None at present
Current Committee Members: Dawn Rafferty (past chair), Sandra McDonald (chair-elect)

OLD BUSINESS:

Phil Banks brought up the relationship of the Noxious Weed Short Course to the WSWS. Registration fees for the course are deposited into the WSWS bank account. Expenses for the course are paid by WSWS. WSWS is billed for services provided by Celestine Duncan and her company. However, this is not currently covered by a written agreement. Phil offered to work with Celestine on wording for an agreement formalizing this working relationship.

Phil Stahlman reviewed the draft efforts on a vision and mission statement, which was begun at last summer's board meeting. Phil led the board through the process of writing good, clear, concise mission and vision statements.

Imagine WSWS in 2015:
- What does the organization look like?
- Who are the members?
- What is it known for?
- With whom is it collaborating?

Phil will continue to work on drafting mission and vision statements.

Discussion was held on travel expenses to the summer board meeting. Currently the only board member who has expenses reimbursed is the business manager. Nelroy Jackson posed the question of whether having board members provide their own travel expenses may limit participation on the board.

NEW BUSINESS:

Dirk Baker brought up student reimbursement at annual meeting attendance. Currently, $10 per night up to 3 nights in the hotel where the meeting is held is available to students. Most faculty and students do not claim this reimbursement. Phil Stahlman moved to increase the rate to $15 per night up to 3 nights in the hotel where the meeting is held and must be presenting a paper or a poster. Tim Miller seconded the motion. The motion passed on a voice vote. The topic will be revisited at the March board meeting.

Janet Clark has agreed to have her name placed on the ballot for the position of secretary. Phil Stahlman moved to have her name added and the motion was seconded. The motion passed on a voice vote. The Nominations Committee will be notified of this addition to the ballot.

The meeting was adjourned at 1:06 PM on Saturday, 30 July, 2005.

Respectfully submitted,

Vince Ulstad
Secretary

WSWS Board Meeting
13 March, 2006
John Ascuaga's Nugget Hotel
Reno, NV

Members Present: Dirk Baker, Phil Banks, Vanelle Carrithers, Janet Clark, Ron Crockett, Joe DiTomaso, Mike Edwards, Wanda Graves, Pam Hutchinson, Nelroy Jackson, Kassim al Khatib, Rod Lym, Tim Miller, Nelroy Jackson, Corey Ransom, Jill Schroeder, Vince Ulstad, Kai Umeda, Joe Yenish

The meeting was called to order at 8:02 AM by President Phil Banks. The agenda was reviewed based on available presenters and those traveling.

The meeting agenda was approved as written. Motion made by Vanelle Carrithers and seconded by Kassim al Khatib. Passed on a voice vote.

Introductions were made.

The minutes of the summer board meeting were reviewed. Tim Miller moved and Corey Ransom seconded a motion to approve the summer board meeting minutes. Motion passed on a voice vote.

Wanda Graves reviewed the financial report of the society. The society is doing well financially. Wanda commented on the financial health of the society now as compared to when she first started. One new line item on the expenses of the society is the fees for PayPal, which is the fee service for having on-line bill pay for registrations and publications.

Wanda indicated no one had commented negatively on the increase in registration fees for the conference.

All records and supplies for the business manager position will be transferred from her facility to Las Cruces, NM at the end of the month. The new phone line for WSWS is already set up and several boxes of materials has already been shipped. A dedicated email address will be set up.

Program Committee Report. Presented by Kassim Al-Khatib.

193 papers, 3 symposia, several proposals for symposia have been submitted for next year's meeting. A project to conduct a perennial weed workshop was submitted, but will be targeted for next year's meeting. The title submission deadline was December 1, but several submissions came in yet in January. There are 2 poster and 2 paper cancellations from the printed program. Kassim reviewed the breakdown of papers and symposia presenters by section. He mentioned that a deadline for submitting PowerPoint files of papers and presentations should be included in the notification of timelines. Submission of presentations and potential modifications after submission were discussed.

Discussion on workshops vs. symposia was held. Federal employees are restricted from attending meetings, but can attend workshops and training. Workshop topics need to be regionalize relative to where the annual meeting is held so that non-members with interest in that topic will be drawn in to the society. Since meeting sites are set 2-3 years in advance, a topic of interest to that geography can be determined. Also, separate vs. dual registration, meeting space, hotel rooms, etc. all need to be considered in joint planning the annual meeting and a workshop.
Fitting such workshops into the program can constrain the program, so close discussion between workshop coordinators/planners and the program committee and board need to be maintained.

WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: Program committee
Officer or Chairperson Name: Kassim Al-Khatib
Date of Preparation (include year): Feb 27, 2006
Committee Activities during the Year:

A call for papers announcement was issued in the September newsletter with instructions for how to submit titles and abstracts on-line at the WSWS website. Deadline for title and summary submission was December 1, 2005 and deadline for submitting of the abstract and indexing information was February 1,

2006. Website Editor Tony White did an excellent job of setting up the website and transmitted the title to me on December 5, 2005. A few authors withdrew titles over the next month whereas several entries were accepted after that date but only one paper that did not appear in the program. The program was posted on the website on January 20, 2006. Seven hundred programs were printed and sent to Business Manager Wanda Graves.

Several symposia proposals were submitted for consideration but not included in the program:

1. What a Weed Scientist Should Know about Application Technology – New and in the Future". Due to large number of papers submitted to the 2006 WSWS meeting, the proposal was postponed to Portland meeting. The program chair for 2007 need to contact Bob Wolf at Kansas State University to resubmit the proposal.
2. Proposal by April Fletcher was submitted to conduct workshop/symposium on riparian weedy invasive plants. A committee was formed headed by Ron Crockett, April Fletcher, Janet Clark, and Celestine Duncan to plan the workshop. However, the committee decided that there was not enough time to prepare for the workshop/symposium. The plan is to explore having the workshop at Portland meeting.
3. There was a proposal from previous year to have symposium on Invasive Knotweeds. The proposal was developed by Vanelle Carrithers, John Brock and Celestine Duncan. However, the group decided to have the symposium at Portland meeting because the topic of the symposium fits the needs of noxious weed people in the Pacific Northwest.

The final program contains 86 volunteered papers, 77 volunteered posters, 5 invited presentations in the general session, a symposium on Status of Biological Control of Knapweeds and Yellow Starthistle (9 invited speakers), a symposium on Prevention or Large-Scale Management? Optimal Allocation of Weed Management Budgets (6 invited speakers), a symposium on Life after Graduate School (5 invited speakers), and the Education and Regulatory Section (4 invited Speakers). In addition, the program included "What's New in Industry" session. The student paper and poster contest has the following: 15 papers, 10 graduate posters and 2 undergraduate posters. Below are the submissions for each project.

Project	Posters	Papers	Student poster contest	Student paper contest
1. Range & Forest	17	33		6
2. Horticultural Crops	9	16	2	
3. Agronomic Crops	32	31	7	8
4. Teaching & Technology	4	11		
Wetlands & Wildlands	8	9	1	
Basic Sciences	7	6		1

Discussion topics for each project are:

Project 1: Quantify the value of weed prevention

Project 2: Three topics will be discussed including herbicide resistant weeds, the potential for developing herbicide resistance in horticultural crops (vegetables, orchards, turf, and ornamentals).

Project 3: Sustainability of no-till and conventional tillage farming systems.

Project 4: Ethics in Agriculture.

Project 5: Is current research on IWM of riparian areas meeting the needs of land managers or are we missing the boat?

Project 6: Gold mine closure and reclamation: Water, weeds, and acid.

The program committee with the help from Matthew Rinella obtained funding for the amount of $3,870 to support the symposium on "Weed Prevention or Control: Optimal Allocation of Weed Management Budgets". The funding can be used to support publication cost and visual aids. The funding can not be used for traveling. The objectives of the funding is to disseminate new advances in invasive weed monitoring and scouting to producers, state Extension personnel, federal agencies, and scientist and synthesize diverse information on invasive species risk assessment and invasive weed decision-making under uncertainty.

Recommendations for Board Action: None

Budget Needs: Maintain current support level for the General Session and Education & Regulatory speakers.

Suggestions for the Future: The Board needs to develop a procedure to solicit ideas for the symposium. It may require the involvement of the membership.

Suggested Changes in Operating Guide: Update Operation Guide with to have the date that the program should be posted on the website. The Program should be posted before January 20th on the website.

Current Committee Members: Corey Ransom-Research Section Chair
Tim Miller-Education & Regulatory Chair

Name of Person Preparing This Report: Kassim Al-Khatib

Research Section Report. Presented by Corey Ransom.
WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: Research Chair
Officer or Chairperson Name: Corey Ransom
Date of Preparation (include year): March 3, 2006
Committee Activities during the Year:
Research project chairs were contacted in June to confirm contact information and to remind them of their responsibilities. Project co-chairs were included on all e-mail correspondence. An e-mail was sent to chairs and co-chairs in September encouraging them to develop the discussion sections for each project. A request for discussion section topics and participants was sent in November, and follow up e-mail and phone contact was made until all discussion session information was gathered. Discussion section topics and participants were e-mailed to Kassim Al-Khatib (President Elect) for inclusion in the program. The draft of the program was reviewed and returned to the president elect prior to his sending it out to project chairs in January. A follow up e-mail was sent asking chairs to collect all presentation by March 1. Section chairs were further instructed to make a backup copy of all presentations in case of any technical difficulties at the meeting.

Recommendations for Board Action: None
Budget Needs: None
Suggestions for the Future:
Suggested Changes in Operating Guide:
Add additional instruction under research project chair position addressing presentation collection. "Contacts the presenters listed in the program and collects copies of each presentation by March 1."

Current Committee Members: Joe DiTomasso (Chair Elect)

Name of Person Preparing This Report: Corey Ransom

Education & Regulatory Section Report. Presented byTim Miller.

Tim reviewed the program for the section this year. Some funds will be utilized to support guest speakers and their travel expenses.

WSWS Officer and Committee Report (Business Meeting, March 2006)
Office or Committee Name: Education and Regulatory
Officer or Chairperson Name: Tim Miller
Date of Preparation (include year): March 2, 2006
Committee Activities during the Year:

The Education and Regulatory session for the 2006 annual meeting is complete. The session includes four topics/speakers:

Overview of the Agricultural Bioterrorism Threat (Doug Luster, Fort Detrich, MD)
Safeguarding Facilities Against Agricultural Bioterrorism (Pete Jacoby, WSU)
US Requirements for International Students and Visiting Professors (Susan Bender, UNR)
After the Event: Tracing Bioterrorism Agents (Bill Cobb, Kennewick, WA)

The session is set for 2.5 to 3 hours on Wednesday, March 15.
Recommendations for Board Action:

None

Budget Needs:

Travel funds for Doug will be necessary, as well as lunch costs for three of the speakers (Doug, Pete, and Susan). The $1,000 budgeted for this session should be more than adequate for these costs.

Current Committee Members: Tim Miller, Charlie Hicks, Joe Yenish

Name of Person Preparing This Report: Tim Miller

Immediate Past President Report. Presented by Phil Banks.

Phil Banks complimented the board on the process of hiring the replacement for the business manager. Jesse Richardson will give the report at the business breakfast. Phil Stahlman has put together a poster on the history of WSWS which was given at the WSSA meeting. Vanelle requested that the poster be posted on the website.

Revision of the wording for the relationship between business manager and the treasurer and the society should be defined for potential outside readers, such as the IRS.

WSWS Officer and Committee Report (Reno Meeting 2006)

Office or Committee Name: Immediate Past-President's Report
Officer or Chairperson Name: Phil Stahlman
Date of Preparation (include year): 8 February 2006
Committee Activities during the Year: President Phil Banks appointed the Immediate Past-President to chair an ad-hoc committee to recruit, screen, and recommend to the Board of Directors the most qualified applicant/proposal for Business Management Services to succeed retiring Business Manager Wanda Graves. Other members of the committee were Kassim Al-Khatib, Vanelle Carrithers, Paul Ogg, Jesse Richardson, Vince Ulstad and Joe Yenish. Desired qualifications were agreed upon and a position announcement was drafted at the 2005 Summer Board Meeting, and distributed through professional society list-serves and newsletters. Two conference call meetings were held and the Past-President worked with the selected applicant in drafting terms of a Service Agreement, which was sent to the committee for review and input, prior to submitting the committee's recommendation and the Service Agreement to the Board of Directors. The Board unanimously approved the committee's recommendation to enter into a contract with MARATHION Agricultural & Environmental Consulting of Las Cruces, NM (Phil Banks, President), for Business Management Services for two years (April 1, 2006 to March 31, 2008) at a compensation rate of $19,500 per year.

The Past President prepared a historical poster of the Western Society of Weed Science for display at the 50th Anniversary meeting of the Weed Science Society of Weed Science in New York, NY, and at this years meeting of the Western Society of Weed Science in Reno.

Recommendations for Board Action: The Board approved a slight modification in the wording of duties of the President-Elect to read "The President-Elect shall perform the duties of the President if he/she can not serve for reasons of incapacity or recusal". The revised wording must also be approved by membership to be adopted. Additional wording changes are needed to accommodate a non-employee in the position of Treasurer-Business Manager. My recommendation is to draft the necessary changes and decide when and how to present the question(s) to the membership.

