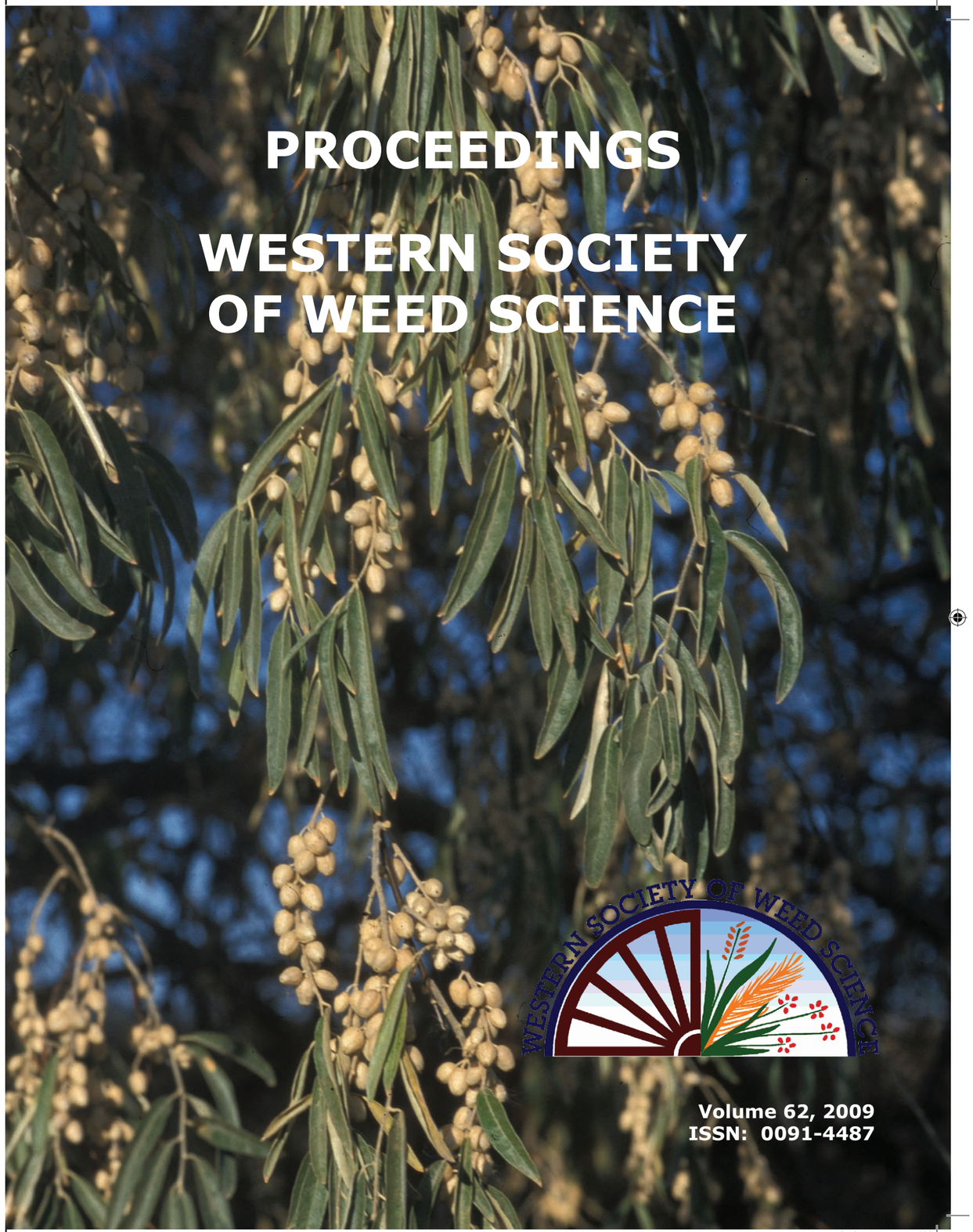
WSWS 2009 PROCEEDINGS VOLUME 62



PROCEEDINGS

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PROCEEDINGS

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PREFACE

The Proceedings contain the written summary of the papers presented at the 2009 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 from WSWS Business Manager, 205 W. Boutz, Bldg. 4, Suite 5, Las Cruces, NM 88005.

Cover photograph, Russian olive (*Elaeagnus angustifolia* L.) by Joe DiTomaso.

Proceedings Co-Editors: Joan Campbell and Traci Rauch

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GENERAL SESSSION

WSWS PRESIDENTIAL ADDRESS FOR 62ND ANNUAL MEETING. Daniel A. Ball

Thank you. It's good to be here with you — my colleagues and friends — for the 62nd annual meeting of the WSWS. It's also a great honor for me to serve as this year's president for our group.

I remember my earliest participation in WSWS meetings when I was beginning my career with the Extension Service in Nevada. That was in about 1981. I remember feeling a bit on the young and inexperienced side — I was, but I also remember feeling like this was a cohesive group of folks whose association would benefit me personally and professionally. At that time I felt like I wanted to contribute in some way to this organization.

Now in 2009, 28 years later, I feel a bit more experienced and much less young, but this feeling of being with a cohesive group is still the same. And I know that my association with this group ***has*** benefited me personally and professionally. I'm glad to have the opportunity to give something back now, by serving as your president.

Serving as president. It's a bit of a twist, really. An idea talked about by many old timers through the years - that in order to lead - we need to serve.

In fact, it was the poet, W.H. Auden, who once said,

"We are here on earth to do good to **others**. What the **others** are here for, I don't know."

So at least I know my role — doing some good in this position as president. And as Ronald Reagan pointed out, there are advantages to being president: "The day after I was elected," he said, "I had my high school grades classified Top Secret."

Well, I may not have perks like *that* by being WSWS president. But my bottom line is that it really ***is*** an honor to give back in this way. And I'd like to talk more about this topic of service, because I think it's an important topic to consider.

But before we get into that, let's talk business. I have several announcements to share.

- *First of all, there is a special symposium on Biological Control of Weeds that's been organized by April Fletcher and her committee. That symposium is in your program and starts immediately after the WSWS breakfast meeting on Thursday.*

- *Also, Alex Ogg has organized a special symposium and poster session on jointed goatgrass. This is a wrap-up of the National Jointed Goatgrass Research Program that began in about 1994. There will be talks and poster viewings on Wednesday afternoon and evening. The details are in your program.*

- *Also, our Education and Regulatory Section Chair, Bill Cobb, has brought together a number of old and new colleagues for a presentation and discussion on digital photography. That will be Thursday morning. It's also in your program.*

- *So I hope you'll be able to squeeze in as many of these events as possible, while still making contacts and getting in those conversations that are so important to gatherings like this.*

- *I'd also like to acknowledge and thank the folks who have made this meeting possible:*

- *Keith Duncan with NMSU Extension and his local arrangements committee have worked with the hotel facilities people and the WSWS board of directors to put together the great meeting facilities we have for the week.*

- *Jesse Richardson and his program committee for organizing, compiling, and tweaking the program as we have it set for this week's meeting.*

- *I want to acknowledge the Sustaining members listed in the back of your program.*

- *Thanks to our Breakfast and Break Sponsors, and to Mike Edwards for pulling these folks together.*

- *Thanks to Doug Ryerson for pulling together the "what's new in industry section".*

- *Also, at this time, I want to recognize and introduce the WSWS Board of Directors, including our Web Site Editor, Business Manager, and Student Liaisons. Would these people please stand?*

- *Could I also have those folks serving on various committees please stand, including our Proceedings and Research Progress Report Editors.*

Now if you'll look around at these people standing, you can see how much personal effort and service goes into making things work for this organization. I'd like for everyone here to think about how busy life is already, and then tack on the hours that all these people have put into making WSWS work. Thank you folks, please have a seat.

It's this tremendous amount of service that actually got me thinking about a topic for my presentation this morning. It's this service that will make our meetings successful, and keep things running smoothly for our organization throughout the year.

But it's more than that. Because service is about how we do our work outside of WSWS, how we serve our community, how we help our families. It's who we *are*, and who we *become* as people.

This is a little bit philosophical, perhaps, but I was visiting a while back with one of my new colleagues from Oregon State, Andy Hulting, about this upcoming talk and thinking about a philosophical slant to it, and he said to me "why not go for it, it might be one of your only chances to do that", so here goes……

150 years ago, Horace Mann spoke to the graduating class of Antioch University and said, "Be ashamed to die until you have won some victory for humanity."

We deal with weeds, my friends; probably not the most glamorous profession out there. But when we make progress in our work, we win some victory for ourselves and for humanity. Through understanding and managing weeds, we allow for more crop production and help to feed the world. We improve native ecosystems, and protect the world's natural resources. In short, whether glamorous or not, we win some victory for humanity, and we should know that our work, our service, is important.

There are plenty of figures, past and present, who we could look to as symbols of service. And one that comes to mind is someone greatly over quoted, but hard to beat - Gandhi.

At the age of 35, Gandhi had already developed much of who he was. But then he read a book by John Ruskin that greatly influenced his life. And he derived three basic principles from it:

First, *that the good of the individual is contained in the common good.*

Second, *that all work has the same value.*

And third, *that the life of labor is the life worth living.*[1]

You've probably heard the phrase "no man is an island" — the idea that we're all intertwined. That no matter what I do, I do to everyone; that no matter what happens to me happens to everyone. And even though this might just sound like philosophy, I think a good way of looking at it is to look at the global economy. We see how the economy of any one country affects the others; and that the collective economy and the individual economy — meaning my wallet — obviously affect one another.

This is what Gandhi's addressing in his first point — that *the good of the individual is contained in the common good.* When the common good is changed in any way, it affects all of us; and when we promote the common good, we're helping each individual too.

Let me give you a concrete example. I've never met Steve Jobs, CEO and founder of Apple Computer, and I don't even know the names of the other people at Apple pumping out iPhones and iPods. But whether or not I ever use these devices, they've influenced millions of people around me. They've influenced the entire music and cell phone industries. And maybe this makes people happier, and we're getting more productivity from people in other industries, perhaps in our own industry, and this affects our work.

When Steve Jobs was born, I didn't know his name. And it doesn't matter if you know it now. His work affects us all. But so does mine, and so does yours. And look, if you really want to get down to it, let's talk about the people who collect our garbage. Not much glamour in *that* line of work either. But can you imagine a world without *their* work being done?

This is what Gandhi realized in the second principle, where all work has equal value. It's like in a baseball game where the pitcher is given the win. But *somebody* had to score to give him a win. And

[1] From *A Higher Standard of Leadership*, p. 28.

a whole lot of people had to do the fielding. Just remove the outfielders from a game of baseball and see what that pitcher's odds are of winning a game.

And what about *off* the field? What about the coaches? And the personal trainers? And the water boy? What about the construction workers who built the stadium? Or the company that makes the bats, the balls, the bases? What about the fans?

This is why I love the concept of collaboration, because collaboration is really a special kind of service. It's the kind where 2 + 2 equals more than 4. Where people come together in service, everyone bringing something different to the table. And by feeding off each other's talents, by filling in the gaps for one another, their total contribution is greater that what they could have accomplished each working individually. And I think that's the real value of organizations like WSWS.

I have to say that the most successful projects I've completed over the years in my position as a weed scientist have been from collaborative efforts, not projects from I've done alone. So my advice to my younger colleagues is to seek out collaborative projects.

In the end, when you take a "big picture" look at things, you might only pay attention to players on the field in a ballgame, forgetting everything that went into making the game possible. The game wouldn't happen if anyone fell down on the job. And this is the same with the entire, collective experience we have here on planet earth. This is why it's important that we all serve in our own capacities, but in collaboration with everyone else.

So here we are in weed science. In fact most of us are *fascinated* by weed science. Strange as it probably seems to most of the world, we actually get excited by minute details about weeds. But if we didn't, if we weren't passionate about our work, if we didn't bring everything we have to the table, the world would be worse off for it. We're part of this great engine driving *every* discovery, *every* invention, *every* bit of progress across the globe.

Not a bad experience to take part in, is it?

Now Gandhi's third principle was that the life of labor was the life worth living. That without work, there is no reason to be here. And there's an anecdote that I think explains why – Here in the U.S., we're very big on talking about our human rights, and we insist that government and other people recognize these rights. But where do they come from? What gives us these rights?

H.G. Wells once asked for Gandhi's views on a document that Wells had co-authored called "Rights of Man." Gandhi didn't agree with the document's emphasis on rights.

"Begin with the charter ***duties*** of man," he told Wells, "and I promise the ***rights*** will follow as spring follows winter."