Budget Needs: None
Suggestions for the Future: None
Suggested Changes in Operating Guide: See above
Current Committee Members: Phil Stahlman
Name of Person Preparing This Report: Phil Stahlman

Vanelle mentioned that Phil Westra has made a CD of the history of WSSA and given to WSWS. The CD will be entered into the archives of the society.

Nomination Committee Report. Presented by Phil Banks.

Jeff Koscelny did a very good job of coming up with a slate of nominees for the positions.

Ron Crockettt and Charlie Hicks ran for president. Ron was elected.
Pam Hutchinson and Janet Clark ran for secretary. Pam was elected.
Rick Boydston and Tim Prather ran for chair-elect of the Research Section. Rick was elected.
Mike Edwards and Vint Hicks ran for chair-elect of the Education-Regulatory Section. Mike was elected.

Jeff has requested the board consider the feasibility of doing electronic ballots. Some members do not have email addresses. About 100 some ballots were returned of about 505 members, thus about 20% of the membership are voting each year. Discussion was held on electronic balloting. A discussion will be held at the business breakfast to get a straw poll of the membership on this topic. If the membership responds favorably, a specific proposal would need to be drawn up for the summer board meeting.

Bob Parker will chair a committee to keep a running list of nominee slates and who have been approached to run for various offices so that future Nomination Committees will know who have been approached in the past.

WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: NOMINATIONS COMMITTEE
Officer or Chairperson Name: JEFFREY KOSCELNY
Date of Preparation (include year): March 1, 2006
Committee Activities during the Year:
The committee prepared a slate of nominees from the active membership of the Society for the offices of President-Elect, Secretary, Chair-Elect of the Research Section and Chair-Elect of the Education-Regulatory Section and submitted the slate to the Board of Directors for discussion at the summer board meeting.
Upon board approval of the slate of nominees, ballots were prepared and mailed to the membership for voting with the request that ballots be returned by January 15, 2006.
A total of 106 ballots were returned by the membership. The ballots were tallied by the committee chair on January 21, 2006 to determine the winners and the WSWS president was notified of the results.
The results of the election were as follows:

- President-Elect: Ron Crockett
- Secretary: Pamela Hutchinson
- Chair-Elect of the Research Section: Rick Boydston
- Chair-Elect of the Education-Regulatory Section: Michael Edwards

The committee also made a request to the board of directors at the summer meeting to consider the feasibility of electronic ballots for those members with email addresses. The board considered this request and made a decision not to conduct on-line ballots for the 2006 elections due to the lack of confidence that every voting member of WSWS is in the list serve. The board also requested the nominations committee make an announcement at the business meeting in Reno, follow-up announcement in the newsletter after the annual meeting and if needed, send a direct mailing to those members not in the list serve regarding on-line ballots for the 2007 elections.

Finally, the committee submitted some suggested changes in the operating guide for the nominations committee. The changes suggested included the following:

- **Operating guide currently states:**

(1) Present a slate of nominees from the active membership of the Society for the offices of President-Elect, Secretary, Chair-Elect of the Research Section, Chair-Elect of the Education-Regulatory Section, and the WSSA Representative (on appropriate years) to the Board of Directors for their approval at the Summer Business Meeting.
(2) Contact the approved nominees regarding their willingness to serve and obtain a written resume of the candidate's employment, title, educational activities, and awards.

- **Suggested change:**

(1) Committee shall prepare a list of nominees from the active membership of the Society for the offices of President-Elect, Secretary, Chair-Elect of the Research Section, Chair-Elect of the Education-Regulatory Section, and the WSSA Representative (on appropriate years).

(2) Committee chair shall contact nominees regarding their willingness to serve.
(3) Nominees will be presented to the Board of Directors for their approval at the Summer Business Meeting.
(4) Committee chair will obtain a written resume of the candidate's employment, title, ~~educational~~ activities, and awards.

- **If electronic ballots are implemented, changes may be required in the following operating guide entry:**

(3) Compile the list of nominees in ballot form and resumes and it forward to the Treasurer-Business Manager for mailing to the membership by October 15. The ballot should contain Committee Chair's address for return mailing. Ballots are due at the discretion of the Chair, generally by January 15.

- **Suggested change:**

(3) Compile the list of nominees in ballot form with resumes and forward to the website editor for electronic mailing to the active membership with valid email addresses. For those members without email accessibility, the Treasurer-Business Manager will mail a paper ballot. Ballots will be issued by October 15. In either case, completed ballots will be returned to the Committee Chair. Ballots will due at the discretion of the Chair, generally by January 15.

Recommendations for Board Action:

1. Poll the membership during the business session of the 2006 WSWS annual meeting to adopt the utilization of electronic ballots for future elections.
2. Accept the suggested changes to the nominations committee operating guide.

Budget Needs:

- None.

Suggestions for the Future:

- Begin the search for board of directors candidates at the annual meeting with follow-up during the summer months.

Suggested Changes in Operating Guide:

- In committee activities section.

Current Committee Members:

- Jeffrey Koscelny (Chair)
- William McCloskey (Past-Chair)
- Robert Parker (first-year member)
- Phillip Stahlman (Immediate Past-President and board contact)

Name of Person Preparing This Report:

- Jeffrey Koscelny

Local Arrangements Committee Report. Presented by Tom Lanini.

Everything is in good order for functions. The cables for projectors and computers are in place. Wanda indicated we have a preregistration of 312 attendees. The graduate student breakfast is set up for 50 each day, although 37 graduate students are preregistered. The business breakfast is set for 285 attendees. The spouses breakfast is set up for 25 attendees. Coffee breaks will be in the poster room.

Carol Mallory-Smith will be chair of the local arrangements committee for next year.

Fellows & Honorary Members Report. Presented by Phil Banks.

The committee has suggested changing the deadline for nominations for these awards. Phil will urge members to submit nominations and packages during his Presidential address.

WSWS Officer and Committee Report (Reno Meeting 2006)

Office or Committee Name: Fellows and Honorary Member

Officer or Chairperson Name: Carol Mallory-Smith

Date of Preparation (include year): January 16, 2006

Committee Activities during the Year:
Committee solicited nominations in each issue of the WSWS newsletter. The committee received one new nomination for Fellow from the Public Sector. One updated nomination from the Public Sector and two updated nominations from the Private Sector were received. No nominations were received for Honorary Member. There are two active files for the Public Sector and one active file for the Private Sector. The nominators of the unsuccessful candidates were notified that their nominee was not selected and asked to update the files for next year.

The recommendations to the Executive Board were that Joan Campbell, Public Sector, and Celestine Duncan, Private Sector, be honored as Fellows at the 2006 WSWS meeting.

Recommendations for Board Action: See change in the MOP.
Budget Needs: None except for the plaques which Executive Secretary orders.
Suggestions for the Future: Need to encourage more members to nominate candidates.
Suggested Changes in Operating Guide:
Change the requirements to be electronic submission only.

The deadline for reporting the selection of the nominees needs to be changed from December 15 because the deadline for nominations is December 1. It is difficult to make copies of materials, mail to committee members and have a response within 2 weeks especially if there is a need to request additional information from a nominee. However, electronic submission would alleviate some of this time crunch.

Current Committee Members: Jeff Tichota, Carol Mallory-Smith and Vanelle Carrithers. Vanelle Carrithers will chair the committee for 2006-2007. Jeff Tichota will be rotating off the committee.

Name of Person Preparing This Report: Carol Mallory-Smith

Awards Committee Report. Presented by Ron Crockett.

No new nominations were received. Applications held over from 2005 were reevaluated. Ron requested assistance in soliciting nominations and encouraging the membership to nominate members for awards. Several awards will not be given this year due to lack of nominations. Two nominees for private, 2 for public and none for leadership were reviewed. One staff award nominee was reevaluated from 2005.

WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: Awards

Officer or Chairperson Name: Ron P. Crockett
Date of Preparation (include year): 12 January 2006
Committee Activities during the Year:

1) The Committee solicited nominations for award nominees in the regularly scheduled WSWS newsletters through the year. Applications held over from 2005 were evaluated along with reports submitted.
2) Following a request of the President, a revised description of the criteria for awards was prepared and distributed for broader review and circulation among interested members and the Board. The final version should be available for review and discussion following direction from the board at the annual meeting in Reno.

Recommendations for Board Action: Accept the slate as proposed for the 2006 Awards.
Budget Needs: None, aside from the cost of the awards. ~$200 estimate.

Suggestions for the Future: Determine a system that streamlines the nomination process thus encouraging more nominations to be prepared and forwarded.

Suggested Changes in Operating Guide: none
Current Committee Members: Ron P. Crockett, Marv Butler, and Don Morishita
Name of Person Preparing This Report: Ron P. Crockett

Finance Committee Report. Presented by Phil Banks.

Stan Cooper, RBC Dain Rauscher, joined the board to review the finances of the society. The return on the society's investments for 2005 was 6.88%, which was better than the averages of the Dow Jones, Standard & Poor's, and NASDAQ. Our return in 2004 was 10.85%. Stan reviewed the investment funds in which the society's money is invested. We are allocated about 31% bonds and about 69% stocks. Of the stocks, about 21% are international, where much of the growth is coming from. All funds are with the American Funds Group, a very conservative funds group.

Phil Banks reminded the board that the society does not have a required policy of a set cash reserve level for operating expenses. He will ask the Finance Committee to review this and look into making a recommendation to the board and society.

WSWS Finance Committee Report
Office or Committee Name: Finance Committee
Officer or Chairperson Name: Jesse Richardson
Date of Preparation: March 3, 2006

Committee Activities during the Year:
The Finance Committee received quarterly updates on accounts and finances from Wanda Graves, WSWS Business Manager and Stanley Cooper, financial advisor RBC Dain Rauscher throughout 2005/06.

As of February 28, 2006, the account balances with RBC Dain Rauscher totaled $175,150, compared to $164,766 on January 31, 2005. Our 2005 annual gain was 6.88%, compared to 10.85% in 2004. Our

earnings compare favorably to the Dow (up 1.72%), S&P 500 (up 4.89%), and NASDAQ (up 1.84%). As of February 22, 2005, Stanley feels the assets are properly allocated* (currently 69% equity and 31% fixed income) and recommended no reallocation of assets at this time. The finance committee is in agreement with Stanley's recommendation.

As of February 28, 2006 the Newark money market account totaled $130,832, compared to $86,185 on January 31, 2005. The Newark checking account totaled $43,436, compared to $8,809 on January 31, 2005. The committee will audit the treasurer's records at the Reno (Sparks) meeting.

From April 1, 2005 to February 28, 2006, income for the society was $155,603, while expenses were $50,709. Income from Weeds of the West comprised $70,000 of the total.

The committee will meet in Reno, NV.

Current Committee Members: Jesse Richardson (chair), Rick Boydston, Phil Munger, Steve Eskelsen

Name of Person Preparing This Report: Jesse Richardson

*WSWS investment policy guidelines are 65% equity and 35% fixed income allocation.

Poster Committee Report. **Presented by Kassim Al-Khatib.**

Seventy-seven posters will be presented during the two sessions. Fifty easels are owned, so 30 easels were rented from WSSA at $5/easel + shipping. The poster session will be represented by the poster author.

Discussion was held on whether or not the society should purchase additional easels and on trying to hold all posters in one session rather than two separate sessions.

WSWS Officer and Committee Report (March Meeting 2006)
Office or Committee Name: Poster Committee
Officer or Chairperson Name: Cheryl Fiore
Date of Preparation (include year): February 24, 2006
Committee Activities during the Year:
Arrangements were made with Bob Parker to transport WSWS easels and foam board to the Sparks meeting in March. Tentative plans have been worked out with Bob Parker to bring the easels and poster boards back to Portland until the 2007 Annual Meeting.

Joyce Lancaster, Executive Secretary WSSA was contacted to make arrangements for renting 30 additional easels. Valorie Blanton, Meeting Planner for Allen Press will have the easels shipped to Tom Lanini, Local Arrangement Committee for WSWS 2006 meeting by March 10. Tom will transport the easels to the meeting. WSSA is charging WSWS $5.00/easel plus shipping charges.

Seventy-nine abstracts were submitted for presentation at the March meeting, as of this date one submission has been cancelled. The schedule for setting up posters starts at 4:30 pm on Monday, March 13 in the Bonanza Room. All the posters will be on display from Monday evening until Thursday morning. Authors of Odd numbered posters will be presented on Tuesday, March 14. Even numbered posters will be presented on Wednesday, March 15. Authors are scheduled to be present at their posters from 7:45 until 9:15 on the day they are presenting.

Recommendations for Board Action: None at this time.

Budget Needs: None at this time.
Suggestions for the Future: None at this time.
Suggested Changes in Operating Guide: None at this time.
Current Committee Members:
Tony White (2006)
Cheryl Fiore, Chair (2007)
Linda Wilson (2008)

Name of Person Preparing This Report: Cheryl Fiore

Student Paper Contest Report. Presented by Kassim Al-Khatib.
WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: Student Paper Judging
Officer or Chairperson Name: Stephen Enloe
Date of Preparation (include year): 2/22/06
Committee Activities during the Year:
With the operating guide revisions from the previous year led by Kirk Howatt, the committee decided that no changes were necessary this year. The committee's primary activities this winter have been in preparing for the student poster and paper contests for the 2006 meeting. Judges have been selected, abstracts will be mailed to each of them this week, each contestant has been properly notified regarding the upcoming contest and two discrepancies regarding contestant participation were discussed and resolved. These included: 1) not allowing one student from the University of Delaware (who did not register for the meeting until January 9, 2006 and was thus placed at the end of the session on Thursday morning) to be in the contest. The student accepted the decision. 2) Allowing one student who registered on time and followed all protocol for the contest but forgot to indicate his interest in participating in the contest. We agreed it was a minor mistake and allowed him into the poster contest.