In other words, if we're not actually *doing* something for the world, what could the world possibly owe us? But if we are taking our interests and our talents and helping others, then the world actually ***wants*** us and will give us the freedom we need to continue being of use. It will give us our rights.

All this, just for serving. As Gandhi saw, the life of labor or service ***is*** the life worth living because we're making life better for others. But it's *also* the life worth living because — in the end — it's make life better for us – and it transforms who we are.

It was once said: "Keep doing good deeds long enough and you'll probably turn out to be a good man in spite of yourself."[2]

That's maybe a good way of putting it. We don't start out loving to serve other people. We start out loving to be served. That's human nature. But as this quote points out, the more we serve — if we're not careful — the more we might start to like it.

Luckily, for each of us, there a selfish aspect to service. If there weren't, I don't know how we'd ever start liking serving others in the first place. It's kind of like the whole bragging thing. When we're children, we brag to get others to like us. But when we get a little older, we figure out something that hadn't really dawned on us before: that other people don't like it when we brag. It doesn't make them like us more.

But good thing we humans are quick learners. As youngsters, we quickly figure out that if we can't make ourselves bigger by bragging, then maybe we can do so by making others smaller. And so we start gossiping.

Then, most of us figure out that ***this*** doesn't really make people like us either.

Eventually we get it, though. Eventually we realize that what people *really* want is for you to make a positive difference in **their** lives.

Malcolm Forbes once said, "Everybody has to be somebody to somebody to be anybody."

In other words … we have to become meaningful in someone else's life to *become* somebody. And *becoming* somebody is what we're really after in the beginning. That's what makes us feel important.

But then, here comes this strange yet wonderful phenomenon, where we start actually taking pleasure in the service itself. We find that we *like* to see what we can accomplish. It makes us feel *good* that others are smiling, or being fed, or getting to enjoy a preserved environment because of our work. And yes, maybe these are also selfish motives — feeling good about what's happening. But I have to imagine we can call that a kind of noble selfishness. Wouldn't you agree?

The philosopher, Albert Schweitzer, once said, "I don't know what your destiny will be, but one thing I know: the only ones among you who will be really happy are those who will have sought and found how to serve."

And that's the real point here: each of us gets the most *out* of life when we give the most *to* life. You have to admit, this is a pretty good trait just for survival of the species - that my pleasure is tied up in your pleasure; that your well-being is tied up in the well-being of all people. That in the end, we're all in this together. The more we serve, the more we are served. The more we bring to our work in weeds, to our duties within our families, to our place in the community … the more they each bring to us.

[2] Louis Auchincloss.

So what am I saying about service? It's that none of this is a lecture or sermon. That no one ought to be serving even though they hate doing so. Instead, it's more an observation about the fact that we ***are*** serving because we ***love*** doing so, and the more we contribute — the more we take part as all those people did who keep the WSWS running as they do, and who make these meetings possible — the more we will *enjoy* that contribution. The more we will get out of life.

And to wrap up, I will just comment on how honored I am to work with so many people who have discovered this love of service, and who are contributing in such meaningful ways to my life, to the lives of everyone in this room, and to the good of people everywhere. It's an honor to know that I can bring *my* love of weeds and of service together with *your* loves, and through collaboration — through a sense of united service — we can accomplish much more than we could without one another.

It's this very reason that I take such pleasure in serving as president for now, and why I'll continue taking pleasure in serving the WSWS in whatever way I can for years to come. Thank you. [68]

NATIONAL AND REGIONAL WEED SCIENCE SOCIETIES: DIRECTOR OF SCIENCE POLICY UPDATE. Lee Van Wychen, Director of Science Policy, Washington, D.C.

No abstract. [69]

WSSA SME POSITION – BUILDING BRIDGES WITH EPA. Steve Dewey, Utah State University, Logan.

No abstract. [70]

WHAT DOES THE FUTURE HOLD FOR U.S. AGRICULTURE? Lowell Catlett, New Mexico State University, Las Cruces.

No abstract. [71]

POSTER SESSION

CONTROL OF CHOLLA AND PRICKLY PEAR WITH PICLORAM AND FLUROXYPYR. Daniel C. Cummings*, Dow AgroSciences and Keith Duncan, New Mexico State University.

Cholla (*Cylindropuntia imbricata*) and Plains prickly pear (*Opuntia polyacantha*) are common succulents throughout the desert grasslands. These species can increase in density on overgrazed sites to the point of obstructing livestock utilization of grass forages and interfere with desirable forage plants for moisture and nutrients. Mechanical control options are available, but are costly and disruptive to native ecosystems. Chemical measures can be an option to control these species. Experiments were initiated in 2005 to determine response of cholla and prickly pear to picloram and fluroxypyr. Individual plant treatments included: a premix of picloram + fluroxypyr (0.67 + 0.67 lb ae/gal) at 1% and 2% v/v, picloram (2 lb ae/gal) alone at 1% v/v, and fluroxypyr (2.8 lb ae/gal) alone at 0.5% and 1% v/v, depending upon location and species. Visual percentage mortality ratings were taken at 1 or 2 years after treatment (YAT). At 2 YAT, picloram + fluroxypyr at 1% and 2% v/v, and picloram at 1% v/v caused 55, 83, and 30% cholla mortality, respectively. At 1 YAT, prickly pear mortality was 96, 62, 82, and 93% for picloram + fluroxypyr at 1% v/v, picloram at 1% v/v, fluroxypyr at 0.5% v/v, and fluroxypyr at 1% v/v, respectively. Effective chemical controls for cholla are picloram + fluroxypyr and for prickly pear are picloram + fluroxypyr or fluroxypyr. [1]

ARIZONA'S INVASIVE SPECIES ADVISORY COUNCIL. John Brock*, Arizona State University Polytechnic, Mesa, AZ; Kai Umeda, University of Arizona Cooperative Extension Service; Brian McGrew, Arizona Department of Agriculture, Phoenix, AZ; and Tom McMahon, Arizona Game and Fish Department, Carefree, AZ.

No abstract submitted. [2]

THREE DECADES OF BIOLOGICAL CONTROL OF WEEDS IN FREMONT COUNTY WYOMING. John L. Baker*, Nancy A.P. Webber, and Kim K. Johnson, Fremont County Weed and Pest, Lander, WY 82520.

The primary responsibility for Wyoming Weed and Pest Control Districts is to implement and carry out effective programs for the control of designated weeds and pests. The availability of Rhinocyllus conicus in 1978 for the biological control of musk thistle sparked an interest in biological control on rangeland weeds that has resulted in the introduction of 32 species of insects on 10 species of weeds in the past 30 years in Fremont County, Wyoming. Since our primary responsibility is weed control, as opposed to research, our focus has been on post release monitoring for establishment, spread and impact, collection for redistribution, and the integration of biological control with other commonly used weed control methods. In recent years we have devoted a greater share of our budget to the development of new agents realizing that there are many other invasive species where biological control could impact their management. As a result of these efforts, Musk thistle acreage has dropped from over 11,000 acres of monotypic stands in 1980 to less than 1,000 infested acres where Musk thistle is only a scattered component with little economic impact. Leafy spurge has been reduced in vigor across most of its range in the county resulting in thinner stands of smaller plants greatly altering the appearance of formerly yellow hill sides. Canada thistle has been greatly reduced in riparian habitats and monotypic stands of Dalmatian toadflax are collapsing. Where host specific agents are available, biological control should become the primary control technology over which other technologies are integrated for the control of established invasive rangeland species. [4]

ASSESSING PLANT COMMUNITY AND ENVIRONMENTAL COVARIATES OF NON-INDIGENOUS PLANT IMPACTS. Tanya C. Skurski*, Bruce D. Maxwell, and Lisa J. Rew, Montana State University, Bozeman.

The concept that the impacts of non-indigenous plant species (NIS) will vary across different environments has been supported in recent research. We conducted a manipulation experiment to examine how plant community richness responded to four treatments (manual removal of downy brome (*Bromus tectorum* L.), ground disturbance, herbicide application (fall application of imazapic at 129 g ha-1) and control). Treatments were randomly applied to 0.25 m2 plots with 10 replicates at three sites (n= 30). Sites represented a range of community types and disturbance histories typical of southwestern Montana. We examined pairwise correlations between the post-treatment change in richness and fifteen covariates. We hypothesized that the response to treatments would vary across different environmental variables. Change in richness with manual removal of downy brome and control plots was positively correlated with probability of this species occurrence, aspect , soil pH, soil organic matter, soil nitrate, and soil percent clay, meaning higher levels of these predictor variables were correlated with an increase in community richness. Whereas, change in richness was negatively correlated with slope, annual radiation, distance to road, and soil percent sand, meaning higher levels of these predictor variables were correlated with a decrease in richness. Non-significant relationships were found with elevation, slope, initial percent cover of downy brome, soil phosphorus, soil potassium, and soil percent silt and change in community richness. Identifying biotic and abiotic correlates with NIS impact and treatment response can help guide weed management efforts, as well as provide mechanistic insight into plant community dynamics. [5]

EFFECTIVE HERBICIDES FOR CONTROLLING YELLOW TOADFLAX? James Sebastian* and K.G. Beck, Colorado State University, Ft. Collins, CO.

Yellow toadflax, *Linaria vulgaris* Mill. (LINVU) is an aggressive escaped ornamental that reproduces from seed and creeping roots. LINVU has rapidly expanded its range on the steep foothill slopes, canyons, and higher elevation parks in Colorado. LINVU has proven to be difficult to control with herbicides and often requires high herbicide rates that still provide unacceptable long-term control. Two experiments were established and sprayed at an adjacent site near Crested Butte, CO on August 29, 2007 to evaluate chemical control of LINVU. Both studies were designed as randomized complete blocks with 4 replications. A new herbicide (DPX-KJM44) from DuPont Crop Protection was evaluated in Experiment 1 and picloram, dicamba, diflufenzopyr, and combinations thereof were tested in Experiment 2. Herbicides were applied when LINVU was in the vegetative to late flower growth stages and 1 to 2 cm long root buds had formed on 70% of LINVU crowns. Visual evaluations for LINVU control and grass injury were conducted on October 7, 2008 approximately 13 months after treatment (MAT). LINVU control increased with increasing rates of DPX-KJM44 (Experiment 1). There was 30 to 100% LINVU control from 3 to 12 oz ai/a of DPX-KJM44 13 MAT. Although there didn't appear to be perennial grass stand loss from DPX-KJM44, there was significant stunting of grass. About 8 to 19% grass height reduction occurred from 0.25 to 1 oz ai/a and 33 to 51% grass height reduction from 2 to 12 oz ai/a of DPX-KJM44. Dicamba or dicamba plus diflufenzopyr controlled 30 or 29% of LINVU, respectively, approximately 13 MAT (Experiment 2). Picloram (32 or 64 oz of product/a) sprayed alone controlled 53 or 70% of LINVU; however, when the same picloram rates were tank mixed with diflufenzopyr + dicamba LINVU control increased to 97 or 94%. There was 73% LINVU control from picloram plus dicamba and no benefit to adding dicamba (without diflufenzopyr) to the picloram tank mix. Although there did not appear to be any perennial grass stand loss from any treatment, there was slight stunting of grass species (0 to 28%). These studies demonstrate that DPX-KJM44 and picloram + diflufenzopyr + dicamba provide

excellent LINVU control 13 MAT with slight to moderate height reduction of grasses. It is possible to lower picloram rates and increase long term LINVU control by tank mixing picloram + diflufenzopyr + dicamba. We suspect, however, that the presence of many root buds on yellow toadflax crowns may have been a key factor for the high level of control in either of these experiments and new experiments currently are in progress to address this issue. [6]

VARIABILITY OF RUSSIAN OLIVE CONTROL USING HERBICIDES. Ryan J. Edwards*, James Sebastain, George Beck, Colorado State University, Fort Collins, CO; Michael T. Edwards, DuPont Crop Protection, Pierre Part, LA.

We applied DPX-KJM 44 and MAT 28 treatments on Russian Olive (*Elaeagnus angustifolia*) in the fall to determine whether results differed from a spring application. Our results were compared to an unreplicated study, at the same site, with similar treatments. In both studies, we evaluated regrowth and control by visual estimates, over a one year period. In both studies, trees regrew leaves 8-9 months after herbicides were applied, with regrowth ranging from1% to 58%. DPX-KJM 44 at 420 g ai/ha and 560 g ai/ha controlled 90% and 93% of *E. angustifolia*, respectively, while 1120 g ai/ha of Imazapyr offered 100% control with no regrowth 9-months after herbicides were applied. Tree height also influenced herbicide susceptibility, with trees >10 ft tall displaying regrowth after treatments, whereas trees <10 ft tall showed much less regrowth and appeared more susceptible to herbicides. In the unreplicated study, we found that 126 g ai/ha Metsulfuron + 560 g ai/ha Imazapyr + 1% COC controlled E. angustifolia similarly to 1120 g ai/ha Imazapyr + 1% COC; herbicides mixed with COC controlled trees better, with less regrowth, than those herbicides mixed with ASPA 80; and Metsulfuron +Imazapyr controlled *E. angustifolia* better then Imazapyr +Chlorsulfuron. [7]

UTILITY OF SAFLUFENACIL FOR BROADLEAF WEED CONTROL IN NON-CROP USE PATTERNS. Joseph E. Zawierucha*, Glenn W. Oliver, John H. O'Barr, Leo D. Charvat, Brad Guice, Larry J.Newsom, Cletus D. Youmans, Walter E. Thomas and Sam Willingham, BASF Corporation, Research Triangle Park, NC.

Saflufenacil is a new herbicide being developed by BASF for annual broadleaf weed control in a variety of crop and non-crop areas. Saflufenacil provides rapid postemergence “knockdown” of broadleaf weeds as well as rate dependent residual control. BASF testing has demonstrated saflufenacil to have potential in several noncrop markets including: industrial, rights-of-way, turfgrass, as well as aquatic weed management. For industrial “bareground” applications, saflufenacil has been tested at rates up to 400 g ai/ha for control of a broad spectrum of weeds including horseweed (*Conyza canadensis*), kochia (*Kochia scoparia*), Russian thistle (*Salsola kali*), and pigweed (*Amaranthus* spp.). Field trials have demonstrated that a number of perennial grasses are tolerant to saflufenacil. This grass selectivity provides the potential for use in rights-of-way areas to control weeds such as horseweed and giant ragweed (*Ambrosia trifida*) while maintaining desirable grasses for erosion control. In utility applications, research has demonstrated that mixtures of saflufenacil and glyphosate can effectively control volunteer pine (*Pinus* spp.). Research results suggest that saflufenacil should become a versatile herbicide for non-crop weed control applications. [8]

ALTERNATIVE HERBICIDES FOR GARLIC MUSTARD CONTROL. Mike Moechnig*, Jill Alms, Darrell Deneke, South Dakota State University, Brookings.

Garlic mustard (*Alliaria petiolata*) is a biennial brassicaceae species that can invade woodland habitats and displace native understory vegetation. Garlic mustard was recently found in eastern South Dakota (Sioux Falls) and is also reportedly found in western South Dakota (Black Hills). Glyphosate is commonly used to control garlic mustard, but it may be desirable to identify a selective

herbicide to minimize injury to non-target plant species. Research was conducted in Sioux Falls, SD to identify alternative herbicides for garlic mustard control. Herbicide treatments included imazapic (70 and 105 g a.i./ha), imazapic + glyphosate (53 + 105 and 105 + 210 g a.i./ha), metsulfuron (21 and 42 g a.i./ha), sulfosulfuron (53 and 105 g a.i./ha), sulfometuron methyl (13 and 26 g a.i./ha), flumioxazin (36 and 107 g a.i./ha), and oxyfluorfen (280 and 560 g a.i./ha). Herbicide treatments were replicated four times in a randomized complete block design. Herbicides were initially applied on April 27, 2007 and applied again in the same plots on May 2, 2008. Visual estimates of the percent garlic mustard shoot reduction were recorded 28 and 370 days after the 2007 application and 23 days after the 2008 application. Garlic mustard control 28 days after the 2007 application was 52% for sulfometuron methyl at 280 g a.i./ha, 73% for sulfometuron methyl at 560 g a.i./ha, and greater than 90% among the other treatments. Control of second year garlic mustard rosettes was greater than 92% in each treatment 370 days after the 2007 application. Garlic mustard control was similar among treatments (63 – 99%) 23 days after the 2008 application. Garlic mustard seedling densities ranged from 75 – 400 plants/m2 among the herbicide treatments 370 days after the 2007 application and were similar to the untreated check. These results indicated that control with herbicides did not reduce the garlic mustard seed bank. Among the herbicide treatments, non-target species number and visual estimates of proportional ground cover were similar to the untreated check indicating that the herbicides did not affect non-target plant populations. These results indicated that several herbicides other than glyphosate may effectively control garlic mustard and that neither glyphosate + imazapic nor the alternative herbicides affected non-target plant populations. [9]

GOT WEEDS? GET GOATS! Lisa L. Boggs*, Southwestern Oklahoma State Univ, Weatherford James P. Muir, Texas AgriLife/Texas A and M, Stephenville Jerry W. Dunn, Southwestern Oklahoma State Univ, Weatherford.

Very little information is available on the control of greenbriar (*Smilax* spp.) which is a problem brush plant in the Cross Timbers of Oklahoma and Texas. Goats will readily browse greenbriar; however, the plants will return with little or no control being achieved. In other parts of the south, different species of weeds cause problems. In south Georgia, kudzu (*Pueraria lobata*) control using sheep and goats is under investigation, while in St. Croix, U.S. Virgin Islands, coral vine (*Antigonon leptopus*) control by sheep is being studied. Using goats and sheep to control problem weeds is not a new practice. However, with many landowners unwilling to spray herbicides or unable to afford chemical or mechanical means of controlling invasive plants, they may be willing to hire goats and sheep to achieve the same goal. Flock owners gain a new source of income while landowners rid their land of unwanted vegetation. Both end up winners!! [10]

MUTUALISM OR PARASITISM: THE RELATIONSHIP BETWEEN LOCOWEED AND ITS FUNGAL ENDOPHYTE. Matthew Pinch*, Nina Klypin, Ameena Nalim, and Tracy M. Sterling, New Mexico State University, Las Cruces.

Locoweeds (*Astragalus* sp. and *Oxytropis* sp.) grow across the western United States and contain the alkaloid, swainsonine which is toxic to grazing livestock. It has recently been confirmed that a fungal endophyte is responsible for the production of swainsonine in locoweeds and that swainsonine production increased in tissue-cultured locoweed seedlings grown under water deficit conditions. To determine the relationship between the fungus and its host in terms of any competition between biomass production and swainsonine synthesis, plant growth and swainsonine production in greenhouse-grown locoweed plants were evaluated in the presence and absence of endophyte under water-deficit and well-watered conditions. Seeds with or without seed coats and inner membranes from *Oxytropis sericea* and *Astragalus mollissimus* var. *mollissimus* were germinated on water agar and seedlings were established in soil in the greenhouse. Seedlings without seed coats did not contain

endophyte based on PCR analysis. Three-month old plants were subjected to three, 10-day-long cycles of water-deficit stress where control (well-watered) plants were watered to full pot capacity while water-deficit plants were watered with 50% pot capacity. Water potential and swainsonine content were measured for samples from each treatment period. Water potentials for well-watered and water-deficit *Astragalus mollissimus* plants were -1.22 and -2.11 MPa, respectively, and -1.02 and -1.56 MPa for *Oxytropis sericea* plants, respectively. Effects of water stress on swainsonine biosynthesis will be discussed. [11]

LEAFY SPURGE CONTROL WITH TANK-MIXES OF IMAZAPIC AND BAS 800H. Stevan Z. Knezevic*, Ryan Rapp, Avishek Datta, Jon Scott, Haskell Ag. Lab., Univ. of Nebraska, Concord, NE; Leo Charvat* and Joseph Zawierucha, BASF Corporation, Lincoln, NE and Raleigh, NC.

No abstract submitted. [12]

RESTORING SPOTTED KNAPWEED INFESTED RANGELAND FOLLOWING WILDFIRE. Monica L. Pokorny*, Salish-Kootenai Confederated Tribes, Polson Jane M. Mangold*, Kirk Denny, Montana State University Extension, Bozeman James Hafer, Chief Dull Knife College, Lame Deer.

Understanding invasive species response to fire is needed so management following fire can move toward maintain and/or restoring a desired plant community. Our study tested treatments that influence species availability and performance following a disturbance in an attempt to maintain and restore desired species. The overall objective was to determine the ability of herbicide and revegetation treatments to restore spotted knapweed infested areas to desired plant communities after wildfire. The study consisted of a factorial combination of three herbicide treatments (broadcast application of picloram at 0.287 kg ae/ha, spot application of picloram at 0.287 kg ae/ha, no application of herbicide) and three seeding treatments (grass seed mix, a grass/forb seed mix, no seeding). Both the broadcast and spot herbicide application methods decreased spotted knapweed cover and density by up to 80% while increasing desired grass cover and density by up to 20% compared to the control. However, broadcast herbicide spraying decreased species richness from 5.7 species/0.1m2 to 3.6 species/0.1m2 and decreased desired forb density and cover compared to spot-applied herbicide treatment. Seeding with desired species had no effect on spotted knapweed cover or density. Our results suggest spot spraying may help to maintain or restore desired plant richness which may contribute to invasion resistance and weed suppression. [13]

THE EFFECT OF DORMANT SEASON HERBICIDE APPLICATIONS ON CABBAGE GROWN FOR SEED. Carl R. Libbey*and Timothy W. Miller, Washington State University, Northwestern Washington Research and Extension Center, Mount Vernon, Washington.

Weed control and phytotoxicity resulting from dormant season applications of herbicides were evaluated on several breeding lines of cabbage in 2007 (7 lines) and 2008 (10 lines). Oxyfluorfen (Goal and Goaltender) and fluroxypyr were applied over-the-top in April 2007 and February 2008. A late application of fluroxypyr was applied in April of both years. In 2007, all treatments resulted in weed control of 60% or greater. Goal treatments and the higher rate of fluroxypyr provided the greatest amount of weed control (>80%). In 2008, all treatments resulted in 77% or greater weed control. In 2007, visual crop injury from Goaltender was less than Goal when used at equivalent rates 3 weeks after treatment (3% and 27% respectively). Neither Goal nor Goaltender showed any crop injury at the April 2008 evaluation. The higher rate of fluroxypyr in 2007 and 2008 resulted in moderate injury (10 and 16%, respectively) while the late applications of fluroxypyr resulted in slight injury both years (4% and 1%, respectively). At harvest, there was no significant difference in fresh weight among the seven cabbage lines due to herbicide treatments in 2007. In 2008, fresh weight was

significantly lower in treatments which received applications of Goal and early post fluroxypyr when compared to the untreated control. Stand counts in 2007 were lowest with the higher rate of Goal. In 2008 there was not a significant difference in stand count. [14]

SIMAZINE DEGRADATION RATES IN CENTRAL VALLEY SOILS WITH VARYING SIMAZINE USE HISTORIES. Christine M. Rainbolt*, Brad D. Hanson, USDA-ARS, Parlier, CA; Anil Shrestha, California State University, Fresno; Dale L. Shaner, USDA-ARS, Fort Collins, CO; and L. Jason Krutz, USDA-ARS, Stoneville, MS.

Simazine is a preemergent herbicide commonly used in California vineyards and orchards. It is valued for its relatively low cost and long residual activity. Simazine may be subject to enhanced biodegradation in some areas which can result in decreased herbicide half-life and reduced residual weed control. Laboratory studies were conducted to compare simazine degradation and mineralization rates in two vineyard soils, one with annual simazine use (adapted) and one with no recent simazine use (non-adapted) and in nine citrus orchard soils with varying simazine use histories. To compare simazine degradation rates, soils were treated with simazine, samples were collected over 35 days, and simazine concentration was quantified using HPLC. The data were fitted to a sigmoid curve, and the simazine half-life was calculated. In the vineyard soils, simazine half-life was 5.6 and 26.2 days in the adapted and non-adapted soil, respectively. Preliminary data from orchard soils indicate that simazine half-life ranges from 3.1 days to 29.9 days and is loosely correlated with simazine use history. In separate studies, simazine mineralization rates were assessed in both vineyard and orchard soils using ring-labeled 14C-simazine. Evolved 14C-CO2 was evaluated at regular intervals, cumulative mineralization was calculated over the course of 35 days, and data were fitted to a sigmoid curve. Maximum cumulative mineralization (% 14C-simazine applied) ranged from 41.9 to 79.1% and clearly indicates that simazine dissipation is due to biological degradation and that degradation rates varied considerably among soils with various simazine exposure histories. [15]

WEED MANAGEMENT IN HIGH-VALUE CROPS UNDER HIGH TUNNELS IN WESTERN WASHINGTON. Tyler Breum*, Thomas Walters, Carol Miles, Debra Inglis, Lynell Tanigoshi, Tim Miller, Hector Saez, and Don McMoran, Washington State University, Mount Vernon Northwestern Washington Research and Extension Center.