We have also successfully recruited a new committee member (Brad Ramsdale) to replace Vanelle Carrithers.
Recommendations for Board Action:
No new recommendations at this time.

Budget Needs: Awards for 2006 contest:
Award money for 1st, 2nd, and 3rd place for the poster contest = $225
Award money for 1st, 2nd, 3rd place for the Agronomic/Basic Sciences paper contest = $225

Award money for 1st and 2nd place for the Weeds of Range and Forest paper contest = $175

Award for 1st place undergraduate = $100

Money to purchase 9 award plaques: Cost estimate not available

Total: $725 + money for 9 plaques.
Suggestions for the Future: none currently
Suggested Changes in Operating Guide:
No changes suggested this year.

Current Committee Members:
Stephen Enloe, Mark Renz, Vanelle Carrithers

Name of Person Preparing This Report: Stephen Enloe

Publications Committee Report. Presented by Kassim Al-Khatib.
WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: Publications Committee
Officer or Chairperson Name: Kassim Al-Khatib
Date of Preparation (include year): February 28, 2006
Committee Activities during the Year: Each editor will be submitting their reports (Newsletter, Proceedings, Research Report, and Website). Janet Clark will submit a report on the "Biological Control of Invasive Plants in the U.S." book and Tom Whitson will submit a report on "Weeds of the West "book. Last summer, Janet Clark wrote an excellent report on the Weed of the West book that covered different aspects of the book including history, printing procedure, copyright, future relationship with the university of Wyoming, etc. One of the results of that report is the signing of memorandum of understanding with the University of Wyoming about Weeds of the West copyright, scope of the duties, pricing, ownership of materials, etc. However, at the current level of sales, we have close to 1 year of inventory and very soon we need to make a decision about have reprinting the book.

Recommendations for Board Action: Prior to reprinting Weeds of the West, the board need to have a comprehensive study about the future of the book. Publication committee, Finance committee, and the Business Manager need to develop a plan of action to address reprinting of the book. The study should be completed before the upcoming summer meeting.

Budget Needs: Each Editor may make budget requests. No printing costs expected for Weeds of the West. No expenses for other publications.

Suggestions for the Future: Require finance and publications committee input before publishing any new publication or reprinting of our existing publications that offer for sale. In addition, the board should vote to approve any new project or reprinting of any existing publication.

Suggested Changes in Operating Guide: None

Current Committee Members:

Pat Clay – Newsletter Editor
Traci Rauch- Research Report Editor
Joan Campbell- Proceedings Editor
Tony White- Website Editor
Janet Clark- Biological Control Book
Tom Whitson- Weeds of the West

Name of Person Preparing This Report: Kassim Al-Khatib, Chair

Proceedings Report. Presented by Kassim Al-Khatib.

Discussion was held on putting the Proceedings on CD format rather than printing hard copies.

PROCEEDINGS Report (Reno Meeting 2006)
Office or Committee Name: **Proceedings**
Officer or Chairperson Name: **Joan Campbell and Traci Rauch, editors**

Date of Preparation (include year): **March, 2006**
Committee Activities during the Year:
The 2005 Proceedings had 160 pages and 240 books were printed. The books sold for $20.00 each. Publication cost including shipping was $2571 ($10.71 per book).

Recommendations for Board Action: none at this time
Budget Needs: About $2600, depending how many books will be ordered. This is determined right before printing based on pre-orders.
Suggestions for the Future: none at this time
Suggested Changes in Operating Guide: Attached
Current Committee Members: This is part of publication committee
Name of Person Preparing This Report: Joan Campbell

Research Progress Report. Presented by Kassim Al-Khatib.

WSWS is the only society still producing a Research Progress Report.

WSWS Officer and Committee Report (Reno Meeting 2006)

Office or Committee Name: Research Progress Report – Publications Committee

Officer or Chairperson Name: Kassim Al-Khatib

Date of Preparation (include year): March 1, 2006

Committee Activities during the Year:
The 2006 Research Progress Report is 228 pages duplexed. Omnipress printed 200 copies of which 125 copies were sent to the meeting site and the remaining copies were sent to Phil Banks. The total cost including shipping was $2,288.00.

Project 1 - 20 reports
Project 2 - 24 reports
Project 3 - 51 reports
Project 4 - 2 reports
Project 5 - 1 report
Project 6 - 0 reports

To continue encouraging submissions to the Research Progress Report, we included a note in the September newsletter and on the website and received 10 more reports than last year.
The number of reports submitted was 98 in 2006. Reports were submitted from the following states:
Arizona, California, Colorado, Idaho, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington

Recommendations for Board Action: none

Budget Needs:
$2,500 (printing) + travel ($380 airfare + 2 nights lodging in 2006) = $2,880

Suggestions for the Future: none

Suggested Changes in Operating Guide: none

Current Committee Members: Kassim Al-Khatib, Traci Rauch, Joan Campbell, Tony White, Pat Clay

Name of Person Preparing This Report: Traci Rauch and Joan Campbell

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Newsletter Report. Presented by Kassim Al-Khatib.

Phil Banks indicated that he will ask members individually, via the meeting registration process, how they want to receive their newsletter—via email or hard copy in the US mail. That will help cut down on printing and mailing expenses.

WSWS Officer and Committee Report (Reno Meeting 2006)

Office or Committee Name: Newsletter

Officer or Chairperson Name:

Date of Preparation (include year): March 1, 2006

Committee Activities during the Year:

Four issues of the newsletter were published in 2005. There are (and will likely continue to be) significant delays from when the newsletter is posted on the website and when members receive the printed version in the mail. This is likely due to the speed of bulk mail.

Recommendations for Board Action:

May not need board action but I would propose submission deadlines to be established and posted on the website:

January Issue: December 15
April Issue: Two weeks after completion of Annual Meeting
July/August Issue: Two weeks after completion of Summer Board Meeting
November Issue: October 15

Also, I will provide the membership with an email reminder one week prior to the deadline.

Name of Person Preparing This Report: Pat Clay

***Weeds of the West* Report. Presented by Janet Clark.**

A memorandum of understanding has been signed between WSWS and Tom Whitson. Janet presented a summary of the costs associated with conducting another reprinting and potential returns to WSWS. Various options related to printing numbers and sales by WSWS and University of WY were discussed. Joe DiTomaso's weed identification book will be released this fall and copies will be available for WSWS

to market as well. Other publications are available for WSWS to market. Retail and wholesale pricing options were discussed as options to increase profitability to the society.

Developing an extended list of publications available for purchase through WSWS should enhance our marketing efforts and opportunities. A focused effort to evaluate these options should be made.

Vanelle Carrithers moved to reprint 12,000 copies of *Weeds of the West* per the contract Tom Whitson has outlined with Grand Teton Lithography. Kassim Al-Khatib seconded the motion. One half of the printing cost is due with the order. Question was called. Motion passed on a voice vote.

Janet Clark moved to ship not more than 2 pallets of the reprinting to WSWS business office in Las Cruces, NM. Motion was seconded. Motion passed on a voice vote.

Weeds of the West Report
March 5, 2006
Tom Whitson

The current inventory of the *Weeds of the West* book is 4,782 copies. Since March 1, 2005, 5,798 copies have been sold. The current balance in the WSWS Weeds of the West account is $119,329.00. The inventory value of 4,782 copies at $14.00 each is $66,948.00 for a current total of $186,277.00 for books and cash. Total books published to date from the start of the project are 138,000 copies.

When inventories reach 3,500 to 4,000 copies, we reprint the publication. With spring and summer sales coming up we could be out of books by July indicating the reprinting process should begin by April 1, 2006. The cost for reprinting by Grand Teton Lithography will be as follows based on numbers printed.

8,000 copies	$12.49 each	$ 99,935.00
10,000 copies	$11.29 each	$112,850.00
12,000 copies	$10.59 each	$127,710.00

I recommend printing 12,000 copies as opposed to 10,000. The extra 2,000 amount to only $7.43 each. After including the $1.00 per book freight charges from Phoenix to Laramie, the projected profits from 10,000 books equals $17,150.00 or $28,290.00 from 12,000 copies. The extra investment in the larger printing returns $11,140.00 more in net profits than the 10,000 book printing as follows.

10,000 copies @ $13.00 each including freight	$130,000.00
printing costs	$112,850.00
Profit	**$ 17,150.00**
12,000 copies @$13.00 each including freight	$156,000.00
printing costs	$127,710.00
Profit	**$ 28,290.00**

Because of the April 1 deadline, a decision needs to be made no later than the March Board meeting. Attached is the official bid from Grand Teton Lithography. Please let me know if there are additional questions or comments.

Website Committee Report. Presented by Tony White.

Tony reviewed requests he had received during the year for website postings. Requests for job postings have not been posted on our website, but Tony has directed where those postings can be found. The biggest addition to the website has been the acceptance of credit card billing for publications and registrations. Several comments from members were received on how easy the system worked. Some issues with government issued credit cards were received.

On behalf of WSWS, the board expresses its sincere and deep felt thanks to Tony White for his excellent implementation of the society's website. He is commended for the high quality and ease of use of our website. Our society is significantly ahead of other societies in regard to website design, implementation, and user friendliness. Tony is also commended for his participation and insight he has provided WSSA on their website committee. His experience has been invaluable to development of that website as well.

Phil Banks indicated that his hope is to add purchases of *Weeds of the West* to the website and he can fulfill the shipping of those orders, which will generate additional income for WSWS.

Discussion was held on compensation for the website editor. Tony's efforts have largely been responsible for the success the society has had with its website process. Phil Banks asked Tony to estimate the time he spent on the website project. Most of the time is incurred during the meeting registration phase and title submission. He estimated he spends about 240 hours per year on the website. Phil Banks asked for discussion on providing an honorarium, service contract, etc. to partially compensate for the time involved in the website management. Discussion was held on options.

Motion was made to compensate Tony White with $2500 and a letter of commendation for his work to date on the website. Vanelle Carrithers seconded the motion. Motion passed on a voice vote.

WSWS Officer and Committee Report

Office or Committee Name: Website

Officer or Chairperson Name: Tony White

Date of Preparation (include year): 2006

Committee Activities during the Year:

The WSWS website (*www.wsweedscience.org*) continued to thrive in 2005. All of the future addition suggestions from last year were implemented. Tracy Sterling worked with Tony White and personnel at the University of Nebraska-Lincoln (UNL) to update the Crop Technology Lessons linked through the WSWS website. Several new modules are currently being developed and will be available through the WSWS website when complete. Included in these modules are several lessons in Spanish. A new system implemented in the summer of 2005 by UNL automatically updates the current WSWS webmaster when a new module is ready for linking to the WSWS website.

Job postings directly on the WSWS website were removed and links were added to the WSSA and ASA website job placement pages. This saves repetitive posting of the same jobs on similar websites.

Presentation slides from the 2004 WSWS Salt Cedar Symposium were provided by Phil Westra and were added to the website. This year, Tim Miller has suggested slide presentations and notes be

added from symposiums held during the 2006 annual meeting. If anyone wishes to post symposium presentations from 2005 or years previous, please contact Tony White.

Several new components were added to the website. Specifically, a credit card payment system was added to allow members to pay for annual dues or annual meeting fees online. The membership has been very positive and receptive to this new tool.

2006 Annual Meeting. Online meeting registration was nearly flawless. Slight glitches in the system were traced back to login problems, duplicates in member profile information, or members not having a valid email address. Nearly 300 people registered online (approximately 95%). The goal for 2007 is to have 100% online registration.

Credit card payment was a hit according to nearly all members who used it. Some had problems with payment due to purchase restrictions on governmental or corporate credit cards, a problem beyond our scope of solutions. Only minor problems with payment verification, double payment, or other issues were encountered. This payment option has been a welcome addition to the website.

The title and abstract submission process changed slightly compared to 2005. Abstracts were entered directly online compared to uploading .doc files. This process required a great learning curve by all parties involved in the process, but seemed to work better than past methods. The need for users to enter HTML code for special characters was problematic for only a select group of members.

The key to a successful WSWS website experience was for users to READ THE DIRECTIONS related to new member registration, member login, registration, title/abstract submission, and the credit card payment process. Members who read the directions and followed instructions did not experience website problems.

Future Additions to the WSWS Website.

5. Enhance and expand the directions and instructions for various aspects of the website including: registration, title/abstract submission, viewing, and editing, sections, and credit card payment areas.
6. Allow credit card payment for other WSWS services and merchandise.
7. Enhance the overall quality and functionality of the website.

Recommendations for Board Action:

1. Require all registrations be made online in 2007 and eliminate all paper registration forms.
2. Allow Weeds of the West and other WSWS publications to be purchased through our website.

Budget Needs: none at this time.

Suggestions for the Future: Additional suggestions are always welcome to make the site better and more appealing to all.