High tunnels (non-heated, three-season structures with open ends) offer a means to enhance crop values by extending the production season and potentially increasing the range of crops which can be successfully grown in western Washington's mild, marine climate. Crop productivity, marketability and diversity could be enhanced with the additional daytime heat units and rain protection they provide. However, high tunnel research in our region is limited. In spring of 2008, a field trial was initiated at the Washington State University Mount Vernon Northwest Washington Research and Extension Center to evaluate the effects of high tunnels on weed management in strawberry. In May, of the 15 strawberry varieties evaluated, the varieties 'Wendy' and 'Jewel' were the poorest competitors with weeds, due primarily to their slow growth patterns coupled with cool temperatures. However, in June and continuing the rest of the growing season, strawberry variety had no effect on weed biomass. Five treatments: straw mulch, cultivation, Weed Barrier (woven fabric mulch), Matran (clove oil), and a mixture of pendimethalin + sulfentrazone were also evaluated for between-row weed control. Weed Barrier and pendimethalin + sulfentrazone treatments were most effective at controlling weed growth. Straw mulch was effective at controlling weed growth until volunteer wheat sprouted in the straw. Clove oil and cultivation were the least effective treatments. Plots outside the high tunnel had more weed biomass than plots inside the tunnel. The primary weed

accounting for this effect was volunteer wheat in the straw mulch. When the straw mulch treatment was removed from the analysis there was not a location effect on weed biomass. [16]

EVALUATION OF REDUCED METHYL BROMIDE RATES IN FIELD GROWN PERENNIAL CROP NURSERIES. Bradley D. Hanson*, James S. Gerik, USDA-ARS, Parlier, CA; and Sally M. Schneider, USDA-ARS, Beltsville, MD.

Preplant soil fumigation with methyl bromide (MB) has commonly been used in field grown nursery crops to provide broad-spectrum control of plant parasitic nematodes, disease pathogens, and weed propagules. Although MB use was officially phased out in 2005 due to negative effects on stratospheric ozone, the fumigant is still allowed in certain crops under the provisions of annually requested Critical Use Exemptions. In California nursery stock nematode-free certification requires a minimum of 300 lb/A MB in sandy soils or 400 lb/A in clay loam soils (33.6 or 44.8 g/m2); however the United Nations Methyl Bromide Technical Options Committee (MBTOC) suggests that rates of 26 g/m2 for nutsedge and 20 g/m2 for pathogens and other weeds should be effective where low permeability barrier films (LPBF, i.e., virtually impermeable film [VIF]) are not available. Where LPBF is available, MBTOC suggests that rates of 17.5 and 15 g/m2 should provide effective control of nutsedge and pathogens, respectively. Two field trials were conducted in 2005-07 and 2006-07 to evaluate pest control with reduced-rate MB treatments in a garden rose nursery near Wasco, CA and a fruit tree nursery near Visalia, CA, respectively. Each trial arranged in a randomized complete block, split-plot design with fumigation treatment (untreated, MB standard, 7-8 reduced MB rates, and two 1,3-dichloropropene treatments) as the main plot and two rose or *Prunus* rootstocks as the split plot factor. Broadcast fumigation treatments were applied in the fall, hardwood cuttings and/or seeded rootstock were planted in the winter, and crop growth and control of nematodes, pathogens, and weeds were monitored for 1-2 growing seasons. Nematode control (citrus nematode bioassay) was very effective to a depth of 36 inches with all treatments. Control of *Pythium* spp. (good control) and *Fusarium* spp. (poor control) was similar among treatments. Weed populations, handweeding times, and seed viability reductions were generally similar among treatments; however, 1,3-dichloropropene treatments usually had slightly higher weed populations and handweeding requirements. Nursery stock productivity did not differ among reduced rate MB treatments and the industry standard treatment in either trail. VIF tarps and low MB rates are not currently allowed in California perennial crop nurseries but, if regulations change, these treatments should be considered. Although the results of this trial were favorable, it is important to note that the experiments were conducted in first-year nursery sites with low nematode and weed populations. The issue of nematode control remains critically important to the industry because certification requires “non-detectable” levels of parasitic nematodes. Regardless of fumigation treatment, supplemental weed control strategies will be needed to provide sufficient season-long control and, due to increasing labor costs, herbicides are likely to become a more important tool in perennial crop nurseries. Additionally, it is possible, if not probable, that long-term repeated use of low rates of MB or alternative fumigants could reveal weaknesses in pest control not evident in single-cycle field trials. [17]

DIFFICULT WEEDS TO CONTROL IN TREE CROPS IN THE SAN JOAQUIN VALLEY. Steve Wright*, Kurt Hembree, Anils Shrestha, Tulio Macedo, Gerardo Banuelos University of California - Tulare, Fresno, KAC, Madera, Tulare.

No abstract submitted. [18]

COTTONWOOD CONTROL IN POTTED BLUEBERRY. Mikio Miyazoe* and Ed Peachey, Oregon State University, Corvallis.

Cottonwoods (*Populus deltoides* L.) are widely grown along rivers and streams as a riparian zone tree in the Willamette Valley of Oregon. The windblown seeds of cottonwood can germinate under adequate environmental conditions and this can cause economical losses in blueberry stock nurseries. This study was conducted to determine whether selected herbicides would control cottonwoods and to evaluate the effect of the herbicides on growth of blueberry seedlings. Herbicides were applied preemergent (EXP I), postemergent (EXP II), and pre- or postemergent (EXP III-A and -B, respectively) to blueberry seedlings in one gallon containers. In the preemergent herbicide experiment, isoxaben and isoxaben plus trifluralin had the best control of cottonwoods, but trifluralin alone did not control cottonwood. In the postemergent herbicide experiment, BAS800 and flazasulfuron had the best control, but shoot and root growth were reduced in both treatments. Halosulfuron applied to blueberry also stunned shoot and root growth. In EXP III-A, there were no significant reduction of cottonwood seedlings compared to check. In EXP III-B, there were no significant differences in the cottonwood control due to the small number of cottonwood seedlings that germinated. [20]

A KANSAS KOCHIA POPULATION SURVIVES A USE RATE OF GLYPHOSATE. Curtis R. Thompson* and Dallas E. Peterson, Kansas State University Agronomy Dept., Manhattan.

Kochia (*Kochia scoparia* L.) has been reported to be resistant to herbicides in the triazine, ALS inhibiting, and synthetic auxin families. An increased number of complaints concerning inadequate control of kochia with glyphosate have occurred during the growing seasons of 2006 through 2008 in western Kansas. Seed was gathered from a meandering row of kochia indicating a common maternal parent kochia plant had rolled across a cotton field in Stevens County, KS. The cotton field was generally free of weeds except for the row of remaining kochia plants. The field had been treated

three times with 0.84 kg ha-1 ae glyphosate. The objective of this experiment was to determine if the suspected glyphosate resistant kochia population would respond differently to glyphosate than a known susceptible kochia population. Greenhouse experiments were conducted using the Stevens County biotype (R) and a susceptible kochia biotype (S) which was gathered from the sandhills of Finney County, KS. Seeds were planted in 1 L pots and after emergence thinned to four plants per pot. Glyphosate at 0, 0.42, 0.84, 1.68, and 3.36 kg ae ha-1 was applied to 2 to 4 cm kochia in Experiment 1 and at the same rates plus 1.26 and 2.52 kg to 7 to 10 cm kochia in Experiment 2. All glyphosate treatments were applied with ammonium sulfate at 2% w/w. Visual injury ratings were taken 2 and 4 weeks after treatment (WAT). Live and dead kochia plants were counted to determine percent mortality 2 and 4 WAT. The S kochia biotype was controlled 100% when glyphosate at 0.84 kg was applied to kochia 2 to 4 or 7 to 10 cm tall 4 WAT. However, the R kochia biotype treated with 0.84 kg glyphosate when plants were 2 to 4 cm tall was injured 88% and had 42% mortality 4 WAT. When 7 to 10 cm R kochia were treated with 0.84 kg glyphosate, a 43% injury rating and 0% mortality rate were observed. Clearly there is a differential response to glyphosate when the R and S biotypes were compared. The R biotype had escapes when glyphosate at 3.36 kg was applied to 2 to 4 cm plants and when glyphosate at 1.68 kg was applied to 7 to 10 cm plants. Thus 0.84 kg ae use rate of glyphosate likely will not control the R kochia biotype in the field. The greenhouse experiments confirm the 2007 field observation which suggests that the R biotype would withstand 0.84 kg ae glyphosate and actual field observations indicate that kochia would produce viable seed while other genetically unrelated kochia in the treated field were controlled. Glyphosate resistance in kochia likely will become an increasing problem where glyphosate only is used for weed control. [21]

RESPONSE OF WINTER WHEAT VARIETIES TO MESOSULFURON APPLIED UNDER ADVERSE ENVIRONMENTAL CONDITIONS. Traci Rauch*, Donn Thill, University of Idaho, Moscow; Ian Burke, Dennis Pittman, Joe Yenish, Rod Rood, Washington State University, Pullman; Dan Ball and Larry Bennett, Oregon State University, Pendleton .

Mesosulfuron herbicide is used in winter wheat to control annual grass weeds such as wild oat and Italian ryegrass. Winter wheat can be injured (chlorosis and shortening) by mesosulfuron, especially if the herbicide is applied when freezing temperatures or large daily minimum and maximum temperature fluctuations occur near application time. Combining mesosulfuron with certain broadleaf herbicides may enhance the potential for crop injury. Studies were established near Moscow, ID, Pullman, WA, and Pendleton, OR to determine the effect of mesosulfuron applied with and without bromoxynil/MCPA during adverse environmental conditions to six winter wheat varieties. Visible crop injury, grain yield, and test weight were measured. Only data from the Moscow site is presented. The experimental design was a randomized complete block, strip plot with four replications. Main plots were six winter wheat varieties (Boundary, Brundage96, Chukar, Eddy, Madsen, and 0RCF 102) and subplots were three herbicide treatments (mesosulfuron alone, mesosulfuron plus bromoxynil/MCPA, and bromoxynil/MCPA alone) and an untreated check. During the 14 days before and after herbicide application, 21 days had temperatures below 0 C and 5 days had at least a 15 C temperature fluctuation. At 7 and 14 days after treatment (DAT), mesosulfuron plus bromoxynil/MCPA and mesosulfuron alone injured wheat 8 and 17% and 4 and 11%, respectively. By 21 DAT, wheat injury was similar for mesosulfuron plus bromoxynil/MCPA and mesosulfuron alone (2 and 3%). Visible wheat injury did not differ among varieties. Wheat grain yield did not differ among herbicide treatments. Wheat grain yield was greatest for Brundage96 and did not differ from ORCF 102. Yield was lowest for Eddy and Chukar. Test weight for all herbicide

treatments was not different from the untreated check. Wheat test weight was different among all varieties, except ORCF 102 and Madsen, which were similar. [22]

CHARACTERIZATION OF TRIAZINE-RESISTANT *AMARANTHUS* SPP. POPULATIONS IN THE PACIFIC NORTHWEST. Murali Bellamkonda, Alejandro Perez-Jones, and Carol Mallory-Smith.

Amaranthus spp. are problematic summer annual weeds in many crops in the Pacific Northwest of the USA. The main objective of this study was to characterize triazine-resistant *Amaranthus* spp. populations from the Pacific Northwest. In the first experiment, 20 different *Amaranthus* spp. populations were evaluated for resistance to atrazine, metribuzin, diuron and terbacil, using the recommended field rates. Four populations (HY4, I, N, and RC2) were identified to be resistant to atrazine, metribuzin, and terbacil but susceptible to diuron. In a second experiment, the four resistant *Amaranthus* spp. populations were treated with metribuzin at 0.21 and 0.63 kg a.i. ha-1, and terbacil at 0.45 and 1.34 kg a.i. ha-1. A known susceptible population was used as a control. The second experiment confirmed that all four populations were highly resistant to metribuzin and terbacil. Once resistance was confirmed, the chloroplast psbA gene that encodes the D1 protein, the target site of photosystem II inhibitors (e.g., atrazine, metribuzin and terbacil), was sequenced. When compared to the susceptible population, DNA sequence analysis of the psbA gene identified two point mutations in the resistant populations: Ser 264 to Gly in Hy4, RC2, and I, and Ala 251 to Val in N. This study confirms resistance to some but not all photosystem II inhibiting herbicides and supports the need to test individual herbicides within an herbicide group. [23]

FALL-SEEDED ALFALFA TOLERANCE TO FLUMIOXAZIN. Rick A. Boydston*, USDA-ARS, Prosser, WA and Robert Parker, Washington State University, Prosser.

Weed control is an important component of producing high quality and high yielding alfalfa forage. Alfalfa tolerance to flumioxazin was evaluated in fall-seeded alfalfa in 2007 and 2008 in Washington State. Alfalfa was planted on three dates; August 15, September 5, and September 26 of 2006 and 2007 on a Warden sandy loam soil containing 1.4% O.M. Alfalfa height in late November averaged 15.7, 4.6, and 2.5 cm in 2006 and 19.6, 4.6, and 2. 5 cm in 2007 for the early, middle, and late planting dates, respectively. Herbicide treatments were applied to dormant alfalfa February 4, 2007 and February 19, 2008. In March of both years, alfalfa planted September 5 was injured about 10% by flumioxazin at 0.14 kg/ha plus paraquat at 0.56 kg/ha, whereas alfalfa planted August 15 was injured 7% or less in both years. Alfalfa planted September 26 was injured 21 to 26% in March by all herbicide treatments. Flumioxazin applied at 0.14 and 0.28 kg/ha plus paraquat at 0.56 kg/ha to fall-seeded dormant alfalfa reduced forage yield of the first harvest by 18% and 25%, respectively 2007, whereas forage yield of the first harvest was not affected by flumioxazin treatment in 2008. Alfalfa forage yield of the second harvest was not reduced by flumioxazin at either rate in both years. In two trials on established alfalfa, first harvest forage yield of alfalfa treated with flumioxazin at 0.14 kg ai/ha plus paraquat at 0.56 kg ai/ha in February 2008 was similar to that treated with paraquat alone. [24]

RESPONSE OF KENTUCKY BLUEGRASS VARIETIES TO PRIMISULFURON. Marvin D. Butler and Richard P. Affeldt*, Oregon State University Extension, Madras.

Primisulfuron is currently the only registered herbicide that effectively controls roughstalk bluegrass and downy brome in seedling Kentucky bluegrass grown for seed. However some varieties of Kentucky bluegrass are susceptible to reduced seed yield from primisulfuron. A field trial was conducted at the Central Oregon Agricultural Research Center north of Madras, Oregon to evaluate the response of fifteen Kentucky bluegrass varieties to primisulfuron. The trial was arranged as a

split-plot design with two subplots, which were an untreated check and primisulfuron applied at 0.018 lb ai/A on September 26, 2007 when the Kentucky bluegrass had 1 to 2 tillers followed by an additional 0.018 lb ai/A on April 18, 2008 when Kentucky bluegrass was 3 to 6 inches tall. Primisulfuron injured some varieties more than others. Kentucky bluegrass seed yield was reduced compared to the untreated check for six of the fifteen varieties: 'Valor', 'Bariris', 'Monte Carlo', 'A00-891', 'Bandera' and 'Bordeaux'. Primisulfuron had no effect on seed yield for seven of the varieties: 'Merit', 'Rhapsody', 'Crest', 'A00-1400', 'Volt', 'Zinfandel', and 'A01-299'. Primisulfuron actually increased seed yield from 'Atlantis' and 'Shamrock'. [25]

FIELD RESPONSE OF PRICKLY LETTUCE ACCESSIONS TO APPLICATIONS OF 2,4-D, GLYPHOSATE, PYRASULFOTOLE PLUS BROMOXYNIL, AND THIFENSULFURON. Randall Stevens*, Dennis Pittmann, and Ian C. Burke, Washington State University, Pullman.

Prickly lettuce is a drought-tolerant weed common to Mediterranean climates and a potential competitor with crops for water because of its deep taproot system. Historically, prickly lettuce has not been a troublesome weed in the inland PNW wheat producing region due to the number of herbicide chemistries available for its control. For example, control in wheat is typically achieved with phenoxyalkanoic acid (2,4-D or MCPA), bromoxynil, and/or acetolactate-synthase (ALS) inhibitors, and a mixture of a phenoxyalkanoic acid herbicide and glyphosate is commonly used in chemical fallow or preplant burndown applications. In 1987, a sulfonylurea herbicide-resistant prickly lettuce biotype was identified in a no-till, continuous winter wheat field that had been treated with sulfonylureas for 5 years. Three other biotypes of ALS inhibitor – resistant prickly lettuce have since been reported. As a consequence, prickly lettuce has increased in importance in the inland PNW production region. It is now considered one of the most common and troublesome broadleaf weeds, and it is found in production fields throughout the dryland wheat production region. The objectives of this study were to investigate accessions of prickly lettuce for thifensulfuron resistance, 2,4-D resistance, glyphosate tolerance, control with pyrasulfotole plus bromoxynil, and investigate the biomass and seed production of the accessions in the field when challenged with these herbicides. In the fall of 2006, 20 accessions of prickly lettuce were collected throughout the southeastern Washington area and adjacent western Idaho. A single plant of each accession was grown for seed in the greenhouse in 2007. In the spring of 2008, progeny of each accession were transplanted to a common garden on the Cook Agronomy Farm in Pullman, WA. At the 8 to 12 leaf stage, individual treatments containing all 20 accessions were sprayed with 0.375 lb ae/A 2,4-D, 0.375 lb ae/A glyphosate, 0.114 lb ai/A pyrasulfotole plus bromoxynil (1/4X rate), or 0.0156 lb ai/A thifensulfuron (1X rate). A nontreated check, containing all 20 accessions, was included for comparison purposes. Plants were rated 3 and 6 weeks after treatment for percent control. At the end of the season, each plant was harvested for aboveground biomass measurement and seed quantification. Of the 20 accessions, 11 were found to be resistant to thifensulfuron. All of the ALS-resistant accessions were collected from the dryland production region – accessions collected in the irrigated Columbia basin were not ALS-reistant. Of the 20 accessions, 3 were found to have resistance to 2,4-D. Control was variable with glyphosate at 0.375 lb/A – one accessions collected near Burbank Heights, WA, has a high level of tolerance. When challenged with thifensulfuron, seed production in resistant accessions was similar to the seed production of nontreated plants. When challenged with 2,4-D and glyphosate, all accessions that survived the treatment produced less seed than nontreated plants. [26]

IMAZAMOX-RESISTANT JOINTED GOATGRASS (*AEGILOPS CYLINDRICA*) BY CLEARFIELD® WHEAT (*TRITICUM AESTIVUM*) HYBRIDS IN A COMMERCIAL PRODUCTION FIELD. Bianca A. B. Martins*, Alejandro Perez-Jones and Carol Mallory-Smith, Oregon State University, Corvallis, OR.

Jointed goatgrass (JGG) can be selectively controlled using the imidazolinone herbicide imazamox in Clearfield® wheat. However, JGG and wheat are closely related, can hybridize, backcross under natural field conditions and set seed. Therefore, transfer of the imidazolinone resistance gene (Imi1) from Clearfield® wheat to JGG via a hybrid bridge may occur. Four hundred JGG by wheat hybrids (F1) spikes were collected from a Clearfield® wheat field and evaluated for seed production. Seed set and germination of the first-generation backcross (BC1) were 3% and 70%, respectively. Plants from the BC1 and a JGG collection (control) were treated with imazamox at 0.053 and 0.130 kg a.i. ha-1, under greenhouse conditions. Survival of the BC1 generation was 100% and 55% at 0.053 and 0.130 kg a.i. ha-1, respectively, compared to 0% for the JGG. DNA from 14 F1 and 16 BC1 plants was extracted, and a PCR-based allele specific assay confirmed the presence of Imi1 in all F1 and BC1 plants tested. Three chloroplast and seven nuclear microsatellite markers were used to evaluate the parentage of the 14 F1 and 16 BC1 plants. All F1 plants tested had JGG as the female parent and wheat as the male parent. All BC1 plants tested originated from F1 plants that had JGG as the female parent, and had wheat as the male backcross parent. The presence of Imi1 in JGG by winter wheat hybrids confirms the potential for gene flow from wheat to JGG under natural field conditions by hybridization and backcrossing events. [27]

BAS800H FOR PREPLANT WEED CONTROL IN FIELD PEA AND SPRING WHEAT. Gregory J. Endres* and Blaine G. Schatz, North Dakota State University, Carrington.

Field trials were conducted in 2008 at the NDSU Carrington Research Extension Center to examine preplant weed control and crop response to BAS800H (saflufenacil). Experimental design was a randomized complete block with three replicates. The trials were conducted on a Heimdahl-Emrick loam soil with 6.8 pH and 2.8% organic matter. Herbicides were applied on June 4 with a CO2 pressurized hand-held plot sprayer delivering 10 gal/A at 35 psi through 8001 flat-fan nozzles to 0.5- to 1-inch tall common lambquarters and wild buckwheat. Rainfall totaled 1.34 inches 2 d after application of herbicides. ‘Admiral’ field pea and ‘Faller’ spring wheat were planted on June 17. Common lambquarters control was excellent (91 to 98%) 3 wk after treatment with BAS800H at 0.016 to 0.023 lb ai/A plus COC and AMS or as a tank mixture with glyphosate at 0.57 to 0.75 lb ae/A. Wild buckwheat control ranged from 77 to 88% 3 wk after treatment with BAS800H at 0.016 to 0.023 lb ai/A or as a tank mixture with glyphosate compared to 56 to 67% control with glyphosate at 0.57 to 0.75 lb ae/A. Increasing the rate of BAS800H to 0.045 lb ai/A plus glyphosate did not improve broadleaf control. No crop response was observed. [28]

MOLECULAR EVIDENCE FOR GENETIC STRUCTURE IN JOINTED GOATGRASS (*AEGILOPS CYLINDRICA*). Bethany F. Econopouly*, John K. McKay, Harald Meimberg, Scott Reid, and Philip Westra, Colorado State University, Fort Collins.

Polymorphic microsatellites were used to analyze accessions of jointed goatgrass (*Aegilops cylindrica*) in both its native and introduced range. Ninety-six individuals representing 12 western U.S. states and 230 individuals from 28 Eurasian countries were screened using fragment analysis. Results imply that genetic structure exists at a small scale within states or countries rather than between these regions. This suggests the presence of gene flow between regions in both ranges and multiple introductions of the species into the U.S. Our results will help to clarify the processes driving the evolution of invasive species, while also contributing knowledge towards improving weed management practices. [29]

CONFIRMATION OF ALS-RESISTANT FLIXWEED IN KANSAS. Dallas E. Peterson*, Kassim Al-Khatib, Curtis R. Thompson, and Thomas M. Maxwell, Kansas State University, Manhattan.

Flixweed (*Descurainia sophia* L.) is a winter annual mustard species that commonly infests winter wheat fields of the High Plains region. Flixweed and many other winter annual weeds have been controlled effectively in winter wheat for many years with acetolactate synthase (ALS) inhibiting herbicides. A number of summer annual weed species have developed resistance to ALS-inhibiting herbicides, but bushy wallflower (*Erysimum repandum* L.) is the only other winter annual weed in the region previously reported to have ALS-resistant populations. Poor control of flixweed with ALS-inhibiting herbicides was reported in Saline County, Kansas during the 2007 wheat growing season. Based on the propensity for the development of ALS-resistance, herbicide use patterns, and poor control of flixweed, it was speculated that ALS-resistant flixweed was present in several Saline County wheat fields. 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 flixweed populations. The herbicides evaluated included chlorsulfuron, metsulfuron, triasulfuron, tribenuron, pyroxsulam, propoxycarbazone, and imazamox. All ALS-inhibiting herbicides evaluated provided excellent control of the susceptible flixweed population. The flixweed population collected from Saline County exhibited varying degrees of resistance to field use rates of the different ALS-inhibiting cereal herbicides evaluated. The resistant flixweed had a high level of resistance to chlorsulfuron and tribenuron; intermediate resistance to propoxycarbazone and pyroxsulam; and low level resistance to triasulfuron, metsulfuron, and imazamox. Although the ALS-resistant flixweed exhibited only a low level of resistance to metsulfuron in the greenhouse, it was not being controlled in the field with a chlorsulfuron plus metsulfuron treatment. Herbicides with alternative modes of action such as MCPA, 2,4-D, or pyrasulfotole will be required to achieve acceptable control of ALS-resistant flixweed. [30]

SEED SHATTERING IN JOINTED GOATGRASS (AEGILOPS CYLINDRICA) POPULATIONS FROM CROPPING AND NOT CROPPING ENVIRONMENTS. Elena Sanchez-Olguin*, Carol Mallory-Smith, Oregon State University, Corvallis.