Name of Person Preparing This Report: Tony White

Noxious Weed Biocontrol Book Report. Presented by Janet Clark.

Janet reported on sales of this book, which originated from a grant ran through WSWS.

Site Selection Committee Report. Presented by Mike Edwards.

A presentation by Steve Seefeldt on Fairbanks, Alaska as a potential site was given by a representative of the Fairbanks Convention &Visitors Bureau. An invitation has been extended by the Fairbanks

Convention & Visitors Bureau to hold our March 2009 meeting in Faribanks. The FCVB will work to make the costs associated with the meeting as low as possible and work with transportation providers as discounted as possible. Steve indicates that Alaska is gaining infestation of invasive weeds and proposed the possibility of a workshop focusing on invasive weeds to attract Alaskans into the WSWS meeting.

Mike reviewed his report on site selection process relative to Allen Marketing. Some issues related to communications have evolved but are being worked out.

Mike summarized facilities and costs available with Albuquerque, NM, Denver, CO, and Fairbanks, AK. It is recommended that, by the post conference board meeting, a city is decided on so that specific facilities can be worked for information and bids. He will conduct a straw poll of the membership at the business breakfast and discussion can be held at the Thursday board meeting.

WSWS Officer and Committee Report (Reno Meeting 2006)

Office or Committee Name: Site Selection Committee – 2009 meeting site
Officer or Chairperson Name: Michael Edwards
Date of Preparation (include year): February 23, 2006
Committee Activities during the Year:
Worked with Allen Marketing to screen hotels in Denver, CO, Colorado Springs, CO, Albuquerque, NM and Fairbanks, AK

See attached hotel list for hotels that will meet are requirements

Recommendations for Board Action:

1. Decide on specific town for the 2009 meeting – Denver, Colorado Springs and Albuquerque all have facilities that meet our needs.

2. Have straw pole at business meeting for possible Alaska meeting in 2010 – Phil suggested a hands raised that would not attend.
   - Airfare Denver – Fairbanks $800-900
   - Airfare Seattle – Fairbanks $600-700
   - Airfare San Francisco – Fairbanks $800-900

Month	Avg. High	Avg. Low	Avg. Precip.	Rec. High	Rec. Low
March	26.0 F	1.0 F	0.34 in	57.0 (03/21/1998)	-41.0 F (03/28/1971)

3. Complete Site selection for specific hotel by Summer Board meeting

Budget Needs: None
Suggestions for the Future: None
Suggested Changes in Operating Guide: None
Current Committee Members:

a. "Traci Rauch" trauch@uidaho.edu (past chair)
b. "Michael T Edwards" michael.t.edwards@usa.dupont.com (current chair)
c. "David Vitolo " david.vitolo@syngenta.com

Name of Person Preparing This Report: Michael Edwards

CAST Report. Presented by Rod Lym.

WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: CAST
Officer or Chairperson Name: Rod Lym, CAST representative for WSWS
Date of Preparation (include year): March 2006
CAST Activities during the Year: The fall board meeting of CAST was held in Albuquerque, NM from 16 - 18 Nov 05. Due to delayed and cancelled flights, I was not able to make it to the meeting. It was unfortunate, but by the time the airline could have gotten me to the site, I would have missed three-quarters of the meeting and did not feel it would have been money well spent.

Highlights for WSWS:

A request to W.K. Kellogg Foundation.to continue the shared leadership program was not approved. However, President Stanley Fletcher announced that CAST has received an anonymous donation from a lifetime member in the amount of $10,000 to be used in a one to one match for a continued leadership program. How to best use this money to continue at least a portion of this program is being investigated. A final Shared Leadership I Workshop will be held on June 13-16, 2006 in Montana. CAST Executive VP Dr. Bonner announced that CAST will send a team to the workshop including the executive vice president, president-elect, and an additional Board member. Also, in February the WSWS board agreed to send a three member team to this training.

The first draft of the *Postcommercialization Gene Flow from Biotechnology-derived Crops: Policy and Research Considerations* issue paper is completed and entering the review process.

CAST has prepared a new Commentary, "*Avian Influenza: Human Pandemic Concerns"* which was published in January 2006.

Dr. Bonner announced some initial success in recouping several noncurrent sustaining members. Ms. Donna Freeman (new membership and marketing director) and Dr. Bonner have received commitments from sustaining members to rejoin CAST for 2005 and commitments for increasing sustaining membership dues for 2006. CAST ended 2005 with a short-fall, but expects in 2006 to begin operating in the black.

A workshop concerning Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes workshop was held in January 2006 in Las Vegas, NV. The Proceedings will be available from CAST.
The issue paper "Implications of Total Maximum Daily Loads on Rural and Urban Land" is expected to be published by late 2006.

Titles of other works in progress of special interest to WSWS:
Acrylamide in Food - (Issue Paper)

Safety of Meat, Milk, and Eggs Produced from Animals Fed with Biotechnology-derived Crops - (Issue Paper)

Role of Transgenic Animals in Development of New Medications - (Issue Paper)

Recommendations for Board Action: This is my final year as CAST rep. A new representative will need to be appointed following the Fall 2006 CAST board meeting.

Budget Needs: WSWS pays the travel costs not covered by CAST. The Spring Board meeting will be held in Washington D. C. From 19 - 21 April 06.

Name of Person Preparing This Report: Rod Lym

WSSA Representative Report. Presented by Nelroy Jackson and Vanelle Carrithers.

WSWS Officer and Committee Report (Reno Meeting 2006)

Office or Committee Name: WSSA Representative
Officer or Chairperson Name: Nelroy Jackson (out-going) and Vanelle Carrithers (in-coming)

Date of Preparation (include year): March 2006
The 2006 annual meeting was held at the Marriott Marquis Hotel in New York City despite the record snowfall. WSSA celebrated its 50th anniversary by honoring past presidents, fellows, and honorary members.

WSSA is in a sound financial state, but still has no business plan, and lacks aggressive membership recruitment.

The new DSP funding scheme will be implemented in 2006 and the escrow account should increase each year. Lee Van Wychen was granted a COL increase for 2006. The Washington Liaison committee has set 2006 priorities for the DSP.

Election Results: Jeff Derr is the new President-elect, Tom Mueller the new secretary, Dave Gealy the new treasurer, and Joe Neal the new member-at-large.

Nelroy Jackson agreed to chair IWAC and the NIWAW8 (2007) Planning committee for WSSA.

The board accepted the recommendations of the website committee and appointed Tom Fermanian as the WSSA website editor and David Krueger as the website technical webmaster. These positions will be overseen by the Computer Applications Committee, whose name will be changed to the Website committee. The Board of Directors approved an agreement between WSSA and NEWSS hosting and maintaining the regional society's website.

Committee Activities during the Year: Information noteworthy for WSWS:

i. WSSA appointed an ad hoc committee to investigate the viability of a new journal around Invasive Plant Management. The board approved funding of $4,000 for a survey and interpretation by ACG. Members are: co-chairs Lars Anderson and Vanelle Carrithers, and members Joe DiTomaso, John Jachetta, Greg MacDonald, Janet Clark, Kevin Gibson, and Mike Foley (ex officio). This committee is charged with doing a survey of potential readers and researchers, interpreting the results, and writing a report for the WSSA Board summer meeting.
ii. The Federal Noxious & Invasive Weeds committee created a subcommittee to work on a position for a terrestrial weed scientist to work with EPA as Kurt Getsinger, US Army Corp of Engineers,

has done as an aquatic weed scientist. Members include: Don Stubbs, Kurt Getsinger, Lee Van Wychen, John Jachetta, Charles Bryson, and Jennifer Vollmer. Their report is due to the WSSA Board by the summer meeting.

iii. Research and competitive grants Committee expressed concerns about NRI and future directions. Reported that Dean Reichers is drafting a report on future research needs and priorities of WSSA. The committee was charged to provide list of NRI (and others) grants that were funded that pertain to weed science. Van Wychen charged to draft newsletter article on this topic.

iv. Retirement of Gerald Stephenson as Director of Education.

v. The next annual meeting will be February 5-8, 2007 at the Hyatt Regency on Riverwalk in San Antonio, TX. The 2008 annual meeting will be held at the Mariott in Chicago from February 4-7.

vi. International Weed Science Society upcoming meeting on June 23-27, 2008 in Vancouver, BC, Canada hosted by WSSA.

Recommendations for Board Action: Request participation in WSSA survey about potential for new Invasive Plant Management Journal by working with ACG to send email to WSWS members when the survey link is available and also allow for the release of email addresses to WSSA (Allen Press-ACG) from the WSWS Short Course so that they can be used to notify attendees of WSSA survey for new publication.

Budget Needs: None
Suggestions for the Future: None
Suggested Changes in Operating Guide: None
Current Committee Members: Vanelle Carrithers
Name of Person Preparing This Report: Nelroy Jackson and Vanelle Carrithers

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Legislative Committee Report. Presented by Nelroy Jackson.

Vanelle Carrithers wrote and Phil Banks modified to WSWS a letter to the BLM for their EIS process supporting herbicide use for control of weed species.

Nelroy Jackson updated the board on various funding activities and various positions available.

Constitution & Operating Guide Report. Presented by Kai Umeda.

Kai reviewed the protocol for conducting email business between board meetings. That should be incorporated into the operating guide for future reference and continuity. Phil Banks reviewed those procedures to date, including the timelines for various types of decisions which need to be made. Kai is working with Dirk Baker on getting the student liaison position described and into the operating guide. Elimination of the Student Educational Enhancement Committee and the Placement Committee will be brought up to the membership at the business breakfast for vote per operating guide directions.

WSWS Officer and Committee Report (Reno Meeting 2006)

Office or Committee Name: Constitution and Operations Guide Representative

Officer or Chairperson Name: Kai Umeda
Date of Preparation (include year): March 3, 2006

Committee Activities during the Year:

- provided notification in February 2006 newsletter to membership of constitutional revision to eliminate Placement committee and Educational Enhancement committee.
- received operating guide revision suggestions from
    - Awards committee,
    - Local Arrangements committee,
    - proposed Student Liaison position to the board,
    - Program committee
- consider operating procedure for conducting WSWS business via email
- consider interpretation of constitution for board actions in absence/recusal by president
- consider incorporation of business manager responsibilities

Recommendations for Board Action:

- discuss operating guide revision suggestions from
    - Awards committee,
    - Local Arrangements committee,
    - proposed Student Liaison position to the board,
    - Program committee
- consider operating procedure for conducting WSWS business via email
- consider interpretation of constitution for board actions in absence/recusal by president
- consider incorporation of business manager responsibilities

Budget Needs: none
Suggestions for the Future: N/A
Suggested Changes in Operating Guide: Make appropriate changes after approval by board
Current Committee Members:
Name of Person Preparing This Report: Kai Umeda

Student Liaison Report. Presented by Dirk Baker.

Dirk reviewed the following guidelines for student liaisons from WSWS and how it interacts with WSSA operating procedures for student liaison of regional societies. Dirk will bring some of these concerns up to the graduate student breakfast meeting and work with Kai Umeda on suggested wording for the operating guide.

ARTICLE ___ - DUTIES OF STUDENT LIAISON(S)

Section 1. The Student Liaison(s) shall maintain liaison with the President and other officers of the Society and shall bring to the attention of the Board of Directors the various concerns of the student members of the Society. (S)he will also serve to represent the Society on the Board of the WSSA Graduate Student Organization. The Student Liaison will assist with the organization of the Student Night Out at Society meetings and may also perform other duties delegated by the President and the Board of Directors.

Questions for discussion:

1. WSSA GSO operating procedures dictate that each regional society be represented by **2** students and there will be one vote between them.
2. Issues with student liaisons' abilities to get to WSSA meetings…

Sustaining Member Committee Report. Presented by Phil Banks.
WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: Sustaining Membership Committee
Officer or Chairperson Name: Lynn Fandrich
Date of Preparation (include year): March 1, 2006
Committee Activities during the Year:
Thirteen Sustaining Members as of March 1, 2006 contributed $4,600 in member dues for 2006 membership year.

Agriliance LLC, AGSCO, Arvesta, BASF Corporation, Bayer CropScience, Bellspray Inc., Dow AgroSciences, Dupont Crop Protection, Gowan Company, Marathon-Agricultural & Environmental Consulting, Inc., Monsanto Company, Syngenta Crop Protection, Inc., and Wilbur-Ellis Company

All 2005 sustaining members and prospective sustaining member were contacted by email to determine their interest in becoming sustainable members. Those that showed interest were sent letters via email (with attached invoice). Follow-up phone calls were made to those who showed interest but did not respond within a reasonable time.

Recommendations for Board Action: None.
Budget Needs: None.
Suggestions for the Future: None.
Suggested Changes in Operating Guide: None.
Current Committee Members: Lynn Fandrich (2007) Chair, Dennis Tonks (2006), and Neil Harker (2008).
Name of Person Preparing This Report: Lynn Fandrich

Necrology Report. Presented by Phil Banks.

WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: Necrology Committee
Officer or Chairperson Name: Amber Vallotton
Date of Preparation (include year): March 1st, 2006
Committee Activities during the Year:
* July 11, 2005: Submitted a notice for the upcoming August newsletter soliciting any names and information related to those who have passed on.