Systems for seed dispersal are critical to the survival of most weeds. In jointed goatgrass, shattering can take place at the base of the spike, between the spikelets, or a combination of both. The seed dispersal mechanisms might differ between populations from cropped and non-cropped systems. In order to determine morphometric variation for seed shattering in jointed goatgrass populations, 648 spikes of jointed goatgrass from two non-cropped (AZ, and PF), one spring cropped (GS), and three winter cropped (BW, FW, and ID) systems were evaluated. For the main spike in each plant the length, width, number of spikelets, and seed shattering resulting from a perpendicular impact were recorded. Shattering also was determined in an additional two spikes from each plant by bending the tip of the spike up to 90° with respect to the peduncle. Populations AZ, PF, and FW produced longer spikes than populations BW, ID, and GS. No correlation was found between moisture content and percentage of seed shattering. Once the moisture content in a spikelet dropped to 36.5%, it would separate from the spike with either disturbance. Spikes of the BW populations were more likely to break at the base and remain intact compared to the other five populations (P-value <0.001). Spikes from AZ, PF, and GS disarticulated into more segments than the winter cropped populations BW, FW, and ID. These results suggest that jointed goatgrass could adapt to different environments. The study of seed shattering genes would help to understand the adaptive ability of jointed goatgrass. [31]

PROSO MILLET TOLERANCE TO SAFLUFENACIL. Robert K. Higgins* and Drew J. Lyon, University of Nebraska-Lincoln Panhandle Research and Extension Center, Scottsbluff; Andrew R. Kniss, University of Wyoming, Laramie; and Philip Westra, Colorado State University, Fort Collins.

Field studies were conducted near Sidney, NE; Lingle, WY; and Ft. Collins, CO to evaluate proso millet tolerance to saflufenacil. Studies were located on a Keith silt loam soil (2.8% organic matter)

at Sidney, a Mitchell silt loam soil (2.1% organic matter) at Lingle, and a Fort Collins loam soil (1.5% organic matter) at Ft. Collins. Two rates of saflufenacil (2.0 and 4.0 oz product/acre) were applied at two different times. The Preplant (PP) treatments were applied approximately 10 to 14 days prior to planting, and the preemergence (PRE) treatments were applied within one day after planting. For comparison purposes, various standard treatments were applied postemergence (POST) approximately three weeks after planting when the proso was in the 3- to 5-leaf stage of development. Saflufenacil injury in proso, if observed,consisted of leaf chlorosis and stand reduction. No crop injury was observed at Ft. Collins. At Sidney and Lingle, crop stands approximately two weeks after emergence were significantly reduced at the 4.0 oz/acre saflufenacil rate at either application timing (18.5 and 16.2 plants/m of row for PP and PRE, respectively) compared to the nontreated check (23.3 plants/m of row). At this same time, visual crop injury was greatest in the treatment receiving 4.0 oz/acre saflufenacil PRE (38 and 15% at Sidney and Lingle, respectively). At Lingle, visual crop injury approximately two weeks after application of POST treatments was greatest when saflufenacil was applied PRE at 4.0 oz/acre (18%). At Sidney, the greatest crop injury was observed when 2,4-D amine + dicamba was applied (17%). No yield differences were observed among treatments at Lingle, with a mean grain yield of 654 lb/acre. At Sidney, grain yield averaged across all treatments was 2180 lb/acre. Grain yield from the two rates of saflufenacil applied PRE and the POST application of Aim alone had significantly greater yield than treatments receiving Aim + 2,4-D amine, 2,4-D amine + dicamba, or 2,4-D amine + prosulfuron. Although crop injury from saflufenacil was observed in two of the three locations in this study, proso millet was able to fully recover from this early season injury and yield well. Further work with saflufenacil in proso millet is encouraged. [32]

TARGET-SITE MUTATIONS AND CROSS-RESISTANCE TO ACETOLACTATE SYNTHASE INHIBITING HERBICIDES IN MAYWEED CHAMOMILE (*ANTHEMIS COTULA*). Suphannika Intanon*, Alejandro Perez-Jones and Carol Mallory-Smith, Oregon State University, Corvallis.

Mayweed chamomile (*Anthemis cotula* L.) is an annual weed in the Asteraceae family that is commonly found in fields of the Pacific Northwest. Acetolactate synthase (ALS)-inhibiting herbicides are frequently used to control a broad spectrum of weed species including *A. cotula*. In 2007, seeds of four biotypes of *A. cotula* (KJ, KL1, KL2, and GW) suspected to be resistant to ALS-inhibiting herbicides were collected from four different wheat fields in Washington State. Seeds from a susceptible (S) biotype of *A. cotula* collected in Oregon were used as a control in all the experiments. Greenhouse studies were conducted to determine if the biotypes were resistant to ALS-inhibiting herbicides. The ALS-inhibiting herbicides, thifensulfuron + tribenuron, imazethapyr, propoxycarbazone and cloransulam were applied at the recommended field rate, a two-fold rate, and a four-fold rate to plants at the four- to six-leaf growth stage. Biotypes KJ, KL1, and KL2 were resistant to thifensulfuron + tribenuron, imazethapyr, and propoxycarbazone; biotype GW was resistant to thifensulfuron + tribenuron and propoxycarbazone. Once resistance was confirmed, the ALS gene was sequenced to determine if mutations occurred in the target-site. When compared to the S biotype, sequence analysis of the ALS gene identified three point mutations at position 197 in the resistant biotypes, Pro197 to Ser in GW and KL2, Pro197 to Thr in KL2, and Pro197 to Gln in KJ and KL1. These results confirmed the presence of three different target-site mutations in the ALS gene in *A. cotula* that are associated with cross-resistance patterns to ALS-inhibiting herbicides. [33]

WEED CONTROL IN DRY BEANS WITH FLUMIOXAZIN. Lori Howlett* and Robert G. Wilson, University of Nebraska, Scottsbluff.

Field experiments were initiated to compare the selectivity and efficacy of flumioxazin for weed control in dry beans. The addition of flumioxazin to metolachlor improved common lambsquarters and hairy nightshade control when compared to metolachlor alone. Early season dry bean injury increased in some years when flumioxazin was added to metolachlor. Dry bean injury was influenced by the timing of flumioxazin application in relation to bean planting. Average crop injury of 6% was observed when flumioxazin was applied preemergence one day after planting. Delaying flumioxazin application until three days after planting resulted in 48% crop injury. Crop injury varied between different market classes. Pinto and pink market classes being more tolerant than kidney, followed by small red and black. The most sensitive market class to flumioxazin was navy. Further experiments conducted under a controlled environment in growth chambers showed that three days after planting the hypocotyl and roots had emerged from the seed and at this stage navy beans were injured by flumioxazin. [34]

RESISTANCE IN FOUR NEW GLYPHOSATE-RESISTANT LOLIUM MULTIFLORUM POPULATIONS IN OREGON IS NOT DUE TO AN ALTERED TARGET-SITE. Wilson V. Avila*, Alejandro Perez-Jones and Carol Mallory-Smith, Oregon State University, Corvallis.

Glyphosate resistance has been reported in 15 weed species and in 12 countries. Two main mechanisms of glyphosate resistance have been documented: mutation of the target site enzyme (EPSP synthase) and reduced glyphosate translocation. The first case of Italian ryegrass (*Lolium multiflorum* Lam.) with resistance to glyphosate in Oregon was reported in 2005. Further studies determined that resistance was due to reduced glyphosate translocation to meristematic tissues. Dose-response bioassays were conducted using seven rates of glyphosate (from 0.01 to 6.0 kg ae ha-1) in four putative glyphosate resistant Italian ryegrass populations that were collected from filbert orchards with a long history of glyphosate use. GR50 values for the four putative resistant populations ranged from 4.9 to 12.6 times greater than the susceptible population, confirming glyphosate resistance in four new collections. Based on these results, DNA was isolated and a set of primers was designed to amplify a region including codon 106, where the proline to serine amino acid substitution has been previously reported to be responsible for decreased glyphosate sensitivity. Sequence analysis showed no differences in the sequenced region of EPSP synthase between the four glyphosate resistant populations and the susceptible population, indicating that resistance was not due to an altered target site. Additionally, a herbicide screening test using commercial rates of paraquat, quizalofop, clethodim, pinoxaden, imazamox and pyroxulam, was conducted on the glyphosate resistant populations. There was 100% control of all four glyphosate resistant populations with all of the herbicides tested. These results indicate that at least six herbicides with three different modes of action (Photosystem I, ACCase and ALS inhibitors) could be used to effectively control Italian ryegrass populations with evolved glyphosate resistance in Oregon. [35]

SOIL PROPERTIES ASSOCIATED WITH A RUSSIAN THISTLE INFESTATION IN SOUTHEASTERN WYOMING. David Claypool* and Andrew Kniss, University of Wyoming, Laramie.

Following harvest in the summer of 2007, a striking pattern of Russian thistle infestation was observed in a semi-arid winter wheat field near Lingle, Wyoming. Dense patches of Russian thistle alternated with thistle-free areas in parts of the field. The Russian thistle patches observed on the ground are visible in 1-meter spatial resolution aerial imagery recorded in late July, about 2 weeks after harvest. A study was designed to determine if soil properties were associated with the Russian thistle patches. A 1.2-hectare study area was defined and 34 soil samples were collected in 2 parallel transects in August 2008. Samples were taken approximately 14 m apart using a 5-cm bucket auger. Sampling depths were 0 to 15, 15 to 30, 30 to 60, 60 to 90 and 90 to 120 cm. Soil samples were

analyzed for electrical conductivity, pH, organic matter, sand, silt, clay, NO3-N, PO4-P, and K. The study area, patches of Russian thistle carcasses, and soil sample locations were mapped on foot with Differential Global Positioning System. Logistic regression was used to determine if the presence or absence of Russian thistle in this area could be predicted by soil properties. Using a stepwise model selection, it was determined that Russian thistle distribution was related to pH and sand content in the top 15 cm of soil. Leave-one-out cross validation of the logistic regression model was conducted and it was determined that a relatively simple predictive model may provide a useful weed management tool. [36]

ECOTYPE RESPONSE OF JOINTED GOATGRASS CARYOPSES TO VERNALIZATION DURATION. Michael Quinn*, Carol Mallory-Smith, Oregon State University, Corvallis, OR; and Lynn Fandrich, Colorado State University, Fort Collins, CO.

Studies conducted at Oregon State University have shown that length of vernalization can affect germination response and seedling fitness of jointed goatgrass. Our objective was to determine if these responses were impacted by ecotype. Jointed goatgrass spikelets were collected from three geographically separate populations from a roadside, a winter wheat rotation, and a spring wheat rotation. Caryopses from these collections were harvested from maternal plants seeded in a common garden at Pendleton, OR. in either October or the following February. Greenhouse studies were conducted to assess germination rate, increase in daily plant height, and above ground biomass production of secondary floret caryopses. Growth chamber experiments examined caryopses germination rate, and shoot and root growth from seedlings produced by caryopses from primary, secondary, and tertiary florets. All experiments were conducted with after-ripened caryopses produced by mother plants with either a long (October) or a short (February) vernalization period, and were repeated. In the greenhouse, plants grown from caryopses produced by a longer vernalization period had greater emergence, greater mean daily increase in height, and greater biomass than those with a shorter vernalization period regardless of the maternal ecotype. Growth chamber experiments revealed greater germination, greater dry weight, and more shoot and root development of seedlings from caryopses with a longer vernalization period regardless of maternal ecotype. These results indicate that length of vernalization can have a significant impact on the fitness of seedlings emerging regardless of the environment in which they were produced. [37]

HERBICIDES FOR CONTROL OF HORSEWEED (*CONYZA CANADENSIS* L. CRONQ.) IN WESTERN CANADA. K.L. Sapsford*, F.A. Holm, University of Saskatchewan Saskatoon, SK; E.N. Johnson, Agriculture and AgriFood Canada Scott, SK; R. Neyedley and S. Dilk Monsanto Canada Inc., Winnipeg, MN.