* October 25, 2005: Contacted Patrick Clay requesting that the necrology note placed in the August newsletter also be included in the November 2005 newsletter.

* On February 1, 2006, I was informed by Bob Parker via email of the passing of Dr. Thomas Muzik, a weed scientist who formerly worked at Washington State University in the late 1960's through 80's.

* February 27, 2006: Performed a cursory search for more information, and corresponded with Dr. Muzik's son, Steven, for more information to be included in the written report for the meeting. He kindly sent me an extensive write-up which had been prepared by his sister, Katherine. I condensed the write-up, which will be presented at the March meeting (included below).

* On March 1st, 2006, the WSWS officer and committee report for the upcoming meeting was emailed and submitted to Phil Banks and Vince Ulstad via email

Recommendations for Board Action: None
Budget Needs: None
Suggestions for the Future: None
Suggested Changes in Operating Guide: None
Current Committee Members: Amber Vallotton (Chair), Carol Mallory-Smith, Lisa Boggs
Name of Person Preparing This Report: Amber Vallotton
The Necrology Committee has been notified of one death of WSWS members or friends since the 2005 annual meeting. We would like to take a moment and celebrate the life of Dr. Thomas Muzik and recognize some of his accomplishments. Our thoughts and prayers are extended to the family of Dr. Muzik.

Dr. Thomas J. Muzik died peacefully on January 26, 2006, near Spokane, WA. Dr. Muzik led a wonderful, long and adventurous life. Born on December 21, 1919, he grew up in Berwyn, Illinois. Fascinated by trees and other plants, he first studied forestry at the University of Michigan, in Ann Arbor, Michigan, and then majored in Botany. He was a proud member of the Society of Les Voyageurs, a University society promoting intellectual intercourse and interest in outdoor life and nature. During WWII, Tom's studies took him to Liberia, West Africa, from 1942 to 1947, where he conducted research on rubber trees for Firestone Company for five years. Returning briefly to Michigan in 1945 to marry his wife, Peggy, she then joined him in Africa, and gave birth there to their first son, Steven Thomas. Upon returning to Michigan to complete his studies, his second child, Katherine Margaret, was born in 1948, and he obtained a Ph.D. in Botany in 1949. In 1956, upon receiving a job offer as a Plant Physiologist in the Agronomy Department at Washington State University, Tom moved with his family to Pullman, Washington. There his third child, a son, Wesley Nicholas, was born, in 1957. While at Washington State, Tom published numerous scholarly papers on weed science, with special attention to herbicides and plant hormones, focusing on the weeds in wheat fields of the rolling Palouse Hills. In 1970, he wrote and published an important book, *Weed Biology and Control*, which is still timely and pertinent to the field. Upon early retirement from WSU in 1981, Dr. Muzik received an invitation to be a Research Advisor for Bechtel Company, in Bahrain, Saudi Arabia, where he spent two years, again with his wife Peggy. During these years and after finally retiring in 1983 to live in Sandpoint, Idaho, he and Peggy traveled all around the world, including Hong Kong and China, Okinawa, Greece, Italy, Alaska, Hawaii, the Caribbean and Bulgaria. He was especially fond of his weekly "Tertulia" discussion group, bowling, gardening, playing bridge, and as ever, fishing. To all three of his children he imparted his love of jokes, his frank manner, his forthright honesty, his resilience, and his stubbornness. One of his favorite aphorisms was, "Count Your Blessings", and certainly among them he counted his wife, his children, and his very successful grandchildren, Joseph and Anita Muzik. His memory will be honored in a ceremony during the summer of 2006, when his remaining relatives will gather to fling his ashes over his favorite secret fishing spot on Lake Coeur D'Alene.

Current Committee members: Amber Vallotton, Lisa Boggs, Carol Mallory-Smith

Name of Person Preparing this Report: Amber D. Vallotton. Sincere thanks goes to Steven and Katherine Muzik, who passed on an extensive write-up of their father's life. The write-up was condensed to create the above report.

Public Relations Committee Report. Presented by Tim Miller.

A press release was issued announcing the annual meeting. CEU credits for several states have been applied for, with the exception of Colorado.

WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: Public Relations
Officer or Chairperson Name: Brian Olson
Date of Preparation (include year): February 17, 2006
Committee Activities during the Year:
☐ A press release dated February 16, 2006 announced the 59th Annual Meeting of the WSWS (see attached) and distributed by e-mail to:

WSSA Newsletter	Capital Press
American Society for Horticultural Science	AgOnline (Successful Farming)
Agronomy Society of America	Advanstar (Landscape Management and Golfdom)
North American Weed Management Association	Turf Magazine
FICMNEW listserve	Wildland Weeds
Farm Press	American Nurseryman Publishing
Meister Publishing	Recreation Management Magazine
Yuma Daily Sun	Associated Press
Southwest Trees and Turf	Farm Progress Publishing (California Farmer,
Columbia Publishing (Carrot Country, Potato Country, Onion World)	Western Farmer-Stockman)
	Metrofarm radio

☐ Continuing education hours requests for various state licensing requirements for attendees were submitted to: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, Oklahoma, Oregon, Utah, Washington, and Wyoming. Certified Crop Advisor (CCA) certification and Society for Range Management certification were applied for this year.

< Requested from local arrangements chair that CEU sign-in area be located near the registration desk with two 6 or 8 ft tables.

< Pat Clay will photograph officers and awards recipients following luncheon

< Erin Taylor, University of Arizona, joined the PR committee this year

Recommendations for Board Action:

Budget Needs:

Suggestions for the Future:
Some states such as Colorado refuse to approve CEU credits for Commercial Pesticide Applicators unless there is strict monitoring of who attends each session. If more states adopt this position, this could cause a significant problem to the WSWS in offering these credits.

Current Committee Members: Erin Taylor, Milt McGiffen, Brad Hanson, Bill Cobb, Mark Ferrell, Brian Olson

Name of Person Preparing This Report: Brian Olson

Membership Development Ad-hoc Committee Report. Presented by Phil Banks.

WSWS Officer and Committee Report (Reno Meeting 2006)
Office or Committee Name: Ad Hoc Membership Committee
Officer or Chairperson Name: Lisa Boggs
Date of Preparation (include year): January 16, 2006
Committee Activities during the Year:

We have exchanged e-mails and ideas on membership but haven't made it beyond that. I am hoping a meeting in Reno will set in motion some of the ideas that have been passed around.

Current Committee Members: Phil Stahlman, Vanelle Carrithers, Jeff Koscelny, John L. Baker, Brenda Waters, Ralph Whitesides, Steve Fennimore, Randy Smith, Dirk Baker, James Olivarez, Eric Coombs, Kai Umeda, Dudley Smith
Name of Person Preparing This Report: Lisa Boggs

Long Distance Education Committee Report. Presented by Tim Miller.

Herbicide Resistant Plant Committee Report. Presented by Phil Banks.

WSWS Officer and Committee Report (Reno Meeting 2006)

Office or Committee Name: Herbicide Resistant Plants Committee
Officer or Chairperson Name: Kirk Howatt
Date of Preparation (include year): February 2006
Committee Activities during the Year:
The Committee information in the Operating Guide was revised to include interaction with the North American Herbicide Resistance Action Committee. Changes were submitted and have been posted in the Operating Guide on the Society web page.

Posting herbicide resistance term fact sheets on the Society web page was approved at the summer board meeting. One sheet with basic terms has been completed. Two additional sheets that include genetics terms and factors affecting resistance development are under revision. The sheets will be posted as a set when they are completed.

Recommendations for Board Action: None
Budget Needs: None
Suggestions for the Future:
Fact sheets on herbicide resistance terms will be placed on the WSWS web site when all three sheets are completed.
Suggested Changes in Operating Guide: None

Current Committee Members:
Mary Corp, Jim Harbour, Tom Beckett, Steve Seefeldt, Monte Anderson, and Kirk Howatt

Name of Person Preparing This Report: Kirk Howatt

Noxious Weed Short Course Report.

WSWS Officer and Committee Report (Reno Meeting 2006)

Office or Committee Name: Noxious Weed Short Course

Officer or Chairperson Name: Celestine Duncan

Date of Preparation (include year):2/ 2006

Committee Activities during the Year:
The Noxious Weed Short Course sponsored by the WSWS was held at Chico Hot Springs Resort located in Pray, MT, April 25th through 28th, 2005, and is scheduled for April 24th through 27th, 2006. We are only offered one session in both 2005 and 2006 because of conflicts with instructor and conference center schedules. There were 40 people that attended in 2005 and 41 registered in 2006 with 27 people on a waiting list. Registrations for the 2006 session were filled to capacity by mid-October, 2005. Participants include USFS, BLM, National Park Service, Fish and Wildlife Service, Dept. of Transportation, and County Weed Coordinators. The course continues to be highly recommended to weed managers within agencies.

Instructors include: Dr. Rod Lym, Dr. Steven Enloe, Dr. Steve Dewey, Dr. Jim Jacobs, Dr. Fabian Menalled, and Celestine Duncan representing the Western Society of Weed Science. Gilbert Gale (USFS), Dr. Bret Olson (MSU), Gary Adams, USDA APHIS, Mary Mayer USDA, ARS, Melissa Brown, consultant, will also assist with the course.

Registration fees were increased from $425 per person to $450 for the 2005 and remain at $450 for the 2006 course to cover additional facility costs. Balance in the NWSC budget is $34,276.26. Additional revenue of about $3100 is outstanding, with projected expenses of ~$14,000 for the 2006 session.

Recommendations for Board Action: Continue the course

Budget Needs: None- funded by registration. There will be an increase in registration fees for the 2007 course to cover cost of PayPal and increase in food/meeting room costs.

Suggestions for the Future: Continue the course

Suggested Changes in Operating Guide: none; continue to modify program based on student evaluations and needs.

Current Committee Members: Celestine Duncan with expert guidance/advice from Stephen Enloe, Rod Lym, and Steve Dewey!

Name of Person Preparing This Report: Celestine Duncan

Director of Science Policy Report. Presented by Lee Van Wychen.

Lee reviewed the highlights of his report, including the federal budget and potential cutbacks in Hatch Act Funding.

Director of Science Policy Report
WSWS Board of Directors Meeting, March 13, 2006, Reno, NV

5 Goals

- Weed Science Research Funding
- EPA Interaction
- 2007 Farm Bill
- Weed Science Federal Job Series
- NIWAW 7

Other Activities
Issues for Upcoming Year/Action Items
Legislation

5 Goals

1. Increase Weed Science research funding opportunities.
    a. USDA CSREES hosted a one day workshop on stakeholder priorities in the area of plant and pest biology. Over 20 different stakeholder groups provided comments and concerns during the workshop. Working in conjunction with the WSSA Research and Competitive Grants Committee, written comments were submitted along with an oral presentation by Dr. David Shaw.
    b. Concerns about USDA's Biology of Weedy and Invasive Species NRI Program. Dr. Michael Bowers, CSREES Program Leader for Ecology met with members of the WSSA Research Committee in NYC. An additional $3 million is proposed for FY07.
    c. The FY2007 USDA Budget includes $10 million for competitive grants to private groups for eradication and control of invasive species through the use of new and innovative methodologies. This appears to be a new program, but is not related to the 2004 Noxious Weed Control and Eradication Act.
    d. Congressional budget hearings for the USDA Research, Education, and Economics agencies are tentatively scheduled for March 16 in the Senate and March 30 in the House.
    e. How do we utilize Gale Buchanan's influence. Gale A. Buchanan was selected in January 2006 to serve as USDA Under Secretary of Agriculture for Research, Education and Economics. Buchanan is dean and director emeritus at the College of Agricultural and Environmental Sciences at the University of Georgia, Athens, GA and a former president of the SWSS.
    f. FY 2007 USDA CSREES budget includes $66 million increase for NRI up to $247 million
        i. $42.3 million is from Section 406 activities will be transferred dollar for dollar and Program Leader for Program Leader to the NRI.
        ii. Section 406 Programs include the Regional Pest Management Centers, Crops at Risk from FQPA Implementation; FQPA Risk Mitigation Program for Major Food Crop Systems; and the Methyl Bromide Transition Program.
        iii. CSREES budget includes increasing the amount provided for the NRI that may be used for competitive integrated activities from a maximum of 22 percent to a maximum of 30 percent.
        iv. Also proposed is the elimination of the cap on indirect costs for competitively awarded grants. This elimination allows full indirect cost recovery under competitive awards.
    g. CSREES is proposing an alternative approach to the ag formula funds that would redirect a portion of the Hatch Act and the McIntire-Stennis programs to nationally, competitively awarded multistate/multi-institutional projects.
    h. This is a critical distinction from the FY06 budget proposal (which proposed a 50% cut in formula funds) since the FY07 proposal sustains a substantial state formula base for the

programs while emphasizing multi-institutional efforts to address issues of mutual importance to states and the nation.

2. Expand the WSSA's participation and recognition within the EPA.
    a. John Jachetta and I met with Don Stubbs, Associate Administrator with EPA Office of Pesticide Programs. Four main themes that emerged from that meeting are:
        i. Capitalize on EPA's interest in WSSA Rangeland and R-O-W expertise. Develop ideas such as expert speakers coming to DC to present seminars on these topics with time for in-depth discussion afterwards.
        ii. Develop a program for EPA field visits, and reciprocal expert visits to DC; a minimum visit of a week would be useful.
        iii. Flesh-out a proposal for the development of expert panels on herbicide families for re-registration. This would be of great assistance to the Agency as they explore the chemical family approach to re-registration.
        iv. Develop an EPA Fellowship to get a Weed Scientist on EPA's Staff for at least 6-months at a time. This person could work at the Agency a week per month and assist Lee in legislative affairs and other WSSA activities, just about any other arrangements would be fine too.
    b. Carol Mallory-Smith, Dale Shaner, Jill Schroeder, John Jachetta, and Rich Bonanno met with Don Stubbs and Kurt Getsinger in NYC to discuss the above proposals.
    c. George Beck will present a seminar at EPA on March 2, 2006 titled "Invasive Weeds: Thieves that Require an Ecologically-based Battle Plan."

3. Find opportunities to advance the awareness and financial support of weed science in the 2007 Farm Bill.
    a. The National Association of Wheat Growers (NAWG) is initiating a Weed Resistance management project through the NAWG Foundation that will produce a web-based curriculum on the topic. Lee worked with Darren Coppock, NAWG Executive Director and Nathan Danielson from BioCognito. On Dec. 7, 2005, Biocognito chose Dr. Lynn Fandrich from Oregon State to head the project.
    b. A similar weed resistance project is likely to be conducted for cotton in the near future and one is already underway for corn.
    c. Ongoing work with CoFARM Research Coalition. Submitted Farm Bill concerns to USDA Secretary Johanns in December. Comments included:
        i. Reauthorize the National Research Initiative (NRI) at $500 million a year
        ii. Eliminate USDA's NRI indirect cost ceiling
        iii. Maintain a maximum 5-year duration for competitive grants
        iv. A provision authorizing a 3-year average duration for competitive grants
        v. Reauthorize IFAFS at $200 million
        vi. Provide the Secretary with the ability to apply up to 30 percent of funding to conduct integrated research, education and extension within the NRI
    d. World Trade Organization (WTO) issues will drive cuts in commodity support programs. Can this Farm Bill money be redirected to other ag programs such as conservation and research and ultimately weed science. Weed science research and extension needs a unified voice to promote our benefits to the affected commodity support groups. Other ag research funding proposals include:
        i. National Institute for Food and Agriculture (Danforth proposal/Bond bill)
        ii. National Institute for Food, Agriculture, and Natural Resources (Land Grant Create-21 proposal)
    e. Other issues that need to be brought up regarding the farm bill? – Noxious weed control provisions in the Conservation programs.

4. Work with the USDA-ARS to adopt Weed Science as a Federal job series
    a. The Office of Personal Management (OPM) has not responded to past requests for implementing a Federal Job series for weed sciences despite considerable effort from Rob Hedberg, Hilda Diaz-Soltero, Ernest Delfosse, and Doug Holy to draft the complete job series outline. Congressional action may be needed in the form of a letter to OPM that is signed by key Representatives and Senators. I plan to push this issue on the Hill to garner support.

5. Expand the awareness of weed science issues and increase participation in the 7th National Invasive Weeds Awareness Week (NIWAW 7). Nelroy Jackson has been awesome.
    a. Applied for National Fish and Wildlife Foundation- Pulling Together Initiative (PTI) grant of $15,000 for NIWAW 8. Formal announcement of award recipients is on May 15, 2006.
    b. This year includes a more unified legislative focus with two official NIWAW positions: Working to secure $15 million in funding for the Noxious Weed Control and Eradication Act; and Working to secure passage of the National Aquatic Invasive Species Act. Part of this legislative push includes my work to organize Congressional visits by key NIWAW participants that target House and Senate committees which deal with invasive weed policy and funding.
    c. I have conducted three, one-hour, Microsoft Live Meeting training courses titled "Legislative Visits 101: Making your visit count." More information can be found at http://www.nawma.org/niwaw/niwaw_index.htm

Other Activities

1. Build a coalition to promote funding for invasive weed management through hunting and fishing groups.
    a. I've met with Russ Mason- Int'l Assoc. of Fish and Wildlife Agencies (IAFWA) and Ron Helinski- Wildlife Management Institute. There is a lot of potential to sequester invasive weed research dollars by building a coalition with wildlife groups. The wildlife groups have a lot of resources to help us. Approximately 75% of Congress are members of the Sportsmen's Caucus. We just need to convince them of the fish and game habitat losses caused by invasive weeds.
        i. Russ Mason has left IAFWA, so I plan to meet with Eric Schwaab and Jen Mock, their Farm Bill coordinator in March.
    b. Get a WSSA member on IAFWA's newly formed Invasive Species Committee. Great opportunity to get one or more weed science members involved and actively promoting the devastation of wildlife habitat loss caused by invasive weeds.

2. Submitted comments to the Canadian Pest Management Regulatory Agency (PMRA) on Herbicide Use in Rangeland. PMRA needed input on the practicality of prescribing no-spray buffer zones for protection of native plants in rangeland and aquatic habitats from the effects of herbicide spray drift. The PMRA is concerned that broadleaf herbicides may negatively impact native vegetation without the observance of spray drift buffer zones. Thanks to John Jachetta for bringing this issue to the WSSA's attention.

3. Submitted comments to the Bureau of Land Management (BLM) regarding their "Draft" Environmental Impact Statement (EIS) that addresses vegetation treatment on BLM lands. There was an organized effort by certain groups to submit a disproportionate share of comments on the EIS that will prevent the use of herbicides on BLM lands in the future. WSSA supports safe, effective use of herbicides in BLM draft EIS. I also worked with Jeff Schardt, APMS and Phil Banks, WSWS to help them submit their comments to BLM.

4. Nominated myself as an ad hoc member of the FIFRA Scientific Advisory Panel dealing with Farm Worker Pesticide Exposure Assessment Methods

5. Nominated myself for the EPA's Pesticide Program Dialogue Committee (PPDC).

6. Grant announcements via email. Is this a good thing? To date, I have sent out approximately 30 such announcements.

Issues for the Upcoming Year/Action Items

1. EPA announced it will provide financial support for Conferences, Workshops and/or Meetings on EPA mission related issues.
    a. Expected $750,000 available in grant funds through 25 awards. Applications for grant funding will be due and approved on a quarterly basis.
    b. Eligible Applicants include city, county and state governments, public and private institutions of higher education and certain nonprofit organizations.

2. Looking for a WSSA member with expertise in the economics of invasive species to give a presentation on the Hill and at USDA at the end of April or first week in May. This would be a joint effort with the Council on Food, Agricultural and Resource Economics (C-FARE) who plans to invite a speaker that was a grant recipient from USDA ERS's Program of Research on the Economics of Invasive Species Management (PREISM).

3. Looking for WSSA members with "captivating" agricultural research programs to present their research in National CFAR's "Break and a Briefing" seminar series on the Hill. In May, David Shaw presented his collaborative work with NASA, US EPA, US DOT, USGS, DoC, NOAA, DoD, and NSF to improve farm practices, profitability and protection of natural resources.

4. Jim Bean, BASF, has initiated efforts to start an Eastern U.S. Invasive Species Coalition (31 States east of the Mississippi). There is a need for economic data, infestation size, and rate of spread data for key eastern invasive species.

5. Recruit a National Spokesman for Invasive weeds? (semi-serious about this)
    a. On Feb. 1, Tommy Lee Jones was on David Letterman. They had a several minute discussion on invasive plants in Florida. Tommy Lee talked about how bad certain invasive plants were like Melalueca and Old World Climbing Fern. Letterman asked why invasive were such a problem and Tommy Lee said that when they cleared out all the invasives, native species came back to the site.
    b. Pipe dream? Get experts to clean up invasive's on W's ranch in Crawford, TX. ☺

6. Weeds Across Borders (WAB) conference, organized by Bonnie Harper-Lore is held every two years to focus on cooperation between Mexico, Canada and the US, especially on issues where roads are a pathway for the spread of weeds. Efforts were initiated at the 2006 WSSA Board Meeting to include WAB as a one day symposium to be held in conjunction with the International Weed Science Congress at the 2008 meeting in Vancouver, Canada.

Legislation

1. H.R. 1749/S. 1269. Pest Management and Fire Suppression Flexibility Act - Amends the Federal Water Pollution Control Act to state that the Administrator of the EPA shall not require a permit under the national pollutant discharge elimination system (NPDES), or require a State to mandate such a permit.

a. Introduced by Rep. Otter (ID)/ Sen. Inhofe (OK). Currently, 73 House members and 15 Senators have signed on as cosponsors. Hearing was held on 9/29/2005 in House Transportation Subcommittee on Water Resources and Environment.
b. Federal courts have expanded the scope of the 1970 Clean Water Act (CWA) far beyond the original intent of Congress. Today, many pesticide applicators are subject to unnecessary, bureaucratic permitting requirements and nuisance lawsuits based on misguided interpretation of the CWA by the 9th U.S. Circuit Court of Appeals.
c. Rumor has it that the bill could be marked up by the end February or in early March.

2. H.R. 4294/S. 1288. Natural Resource Protection Cooperative Agreement Act - Authorizes the Secretary of the Interior to enter into cooperative agreements with State, local, or tribal governments, other public entities, educational institutions, private nonprofit organizations, or willing private landowners to prevent, control, or eradicate invasive species that occupy land within a unit of the National Park System or adjacent to such a unit.
    a. This legislation is based on successful watershed protection legislation enacted for the Forest Service and the Bureau of Land Management where cooperative agreements with neighboring State and local land owners has accomplished high priority restoration, protection and enhancement work on public and private lands.
    b. No additional funding is requested, but this bill has allowed the agencies to leverage their scarce restoration dollars.
    c. Introduced by Rep. Porter (NV)/ Sen. Wyden (OR). There are only 5 co-sponsors in the House and Senate, but the Senate Energy and Natural Resources Subcommittee on National Parks held a hearing on 11/15/2005.

3. H.R. 2720/S. 177. Salt Cedar and Russian Olive Control Act- Authorizes the appropriation of $20 million for 2006 and $15 million for each subsequent fiscal year for a program to address the infestation of Salt Cedar and Russian Olive trees. The Secretary of the Interior, acting through the Bureau of Reclamation, would provide grants to institutions of higher education to develop public policy expertise in long-term management strategies for these invasive species.
    a. Introduced by Rep. Pearce (NM)/Sen. Domenici (NM). Both bills have been discharged out of their respective committees in the House and Senate and await passage. This bill may end up as an earmark in an appropriation bill similar to that of the $10 million earmark to the University of Nevada in FY 2006.

Old Business:

Phil Banks updated the board on the shared leadership conference. It looks like WSWS applications will be accepted and he will know more next week.

Solicitations of monetary gift for Wanda Graves were collected and will be given to her at the Awards Luncheon.

New Business:

No new business was presented. Motion was made and seconded to adjourn. Meeting was adjourned at 4:56 PM. Respectfully submitted, Vince Ulstad, Secretary

WSWS BUSINESS MEETING MINUTES
16 March, 2006
John Ascuaga's Nugget Hotel / Sparks, NV

The buffet breakfast, sponsored by BASF, was available at 6:30 AM.

The meeting was called to order by President Phil Banks at 6:59 AM.

The secretary's minutes of the 2005 business breakfast were approved by voice vote.

Treasurer-Business Manager Report. Presented by Wanda Graves.

Registration was 340, up significantly from 2005. The society has about $350,000 in our bank accounts and is in good financial condition.

Program Committee Report. Presented by Kassim Al-Khatib.

A total of 194 papers and posters were presented. Kassim provided a breakdown by section of the numbers of papers and posters. The next program chair is Ron Crockett. Please provide ideas for program content to Ron.

Local Arrangements Report. Presented by Tom Lanini

Tom thanked his committee for their efforts on bringing the meeting together, Kassim Al-Khatib for his efforts on the program, and the section chairs.

Immediate Past-President's Report. Prepared by Phil Stahlman (given by Jesse Richardson)

A list of qualifications and desirable features in a new business manager were drawn up by the board at the summer board meeting. A search committee was set up to draft the job description for the business manager position. Four applications were received for consideration by the board. Marathon Consulting Services was given a contract to supply business management for the society.

Member-at-Large Report. Presented by Janet Clark.

A formal memo of understanding with Tom Whitson was reached on Weeds of the West.
WOW will be reprinted 12000copies

138000 copies have been sold since first published.

WSSA Representative Report. Presented by Vanelle Carrithers.

Vanelle recognized Nelroy Jackson as the outgoing WSSA representative. The WSSA annual meeting was held in February in New York City. The WSSA is in excellent financial condition. She reviewed WSWS support of the Director of Science Policy and introduced the new officers of WSSA.
The potential for publishing a new journal on invasive plant management is being considered by the board of WSSA.
A consideration for hiring a terrestrial weed scientist to work with EPA on various projects is under consideration, similar to the aquatic position now being supported.
The 2007 meeting will be in San Antonio, TX and the 2008 meeting will be in Chicago, IL.

CAST Representative Report. Presented by Rod Lym

The fall CAST meeting was held in Albuquerque, NM. The Shared Leadership Program will no longer be funded by the Kellogg Foundation. WSWS has been asked to provide 3 participants in the last schedule meeting to be held in June in Montana.
CAST has a new commentary on avian flu and pandemic influenza. It is available on the CAST website.
The financial condition has improved. New sustaining members have been added. While the operating expenses put CAST in the red for 2005, it is expected to operate in the black, financially, in 2006.
This is Rod Lym's last year on CAST and a new member will be appointed by Kassim Al-Khatib.