There are now 15 species of weeds that have known resistance to glyphosate around the world. However there are no known glyphosate resistant weed biotypes in Canada at this time. Most of the species that have shown resistance to glyphosate are not in western Canada. The one species that is present and has developed glyphosate resistance in 5 other countries (USA, Brazil, China, Spain and Czech Republic) is marestail (*Conyza canadensis*). This trial was established to evaluate other herbicide options available to producers for control of marestail in western Canada. The trials have been conducted over 3 years at 3 locations in Saskatchewan (2006 at Meota, 2007 & 2008 at North Battleford and Saskatoon). Sites were identified where marestail was the dominant weed. Applications were made in the spring when the majority of the marestail was less than 5 cm. tall. Visual ratings were recorded at 7 to 10, 21-28 and >35 days after application. There was no crop

seeded in the trials and the trials were terminated after the final rating. The treatments included dicamba @140 gai/ha, 2,4-D @ 560 and 700 gai/ha, clopyralid @ 75, 100 & 150 gai/ha, amitrol @ 1000 gai/ha, florasulam @ 5 gai/ha, pyrasulfotole + bromoxynil @ 202 gai/ha and saflufenacil @ 18 gai/ha. At 16 – 28 DAA, all treatments controlled marestail greater than 70%. Greater than 80% control was achieved with clopyralid @150 gai/ha, florasulam @ 5 gai/ha, pyrasulfotole + bromoxynil @ 202 gai/ha and saflufenacil @ 18 gai/ha. Greater than 90% control was achieved with amitrol @ 1000 gai/ha and glyphosate @ 675 gai/ha indicating that these populations of marestail were not resistant to glyphosate. By the final rating, control had fallen back on some of the treatments as some of the marestail began to regrow. Greater than 70% control was achieved with dicamba @ 140 gai/ha and clopyralid @ 75 and 100 gai/ha. Greater than 90% control was achieved with clopyralid @ 150 gai/ha, amitrol @ 1000 gai/ha and glyphosate @675 gai/ha. There are alternatives that will suppress and/or control marestail if glyphosate resistant biotypes appear in Western Canada. Future work should be considered to evaluate all of these products with crop competition and in-crop herbicides. [38]

FERAL RYE RESPONSE TO IMAZAMOX WITH AND WITHOUT MCPA AND NITROGEN. Jared C. Unverzagt* and Andrew R. Kniss, University of Wyoming, Laramie; and Drew J. Lyon, University of Nebraska Panhandle Research and Extension Center, Scottsbluff.

Feral rye (*Secale cereale*) can significantly reduce yield of winter wheat, and it can be difficult and expensive to control. With the introduction of imidazolinone-resistant wheat, a selective herbicide is now available for control of feral rye in winter wheat-fallow cropping systems. Field observations indicated MCPA and nitrogen may affect feral rye control with imazamox. A greenhouse study was conducted to determine whether MCPA-ester influences imazamox control of feral rye. Herbicide treatments consisted of MCPA-ester at 0, 70, 140, 280 and 560 g/ha; imazamox at 0, 11, 22, 34, and 67 g/ha; and all combinations between the two herbicides. All treatments included nonionic surfactant at 0.25% v/v and urea ammonium nitrate (32-0-0) at 1% v/v. Feral rye was sprayed at the 3- to 5-leaf stage and was harvested 28 days after treatment. Plants were clipped at soil level, dried for 24 hours then dry weights were recorded. Non-linear regression was used to determine the response of rye to imazamox at each level of MCPA-ester using the log-logistic model. GR50 values were generated from the fitted model for each rate of MCPA-ester. When MCPA-ester was sprayed alone, it resulted in no dry weight reduction of the feral rye, regardless of rate. As rates of MCPA-ester increased in the imazamox mixture, the imazamox GR50 decreased. These results suggest that MCPA-ester is synergistic with imazamox on feral rye. [39]

COTTON INJURY STUDY IN ROUNDUP READY COTTON WITH HALSULFURON. Steve Wright* and Gerardo Banuelos, University of California, Tulare.

The objective of these studies was to see if Sandea (halsulfuron) could be used safely in California cotton. In one study we evaluated the effectiveness of various herbicides at controlling purple nutsedge (*Cyperus rotundus*). In another study only injury to cotton was evaluated. MSMA with Agridex, Roundup WeatherMax with AMS, and Envoke with Agridex over the top and directed demonstrated the best control at 70 DAT, with good control by 28 DAT. Sandea at 0.67 oz/A and 1 oz/A (both applied on April 17 over the top), and Envoke with Agridex as a directed spray provided the least control, with only moderate control. While some treatments had mild to moderate injury earlier in the trial, by 70 DAT, only Sandea with Agridex (at 0.67, 1, and 1.3 oz/A applied as a shielded spray still had moderate injury by 70 DAT. Purple nutsedge population was so high (22 plants per square foot) that the cotton was very stunted due to competition and water stress. In addition, weed control was less than expected due to moisture stress caused by intense competition and lack of an early irrigation. Yield and quality data will be presented. [40]

INTERACTIONS OF: IPOMOEA PURPUREA, ANODA CRISTATA, PHYSALIS WRIGHTII AND CAPSICUM ANNUUM WITH MELOIDOGYNE INCOGNITA AND VERTICILLIUM DAHLIA. Krystle McCarson*, Jill Schroeder, Cheryl Fiore, Steve Thomas, Jacki Trojan, Soumaila Sanogo and Linda Leiss, New Mexico State University Entomology Plant Pathology and Weed Sciences, Las Cruces, New Mexico; and Leigh Murray Kansas State University Experimental Statistics, Manhattan, Kansas.

Chile fields near Deming, New Mexico were found to be infested with the following weeds: *Anoda cristata* (spurred anoda), *Ipomoea purpurea* (tall morningglory) and *Physiallis wrightii* (Wright's groundcherry). The weeds were infected with *Meloidogyne incognita* (Root-Knot Nematode, RKN) and *Verticillium dahlia* (Vert). Although the weeds appeared healthy the chile was dead. A greenhouse trial was conducted to determine the effect of inoculation with RKN, Vert or both organisms on plant growth compared to a control. Plants were treated at the 4 to 6 leaf stage and harvested 6 weeks after inoculation. Data included shoot, fruit, and root dry weights, presence or absence of Vert, and the number of RKN eggs per gram of dry root. The experiment was designed as a generalized randomized complete block design with bench as the block. In order to compare treatment effects among host plants, shoot, root, and above ground (shoot + fruit) dry weights were normalized by the non-inoculated control and relative percentages were compared. Preliminary analysis identified no difference in growth responses among the inoculation treatments. Chile growth, averaged across inoculation treatments, was reduced compared to any weed species. Weed growth was either unaffected or stimulated by the inoculation treatments. This study emphasizes the importance of weed management in crop production. Weeds infesting crop fields could be harboring Vert, RKN, or both organisms. These results also suggest that breeding chile for resistance may be possible since Wright's groundcherry appeared unaffected by infection with either pathogen and is in the Solanaceae family. [41]

WEED POPULATION DYNAMICS IN PACIFIC NORTHWEST MINIMUM DISTURBANCE SYSTEMS. Ian C. Burke*, Washington State University, Pullman; Eric Gallandt, University of Maine, Orono; Stewart Higgins, and David Huggins, USDA-ARS Pullman, Pullman.

Little information exists on the effects of conservation tillage practices, including crop rotation, on weed populations in the high rainfall (>46 cm) zone of eastern Washington. As any cropping or weed control system that exerts a continuous, strong selection pressure will cause a buildup of the weed species most-adapted to that selection pressure, a multi-year cropping systems study with a winter wheat (WW) - spring wheat (SW) - alternative crop rotation (winter or spring plantings each of barley, canola, or pea) was initiated in 2000 on the Cook Agronomy Farm near Pullman, WA, to evaluate, in part, the effect of conservation tillage practices on weed species populations' composition and distribution across the landscape. Each of the 6 rotations was represented by a large, farm-scale plot. At that time, the soil seedbank was sampled at 246 1 m2 quadrats. In the spring of 2007, the same quadrats were resampled to evaluate the change in weed species populations composition and distribution in response to management practices, biotic and abiotic factors. Methods of exhaustive germination were similar at each sampling time. Homogenized soil samples were placed in 32 cm square plastic trays and watered regularly. Weed germination was recorded by species on one week intervals for 6 months. Each month, at the end of three weeks, the soil was allowed to dry for one week, and each sample was re-homogenized and re-randomized on the greenhouse benches. Nonmetric multidimensional scaling (NMS) ordinations using PC-ORD software (version 5.0) were conducted to examine compositional differences in the weed seedbank community among rotations over the two sampling intervals. Weed counts were averaged across the 6 farm-scale plot areas to yield a total of 24 data points (6 rotational crops, 2 sampling years, 2

adjacent fields). The abundance of each weed species changed depending on the 6 alternative rotation options during the study interval and the field being evaluated. Wild oat and common lambsquarters abundance decreased while Italian ryegrass and mayweed chamomile increased when the rotation was WW - SW - spring alternative crop rotation. Weed species composition in winter canola or barley alternative crop systems changed from wild oat and common lambsquarters to prickly lettuce, while weed species composition in winter pea changed depending on field position, becoming dominated by Italian ryegrass or prickly lettuce. The observed changes in weed species composition agree with the changes that have occurred in management practices on the site, particularly the repeated use of herbicides for wild oat control. [42]

INTEGRATING WEED SCIENCE INTO A CROP DIAGNOSTIC EDUCATIONAL PROGRAM. Richard P. Affeldt*, Oregon State University Extension, Madras; Amy J. Dreves, Glenn Fisher, Oregon State University, Corvallis; Donald A. Horneck, and Philip B. Hamm, Oregon State University Extension, Hermiston.

The task of diagnosing problems in field crops can be incredibly complex because of the wide range of potential factors that may be involved. Based on the complexity of crop diagnostics it seems that an interdisciplinary approach would be the best way to solve problems. However, in our experience crop diagnostics tends be the concern of plant pathologists more than other disciplines. Weed science has an important role in crop diagnostics, particularly for investigation of herbicide injury. A crop diagnostic educational program was conducted in Oregon that included expertise from local and statewide OSU Extension personnel from disciplines including entomology, plant pathology, plant nutrition, and weed science. The program taught a systematic approach to diagnosing problems in field crops using case studies. The half-day program was conducted at four locations where it was evaluated by 14, 41, 20, and 15 participants and got an average overall rating of 4.7, 4.7, 4.7, and 4.9, respectively at each location on a scale of 1 (poor) to 5 (excellent). Participants' comments included statements that it was "the best Extension program" they had ever been to and that it was "exactly the kind of program that Extension should be doing." The program was presented in a way that engaged participants to think and solve problems across a broad spectrum of real world factors, which we think was superior to presenting crop diagnostics in a lecture format. [43]

ON-SITE EDUCATIONAL TRAINING FOR LARGE-SCALE WEED MANAGEMENT ACTIVITES BY VOLUNTEERS. Ralph E. Whitesides*, and Steven A. Dewey, Utah State University, Logan.

In 5 days in June 2008 a group of Boy Scouts and other volumteers eradicated over 46 linear miles of saltcedar (*Tamarix ramossisima*) from lands in Central Utah. The project was one of five across the United States completed by the Boy Scouts of America Order of the Arrow members, an elite group of experienced Scouts, including adults. About 400 Arrowmen, members of ArrowCorps5, and their leaders from throughout the United States joined efforts with volunteers and employees of local, state, and federal agencies to clear saltcedar from three drainages in the Manti-LaSal National Forest and on Bureau of Land Management lands that feed into the Colorado River. Scouts used pruners and handsaws to cut limbs from the saltcedar. They were followed by agency employees who used chainsaws on the trunks and sprayed stumps with herbicide. Triclopyr herbicide (Garlon 4 Ultra) was applied using hand cans and backpack sprayers with methylated seed oil as the carrier. Visual evaluations conducted 60 and 90 days after application showed 99% control. Weed scientists from Utah State University conducted plant identification training and sprayer calibration training during

the entire activity. Initial training was conducted in a series of plant identification workshops conducted 1 day prior to project initiation. Scouts and volunteers attended a 45-minute training about saltcedar, its morphology, and why it is considered noxious and invasive in the auditorium of a local junior high school. Orientation classes were taught on the hour for small groups of Scouts. Five sessions of the class were taught. Simultaneous to the training for the Scouts five sessions of sprayer calibration were conducted for employees and volunteers who would be making herbicide applications. Utah State University staff worked in the field each day of the project to assist in plant identification and in sprayer calibration. Every day of the project new volunteers arrived. Each morning, prior to arrival of the Scouts, spray applicators were trained in the safe use of pesticides and oriented regarding spray application and calibration. At the conclusion of the project 400 Boy Scouts, 110 agency personnel, and 50 volunteers had been trained. The project used 50 spray cans and backpack sprayers, 600 gallons of spray solution, 30 chain saws, and two boats. More than 150 feet of saw chain was used, 375 chain saws were sharpened, and 500 pairs of neoprene gloves were used. When the saltcedar control project concluded, 13,850 acres of United States Forest Service and Bureau of Land Management land had been treated. [44]

EFFICACY OF KJM-44 FOR JAPANESE KNOTWEED MANAGEMENT. Melody Rudenko*, Andrew Hulting and Alejandro Perez-Jones, Oregon State University, Corvallis.