Constitution & Operating Procedures Report. Presented by Kai Umeda.

All committees were worked with to bring about any needed changes in the constitution or operating guide.

Director of Science Policy Report. Presented by Lee Van Wychen.

Lee thanked everyone who gave him comments and feedback during this meeting and encouraged continued dialogue as he returns to Washington. He encouraged everyone to lobby their representative on behalf of weed science.

Committee Reports

Poster Section Report. Presented by Cheryl Fiore.

Cheryl reviewed the numbers of posters presented in the two sessions and thanked everyone for their participation. A reminder was given to have all posters removed by this morning.

Finance Report. Presented by Jesse Richardson.

As of Feb. 28, a balance of $175,150 exists in the Dain Rauscher accounts. While the WSWS is in excellent financial condition, there are no guidelines in the operating guide for an operating reserve. The finance committee met yesterday and is proposing the society adopt a guideline of maintaining a cash reserve of 2.5 times the annual operating expenses.

Nominations Report. Presented by Jeff Koscelny.

The committee members were presented. A slate of nominees were prepared and submitted to the board at the summer meeting for discussion. Upon the board's approval, a ballot and vote was prepared. A total of 106 ballots were returned and counted.

President-elect: Ron Crockett
Secretary-elect: Pam Hutchinson
Chair-elect, Research Section: Rick Boydston
Chair-elect, Education Regulatory Section: Mike Edwards.

A request was made to consider the feasibility of electronic ballots. Some concern was expressed about members not on an electronic service, and thus, the election conducted in 2006 will continue to be via paper balloting. If electronic ballots are accepted for future elections, changes in the operating guide will be drawn up and adopted.

Fellows & Honorary Members Report. Presented by Carol Mallory-Smith.

Celestine Duncan & Joan Campbell were made Fellows. Wanda Graves was made Honorary Member. Vanelle Carrithers will chair the committee this year. Rod Lym has agreed to serve on the committee. Carol encouraged the membership to consider putting forth the effort to nominate members for awards.

Awards Report. Presented by Ron Crockett.

Ron thanked the committee members and reviewed the committee members for the upcoming year.

Proceedings Report. Presented by Kassim Al-Khatib.

240 copies were published and sold for $20 per copy. Joan Campbell is the chair of this committee.

Research Progress Report. Presented by Kassim Al-Khatib.

For 2006, 200 copies were printed and all copies brought to the meeting were distributed. 98 reports were listed in the report. The report is a breakeven function of the society. Traci Rauch is the editor of the report.

Website Report. Presented by Tony White.

The website continued to function well in 2005. The Crop Technology modules increased in number. Job postings were removed directly from the website, but links were provided to job listings. Presentations from the 2004 Salt Cedar symposium were put on the site. Credit card payment capability was added to the site for meeting registrations and publications. Registration on-line for this meeting went very well. A few specific situations regarding credit card payment were encountered, but were generally a function of the specific credit card limitations rather than a website function.

Newsletter Report. Presented by Pat Clay.

Four issues of the newsletter were published since the last annual meeting. An option will be available to receive the newsletter electronically. This speeds up delivery by 2-3 weeks compared to bulk mail. The deadline for the next newsletter for article submission is in 15 days.

Site Selection Report. Presented by Mike Edwards.

Four sites are being considered for the 2009 meeting: Albuquerque, NM; Denver, CO; Colorado Springs, CO; Fairbanks, AK. A representative of the Fairbanks Convention and Visitors Bureau was at our meeting this week to answer questions. Mike reviewed the estimated costs for travel and rooms at the locations.
The committee desires input from the membership on the site selection for 2009. Mike conducted a straw poll of the memberships intent to attend the meeting if it was held in Fairbanks, AK. Mike answered questions from the floor that came up regarding site selection.

Education Report. Presented by Tracy Sterling.

On-line website materials continue to be updated and expanded. The funds provided by WSWS has been used to improve animations and quality of on-line materials. A graduate level mode-of-action course is being added to the website.

Noxious Weed Short Course Report. Presented by Celestine Duncan.

The 2005 course was held in Chico Hot Springs, MT. The 2006 course is full and 40 people are on the waiting list. The instructors were listed and thanked. There is about $34,000 in the account to date, with minimal outstanding expenses. The course operates as a break-even undertaking.

Student Night Out Report. Presented by Steve Dewey.

This year 22 hosts and 25 students participated.

Public Relations Report. Presented by Brian Olson.

CEU credits from several states have been obtained. If a specific state is not available and a member would like such, let the committee know so that it can be applied for or lobbied for at the state level.

Legislative Report. Presented by Eric Lane.

Committee members were introduced. Comments from the society on the BLM EIS process & issues were submitted. Support letters for the Noxious Weed Control Act are being circulated and members are encouraged to voice their support to their elected representatives.

Sustaining Member Report. Presented by Lynn Fandrich.

Committee members were reviewed. Jeff Tichota will join the committee. Thirteen ng members contributed 4600 in dues. Members were thanked for their contributions to the society.

Necrology Report. Presented by Carol Mallory-Smith.

The society was notified of the death of Dr. Tom Muzik, who died January 26, 2006. His life accomplishments were reviewed and a moment of remembrance was taken in honor of his life.

Herbicide Resistant Plants Report. Presented by Kirk Howatt.

Fact sheets have been prepared and have/will be placed on the website regarding weed resistance. Input from members on needs and ideas for the committee was solicited.

Membership Development Report. Presented by Lisa Boggs.

Ideas for keeping membership involved with the society and serving the needs of the membership were solicited.

Student Liaison Report. Presented by Dirk Baker.

The first annual student business meeting was held yesterday morning. A vote was taken to formalize the student representation to the WSWS and WSSA and passed. Two student liaisons are required to meet national and regional guidelines.

Poster & Paper Contest Report. Presented by Steve Enloe.

Steve recognized all students and judges who participated in the contests.

<u>Undergraduate Poster Contest:</u>

1st Place: Adrienne Olson, Univ. of WY. *Alfalfa Injury Resulting from Application of Flumioxazin with a Nonionic Surfactant.*

Graduate Poster Contest:

3rd Place. Lydia Clayton, Univ. of ID. *Is ACCase Resistant Italien Ryegrass Also Resistant to Pinoxaden?*

2nd Place: Alejandro Perez-Jones. OSU. *Introgression of the Imazamox Resistant Gene from Clearfield Wheat to Jointed Goatgrass.*

1st place: Ryan Rector. Univ. of AZ, Tucson. *Partial Budget Analysis of an Automatic Spot Spot Sprayer in Western Tree Crops.*

Graduate Student Paper Contest

Weeds of Range & Forest Section:

2nd Place: Luke Samuel. NDSU. *Aminopyralid Efficacy on Canada Thistle and Native Plant Species in Theodore Roosevelt National Park.*

1st Place: Dirk Baker. CSU. *Estimating Wind Velocities for Diffuse Knapweed Dispersal.*

Agronomic Crops Section:

3rd Place: Gustavo Sbatella. Univ. of WY. *Jointed Goatgrass Viability Losses Under Different Environments.*

2nd Place: Sonja Nunez. New Mexico State University. *Effect of Early Season Irrigation and Heat Unit Accumulation on Yellow Nutsedge, Purple Nutsedge, and Root-Knot Nematode Development.*

1st Place: Todd Gaines. CSU. *Gene Flow in Wheat and Jointed Goatgrass at the Landscape Level.*

Old Business:

Constitution vote to change the wording regarding the Placement Committee and Student Educational Enhancement Committee was conducted by Kai Umeda. The committees were eliminated last year and this requires a constitutional change. A motion was made and seconded to make these changes. Motion was approved on a voice vote.

A knotweed symposium is being planned for next year's annual meeting in Portland, OR. Vanelle Carrithers, Tim Miller, and Janet Clark will organize the symposium. Some international speakers may be brought in to participate in this function.

New Business:

WSWS will be participating in the Shared Leadership Workshop put on by the Institute for Conservation Leadership on June 13-17, 2006 in Montana. Tim Miller, Janet Clark, and Jesse Richardson will attend on behalf of WSWS.

Phil Westra announced that a salt cedar research conference will be held in Ft. Collins at the Hilton Hotel on October 3 & 4, 2006. It is primarily sponsored by Colorado State University. Title submissions are due April 30, 2006. Hopes are to publish some of the papers from this event. Co-sponsors are being sought.

Phil Westra reviewed the success of the national jointed goatgrass research effort. Phil thanked Alex Ogg for his efforts on chairing this project. The efforts will be channeled into a broader spectrum for managing weeds in wheat.

President Phil Banks passed the leadership gavel/hoe to incoming president Kassim Al-Khatib. Kassim presented Phil Banks with a plaque thanking him for his service to the society as president.

The meeting was adjourned 8:31 AM.

Respectfully submitted,

Vince Ulstad
Secretary

Western Society of Weed Science
EXECUTIVE BOARD MEETING, POST-ANNUAL MEETING
16 March, 2006
John Ascuaga's Nugget Hotel
Sparks, NV

Members present: Kassim Al-Khatib, Dirk Baker, Phil Banks, Rick Boydston, Vanelle Carrithers, Janet Clark, Ron Crockett, Joe DiTamaso, Mike Edwards, Wanda Graves, Pamela Hutchinson, Angela Kazmierczak, Jeff Koscelny, Tom Lanini, Carol Mallory-Smith, Tim Miller, Corey Ransom, Jesse Richardson, Jill Schroeder, Kai Umeda, Joe Yenish.

The meeting was called to order by President Kassim Al-khatib at 12:00 pm on Thursday March 16, 2006. Kassim thanked everyone for their work and stated the main objectives of this meeting were to a) give feed-back to the 2007 meeting Program Chair, b) to make the decision about the location of the 2009 meeting, and c) to set a date for the Portland 2006 summer meeting. Introductions were made around the table.

Program Committee Report: Kassim Al-Khatib

- Kassim reported on the following:
  - There was a problem with a General Session guest speaker needed an Apple computer for the presentation. It was assumed that people would know the rule about talks having to come from PC not Apple computer software set for the section talks, but in the future, the Program Chair shouldn't assume that guest speakers would know the rule.
  - Some presenters did not e-mail their talks to the section chairs ahead of time, so the chairs had to take time and track those people down at Reno.
  - When computers in the session rooms were left for a while they would go into "sleep mode" and if the computer owner was not around, no one would know the password to unlock the computer. In the future, arrangements need to be made to avoid this problem.
  - Kassim went to Discussion Sessions and felt that one had too much formal presentation and not enough discussion. In general other board members said they had seen this and also the other end of the spectrum, too, when there was not enough talk before discussion, so the discussion could not evolve.
  - Mention was made of a Basic Section discussion session which did not have anyone in the audience for a guest speaker. Bill Dyer had to go out and grab Board members to come in for the speaker.
  - Mention was made that at the "What's New in Industry" session, some people talked 30 min, which was too long for that session. A talk that length should be a talk in a paper session.
  - Sessions did not stay on time always, so the Moderator needs to do the introductions quickly and get the speaker to finish on time so that the session stays on time. A 2nd person, e.g. the Chair-elect should be changing to the next presentation on the computer, and a 3rd person should be running the lights so the Moderator is not doing everything.

  - Tom Lanini mentioned that if the computer is not right on the speaker podium at the 2008 WSWS meetings in California, they can pay students to assist with the computer.
  - Vanelle Carrithers thought it works best when moderators have all of the talks linked to the title slide and can simply click on the talk title to quickly pull up the next talk in presentation mode.
  - Mike Edwards suggested that the meeting hotel should always wire the cable right from the computer to the podium.
- Many Board members heard complaints about running concurrent sessions of interest to one group e.g. Rangeland and Forestry and Wetland and Wildlands, so all of the talks they wanted to hear could not be attended. A discussion followed about merging those two particular sections and that would be hard to decide since there's no way to know how many papers will be submitted in each section each year. It was suggested that the Board address this issue at the 2006 summer meeting.

Local Arrangement Committee Report – Reno: Tom Lanini

- Tom thanked the committee members for their help and hard work.
- Tom said that training for LCD, computers, etc. should be given on the first day before the talks start at the next WSWS meeting.
- He says there will be no Apple/Mac computers at that meeting and people needed to pay attention to the Program instructions which say PC only.
- Tom and other Board members reported they heard complaints from WSWS member about the smoking allowed in the meeting areas. Many WSWS members have stated that they want a smoke-free meeting.
  - Mike Edwards said he will add the smoke-free requirement to the RFP for the next meeting hotels.
- Tom said that the J.A. Nugget Hotel staff members were very responsive to WSWS needs at this meeting.
- Vannelle Carrithers said she herself and other people couldn't get to all the talks as easily because the talk rooms were split up too far. Joe DiTamaso said he missed the first part of one student contest paper because it was too far away from the contest talk he had just finished judging.
  - Kassim told the Board that the hotel informed him they committed to another group and needed to re-arrange the session rooms. He said he okayed the change because he wanted to get the bigger room offered – the Pavilion, rather than a smaller closer room which would not have accommodated the sessions in that room.
- Tim Miller reported that some of the foam boards for posters are deteriorating past the point of use and should be rotated out.
- Kassim stated that the Poster committee can decide if WSWS needs to buy new easels/stands rather than continuing to rent them from WSSA. The committee could compare shipping + rental costs to the costs of buying new ones.
  - Bob Parker has been carrying them back and forth, but may not do that in the future.
  - Phil Banks mentioned that Marathon-Ag and Environmental Consulting would be willing to store them and then ship by freight which is inexpensive but takes two weeks compared with UPS or Fed Ex which cost much more but is faster.
  - The Board will discuss the easel needs and possibilities at the 2006 summer meeting.

Local Arrangements Committee Report – Portland: Carol Mallory-Smith

- Carol reported that negotiations will soon be taking place for details/needs at the Portland hotel for the 2007 WSWS meeting.

WSWS Summer Business Meeting - Portland

- It was noted that the summer meeting is usually held the last week of July on a Friday afternoon lasting until noon the next day, Saturday. July 28 and 29th were suggested for the 2006 meeting since there were some conflicts for the weekend before. Carol Mallory-Smith took a head count for a room block and will check on availability at the hotel for the tentative dates.

- Mike Edwards reported that based on the straw poll at the WSWS Business meeting earlier this morning, there were too many members saying that they would NOT go to Fairbanks if that is where the 2009 meeting site was located.
  - Mike recommended Albuquerque as the best 2009 site choice because WSWS already has been in Colorado a few times recently. He said that he will talk with Allen Marketing so they can gather information on hotel room prices plus handle all hotel arrangements.
- Hawaii was mentioned for the 2010 meeting.
- There was a motion which was seconded to hold the 2009 WSWS Meeting in Albuquerque, NM. Kai Umeda called for the question, and the motion passed on a unanimous voice vote.

New Business

- Janet Clark asked if it would be appropriate to have a table at the 2007 WSWS meeting to sell books and other offerings that may be on the WSWS web by then. Phil Banks says that Marathon-Ag and Environmental Consulting will look at the logistics of actually bringing copies people could walk away with. Many Board members thought it was a good idea. Mike Edwards says that the Range Management society sells books, etc. at their annual meetings and that they make a lot of sales. Corey Ransom wondered if there were any WSWS hats left that could be sold. Pamela Hutchinson said she would contact Don Morishita about the hats.
- Dirk Baker reported that while he has been the WSWS Grad Student Representative, his major professor has been supportive of allowing him to attend both and financing the travel to both the WSWS summer and annual meetings, but that may not be the case for whoever is the Grad Student Rep in the future.
  - Kassim stated that Grad Student Rep travel costs are a legitimate concern and should be addressed. In the past, WSWS had the Student Enhancement Program and now that it's been dropped, maybe the money can be used to support travel costs for the Grad Student Rep. Ron Crockett and others added their agreement with further discussion.
  - Tom Lanini thought that the Board needs to come up with a formula to not pay all of, but to pay part of the Grad Student Rep's travel costs.
  - The WSSA Graduate Student Committee apparently requires 2 reps from each region to attend the annual WSSA meetings. Dirk says that if the regional rep is a Ph.D student then they probably are presenting anyway at WSSA, but probably not if they are an M.S. student so it would be hard for a WSWS Grad Student Rep to be at both WSSA and WSWS annual meetings as well as the WSWS summer meeting if they were an M.S. student.
  - Angela Kazmierczak, the new WSWS Grad Student Rep, reported that her advisor will be financially supportive of her position at least for the short term.
  - The question arose as to what committee would deal with this situation? Kai Umeda says that at the summer meeting the Member-at-Large could be the liaison as well as himself as the rules person if the Grad Student Rep could not attend.
  - Discussion followed about how the summer meeting would be the hardest for the WSWS Grad Student Rep to attend since there is no other reason for them to attend i.e. they are presenting a paper or poster.
  - Kassim asked if both Grad Student Reps were needed at the summer meeting? Dirk says that it could be open for discussion. Jeff Kocselny says he will do some research and get back to the Board on the need for both Reps at the summer meeting.
  - Kai Umeda asked if any summer meeting rooms were comp with the idea that Grad Student Reps would get those rooms. Phil Banks said that there will be no free rooms in Portland but there will be in Anaheim for the 2008 meeting and can be put into the negotiations for the 2009 Albuquerque meeting.

- Dirk told the Board that he would like to come to the 2006 summer meeting even if Angela comes, but if he can't come because of funds, then Angela should come because she has not been to a summer meeting while he has experienced a summer meeting.
- Kassim said that Angela and Dirk should work with Jeff Kocselny to decide
  - Grad Student Rep funding support needs
  - Should both reps attend the summer meeting.
- Kai stated that Dirk should come to this upcoming summer meeting because he has been involved, and at this early stage of having a Grad Student Rep, he needs to be there. Kai suggested that WSWS pay for the Grad Student Reps' travel to the summer meeting this one time, only.
- Phil Banks reminded the Board that Jesse Richardson had emphasized at the WSWS business morning meeting that a Reserve Fund Policy was needed. Phil noted that this Grad Student Rep travel funding is an example of how that Fund could be used.
  - Phil Banks suggested that 2 times the annual operating cost (a total of approximately $150,000) plus the costs for the Weeds of the West reprinting which will be occurring soon = approx $ 250,000 should be held in the Reserve Fund.
- Kassim stated that WSWS can help the Grad Student Reps in other ways by waiving registration fee, etc. and that he doesn't want inability to travel to meetings because of not enough funds to be prohibitive for the Grad Student Reps to come to both the summer and annual meetings.
- Joe Yenish told the Board that maybe if the University the Grad Student Rep is attending has a Travel Grant Fund, the student could write a proposal for those type of funds. Others said that some universities only allow one trip per year on travel grant funding.
- Kai Umeda moved that we pay for student travel to the Portland 2006 summer meeting for both Grad Student Reps to solidify the position, seconded by Joe DiTamaso.
  - A discussion followed: Wanda Graves stated that in her opinion travel costs for one student rep would be enough to pay out of the WSWS reserve money. She said that the reason why WSWS has that reserve is because we've been careful. Other Board members reasoned that the travel payment would only occur for this one summer meeting after which the funding issue would be resolved and the Grad Student Rep position solidified and most likely there would only be one Grad Student Rep going to the summer meetings in the future. Tom Lanini said that the summer meeting attendance should be supported by WSWS while the annual and WSSA should not be funded or should only be partially funded.
- The question was called and the motion passed with a majority voice vote.

The meeting was adjourned at 1:15 pm Thursday, March 16, 2006.

Respectfully submitted,

Pamela J.S. Hutchinson
Secretary

2006 FELLOW AWARD
JOAN CAMPBELL

Joan Campbell is a Research and Instructional Associate at the University of Idaho. She received her B.S. in Agronomy with a Weed Science Option and her M.S. in Weed Science from North Dakota State University. She has been at the University of Idaho and a member of the Western Society of Weed Science since 1981.

Joan is a dedicated member of WSWS. She has served as a Member-at-Large, as Agronomic Section Chair, Proceedings Editor, and Progress Report Editor. She was the Website Founder and its first Editor. She also has served on numerous committees including Necrology, Student Paper Judging, Resolutions, Posters, and Editorial Committee Chairperson. Joan has authored over 100 WSWS Research Progress Reports. She has presented 17 papers at the annual meetings and for publication in the proceedings. Joan received the Presidential Award of Merit in 2004.

Joan is active in the Weed Science Society of America and has served on numerous committees. She is also a member of the Idaho Weed Control Association and the International Weed Science Society.

Joan teaches the Introductory Weed Science Class at the University of Idaho. She also teaches laboratory classes for the advanced weed science classes. She is instrumental in advising graduate students in the Weed Science Project. She has a vast knowledge of field plot techniques and has helped most of the graduate students with their field projects.

Joan has an outstanding record of service to WSWS and to Weed Science.

2006 FELLOW AWARD
CELESTINE DUNCAN

Celestine Duncan is the owner and manager of a private consulting business that specializes in invasive plant management on range and wildland sites in the western states since 1988. Celestine received her B.S. in Horticulture from New Mexico State University and her M.S. in Agronomy with a minor in Range Science from Montana State University. Before starting her own business, she was the State Weed Coordinator with the Montana Department of Agriculture.

Celestine has been an active member of WSWS since 1993. She received the Presidential Award of Merit in 1999. Celestine served a Project chair for Weeds of Range and Forest and for Weeds of Wetlands and Wildlands. She has served on numerous committees.

Celestine is recognized nationally as a leader in invasive weed control. Celestine served as vice-chair of the National Invasive Species Advisory Committee. She also served on the Invasive Plant Management working group for the development of the National Invasive Species Management Plan.

Celestine has been the coordinator of the WSWS Noxious Weed Shortcourse since its inception in 1990. She developed curriculum and coordinated the course which has included over 32 instructors. More than 700 federal, state, county, and private land managers have been trained in identification, inventory, and management of invasive plants on range and wildland areas in the Western US.

Celestine has made outstanding contributions to WSWS and Weed Science.

Joan Campbell, WSWS Fellow presented by Carol Mallory-Smith (left)

Celestine Duncan, WSWS Fellow presented by Carol Mallory-Smith (left)

Janet Clark, WSWS Presidential Award of Merit

Wanda Graves, WSWS Honorary Member

PROFESSIONAL STAFF AWARD
DR. R. EDWARD PEACHEY

Assistant Professor, Senior Research
Horticulture Dept., Oregon State University
Nominator: Carol-Mallory Smith

Dr. Peachey has been associated with Oregon State University more than 20 years. During that time he has built a solid research program centering on weed control in horticultural crops, primarily processed vegetables for Oregon. He spent several years in the late 1980's serving as an agricultural advisor and extension program leader in Dhaka, Bangladesh. He has also contributed with a number of refereed journal articles and extension publications. Dr. Peachey has secured more than a million dollars in funded grants over a broad range of research interests. His creativity has sparked innovative weed management practices coupled with new understandings of commercially viable weed seed reduction practices. Dr. Peachey was honored in 2003 with the Oregon Society of Weed Science, "Weed Worker of the Year" award.

OUTSTANDING WEED SCIENTIST (PUBLIC SECTOR)
MR. RICK ARNOLD

Pest Management Specialist, Associate Professor,
New Mexico State University, Ag Center- Farmington, NM
Nominator: Gus Foster

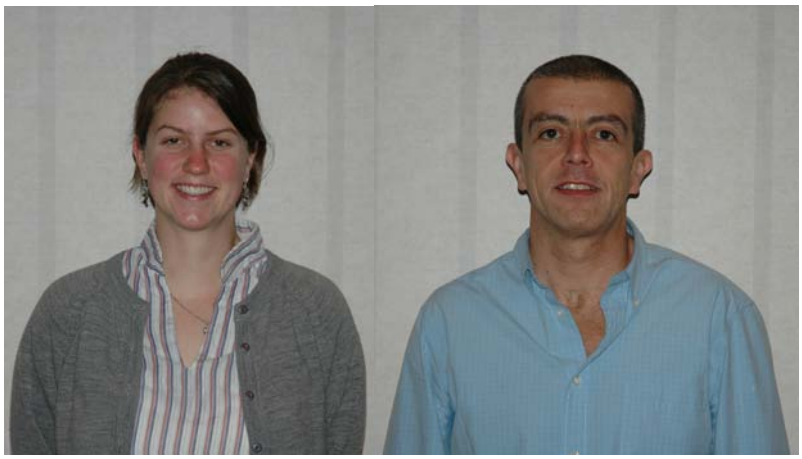
Mr. Rick Arnold has provided outstanding contributions for over 20 years to the farmers of New Mexico. Rick is currently an Associate Professor in the Dept. of Entomology, Plant Pathology, Agricultural Extension Education, and Horticulture at New Mexico State University. Rick has conducted weed control research in crop and non-cropland, insect control in agronomic and horticultural crops. He has devoted considerable efforts over the years in assisting the Navajo Agriculture Products Industry (NAPI). He has conducted field research, and weed management training to NAPI members to solve pest management issues. Rick is an active member of the WSWS and has submitted numerous technical articles he has written to the annual WSWS Research Progress Reports. In addition, Rick has served on Society committees, and has chaired the Education and Regulatory Section, and as Project Chair for the Weeds in Horticulture and Weeds of Agronomic Crops. Rick is seen as a tremendous resource for technical weed and pest recommendations. Rick has garnered over $1M in grant support from industry, commodity groups, and government grants to conduct his research efforts.

Edward Peachy, WSWS Professional Staff Award presented by Ron Crocket (right)

Rick Arnold, WSWS Outstanding Weed Scientist, Public sector, presented by Ron Crockett (right)

First place graduate student awards: Todd Gaines, Agronomic Oral Paper; Dirk Baker, Range and Forest Oral Paper; and Ryan Rector, Poster (left to right)

Second place graduate student awards: Sonia Nunez, Agronomic Oral Paper; Luke Samuel, Range and Forest Oral Paper, and Alejendro Perez-Jones, Poster (left to right)



Third place graduate student awards:
Lydia Clayton, Poster (left) and Gustavo Sbatella Agronomic Oral Paper

First place undergraduate poster award: Adrienne Olson

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