Japanese knotweed is an invasive perennial shrub that dominates riparian ecosystems. There are a limited number of active ingredients currently being use for chemical control of this species. A randomized complete block greenhouse experiment with three replications per treatment was conducted to evaluate the efficacy of the experimental herbicide aminocyclopyrachlor methyl ester (KJM-44) for Japanese knotweed control. The herbicide screening trial consisted of seven treatment groups in addition to an untreated control. Five rates of KJM-44 (1/4x, 1/2x, 1x, 2x, 4x; 1x rate=0.14 kg ai/ha) and industry standard treatments of imazapyr (.84 kg ae/ha) and glyphosate (4.55 kg ai/ha) were applied to knotweed plants grown in 2.8 liter containers. Visual evaluation of percent injury 63 days after treatment (DAT) and mass of above ground biomass 70 DAT was quantified. Pots were maintained in the greenhouse and knotweed was allowed to regrow. Above ground biomass was again quantified at 186 DAT. Percent injury (50%) for all KJM-44 rates 63 DAT was equivalent to the glyphosate treatment. The imazapyr treatment resulted in significantly higher percent injury 63 DAT (80%). Mean knotweed biomass reduction as a result of all treatments was equal 70 DAT (68%). Biomass of regrowth for the KJM-44 treatments was significantly less than all other treatment and equal to zero. This lack of knotweed regrowth indicates that while KJM-44 did not initially appear to be more effective than current standard herbicide treatments for knotweed control, it may be significantly more effective for controlling Japanese knotweed regrowth and should be evaluated under field conditions. [45]

CUT STUMP HERBICIDE APPLICATIONS ON RUSSIAN OLIVE. Paticia Nielsen* and Robert G. Wilson, University of Nebraska, Scottsbluff.

A field study was initiated near McGrew, Nebraska to compare the effectiveness of various herbicides for Russian olive control. Russian olive trees with an average diameter of 9 inches were cut off at the soil surface with a chain saw. The cut-stump was then treated with herbicide within 15 minutes of cutting. Herbicide plus carrier were sprayed on the cut-stump and on bark just below the cut. The stump was completely covered with spray solution but application stopped at the first sign of spray solution run-off. Two application timings were evaluated: fall after the shrubs had lost leaves (October 23, 2006) or in the spring (May 4, 2007) as Russian olive was breaking dormancy and new leaf growth was visible. Each treatment consisted of ten shrubs and each shrub was considered as a replicate. After the shrub was cut the diameter of the stump was recorded using a caliper and a metal

tag was nailed to the stump to identify the different treatments. Russian olive control was evaluated on June 13, 2007, September 26, 2007, and August 6, 2008, by observing each shrub for the presence of regrowth. Each stump was evaluated on a scale from 0 to 100 with 0 equal to regrowth covering the stump and 100 equal to no regrowth. On June 13 only shrubs cut during the fall of 2006 were evaluated while on September 26, 2007 and August 6, 2008 both spring and fall application dates were evaluated. Spring and fall treatment dates were equally effective for Russian olive control. Imazapyr at 10% plus methylated seed oil (MSO) at 90%, triclopyr at 33% plus diesel fuel at 67%, picloram RTU, glyphosate at 50% plus MSO at 50%, triclopyr at 16% plus picloram at 16% plus diesel fuel at 68%, and dicamba at 13% plus 2,4D at 37% plus MSO at 50% provided 100% control of Russian olive 12 months after treatment (MAT). Hexazinone at 33% plus 67% water provided 86% Russian olive control 12 MAT. Approximately 60% of the Russian olive trees that were cut and only treated with diesel fuel resprouted. Treatments containing imazapyr and hexazinone caused injury to perennial grasses adjacent to the Russian olive stump. [46]

AMINOPYRALID: NEW EFFICACY RESEARCH ON NOXIOUS AND INVASIVE WEEDS. Byron S. Sleugh*, Vanelle F. Peterson, Mary Halstvedt, Dow AgroSciences; Tom D. Whitson, University of Wyoming (retired); Steve A. Dewey, Utah State University; Rodney G. Lym, North Dakota State University; Stevan Z. Knezevic, University of Nebraska; Kim Patten, Washington State University; Joseph M. DiTomaso, University of California.

Aminopyralid (Milestone®) is a new herbicide developed by Dow AgroSciences for managing noxious and invasive plants in rangeland, pasture, rights-of-way, and other non-cropland sites. Milestone controls over 70 susceptible herbaceous broadleaf plants including yellow starthistle (*Centaurea solstitialis*), Canada thistle (*Cirsium arvense)* and *Centaurea biebersteinii*. Research trials in California, Washington, Utah, Idaho, Montana, North Dakota, Nebraska, and Oregon were initiated in 2006, 2007 and 2008 on rangeland, pasture, and non-cropland sites to assess the efficacy of aminopyralid on weeds for which there is no or very limited efficacy information. In these experiments aminopyralid at 0.75, 1.25, 1.75 and 3.5 oz/A (3, 5, 7 and 14 fl oz product/A of Milestone) was applied with CO2-pressurized backpack sprayers in spray volumes of 15 to 20 GPA. Percent visual control assessments were made 235 to 1097 days after application (DAA). Purple loosestrife (*Lythrum salicaria*), Japanese knotweed (*Reynoutra japonica*), Camel-thorn (*Alhagi pseudalhagi*), poverty weed (*Iva axillaris*), Swainson pea (*Swainsonia salsula*), plains prickly pear (*Opuntia polyacantha*), silverleaf nightshade (*Solanum elaeagnifolium*), and squarrose knapweed (*Centaurea squarrose*) response to aminopyralid was assessed. Milestone at 1.25 and 1.75 oz/A provided excellent control of poverty weed (98 to 99%), Swainson pea (95-100%), plains prickly pear (93 to 95%), and squarrose knapweed (summer application)– 95 to 99%, fall application - 97 to 100%). Camel-thorn (94%) was controlled with 1.75 oz/A aminopyralid at 1 year after application and later. Rates of 1.75 and 3.5 oz/A aminopyralid provided good control (80 to 88%) of purple loosestrife. During the season of application there was excellent control of silverleaf nightshade (97 to 100%), and Dalmatian toadflax (92% with fall applied Milestone at 7 fl oz + 0.5 oz product/A of Telar). Japanese knotweed was controlled (72 to 100%) with 1.75 and 3.5 oz/A aminopyralid (Milestone at 7 and 14 fl oz/A, respectively) in-season. Based on these efficacy data aminopyralid will be will be a useful tool in the management of these difficult to control noxious and invasive weeds and they will be added to the label in the near future. ®Registered trademark of Dow AgroSciences LLC [47]

EFFECT OF SHEEP GRAZING ON PERENNIAL PEPPERWEED. J. Earl Creech* and Jason C. Davison, University of Nevada Cooperative Extension, Fallon.

Two studies were conducted in Reno, Nevada to determine the effect of grazing on perennial pepperweed growth. Each trial was established to investigate a different grazing strategy; 1) short duration intensive grazing (small plot trial) and 2) longer duration, less intensive grazing (large plot trial). Both studies were initiated in 2005 and consisted of two treatments, grazed and non-grazed. Individual treatments were replicated three times and were applied to plots that measured 0.5 acres in the small plot trial and approximately 10 acres in the large plot trial. Grazing in each study occurred three times per year for three consecutive years. Perennial pepperweed density and biomass was reduced in the grazed plots compared to the nontreated check in the small plot trial. In this trial, however, nongrazed plots had significantly greater species diversity than grazed plots. No significant differences existed among grazed and nongrazed plots in the large plot trial. These results suggest that grazing for perennial pepperweed management should be intensive and short in duration. One drawback to this approach is potential injury to nontarget perennial species. [48]

DOES VARYING NITROGEN ALTER SWAINSONINE LEVELS IN A TOXIC RANGELAND WEED? Carol J. Lange,* Nina S. Klypin and Tracy M. Sterling, New Mexico State University, Las Cruces, NM.

Swainsonine is a toxic alkaloid present in the leguminous rangeland weed, locoweed, which acts as an inhibitor of α-mannosidase preventing the complete metabolism of oligosaccharides, leading to brain damage and possibly death of grazing animals. Little work has been conducted to help predict swainsonine levels in response to environmental stresses. It has been suggested that under drought conditions, nitrogen may serve a role in defense by contributing to alkaloid production, because root nodulation increases under water-deficit conditions. Therefore, locoweed species and varieties, which contain a range of swainsonine from highly toxic to non-toxic levels, were treated with increasing levels of soil nitrogen, and swainsonine levels compared. Four varieties native to New Mexico were grown from seed and maintained in a common greenhouse environment under normal conditions using techniques to ensure the absence of Rhizobia and root nodulation. *Oxytropis sericea* produces high levels of swainsonine, while *Astralagus mollissimus* varieties *mollissimus*, *bigelovii* and *matthewsii* are high, medium and low producers, respectively. On a weekly basis, five different nitrogen levels were applied in Hoagland's solution to the soil of pots containing locoweed plants. Leaf tissue was collected over time for swainsonine analysis to determine the effect of nitrogen on production of swainsonine, as detected using LC/MS. Since limited nitrogen supply may decrease the production of nitrogen-containing compounds such as swainsonine, additional nitrogen is expected to yield more swainsonine in all varieties of locoweed while maintaining status of high, medium, and low swainsonine producers. [49]

EFFECTS OF MAGNETIC POLARITY AND GENE METHYLATION ON SEEDLING GROWTH OF INVASIVE AND NONINVASIVE SPECIES. Sharon M. Talley* and Craig L. Ramsey, USDA-APHIS, Fort Collins, CO.

No Abstract submitted. [50]

IMPACT OF IMMERSION TIME AND WATER TEMPERATURE ON GERMINATION OF CREEPING BENTGRASS SEED. Maria L. Zapiola* and Carol A. Mallory-Smith, Oregon State University, Corvallis.

When assessing the potential for gene flow from transgenic plants at the landscape level, it is important to consider all the ways the genes can move. Creeping bentgrass (*Agrostis stolonifera* L.) is a perennial turfgrass species that can establish outside of cultivation, especially close to water

sources such as irrigation ditches and canals. As part of our study of gene flow from transgenic glyphosate-resistant creeping bentgrass, we analyzed how immersion of panicles in water could affect germination of creeping bentgrass seed. We evaluated under laboratory conditions the effect of the time that the panicles spent in water and water temperature on seed germination using panicles collected from non-transgenic creeping bentgrass seed production fields. Panicles were kept in water at 20 and 4 C and removed at 0, 1, 2, 4, 6, 8, 12, and 17 weeks. Panicles were dried, threshed and seed germination tests with five replicates were conducted. We found an interaction between time in water and water temperature on seed germination. The average germination at 0 weeks was 92.7%. Although panicles that were in water at 20 C for 17 weeks had an average seed germination of 88.2%, seeds from panicles that were in water at 4 C for 17 weeks had a greatly reduced germination of 46.1%. These results show that a seed from a panicle that falls into a waterway has a good potential for establishing a seedling, even after 17 weeks of being in the water at low temperatures. [51]

KIH-485 BEHAVIOR IN DIFFERENT SOILS. Eric P. Westra*, Colorado State University, Ft. Collins, CO Dale Shaner, USDA-ARS,Ft. Collins, CO Philip Westra, Colorado State University, Ft. Collins, CO.

Control of rigid ryegrass (*Lolium rigidum*) was evaluated with a dose response study using six rigid ryegrass accessions planted into 4 different soils and sprayed at five rates of KIH-485 (pyroxasulfone). A simulated rainfall study was conducted to evaluate pre-emerge lolium control with KIH-485 at three rainfall intervals after application; 1, 3, or 7 days after treatment (DAT). In the dose response study across the four soils, QLS, Platner, and California were similar with an average dry weight of 0.03 to 0.04 grams per three plants. The Montana soil averaged 0.04 to 0.06 grams per three plants. KIH-485 soil activity appears to be correlated with key soil characteristics. Across the six rigid ryegrass accessions, accessions one, two, three, and six had a dry weight average of 0.03 to 0.05 grams per three plants. Accession 4 produced less biomass, averaging 0.02 grams per three plants, while accession 5 produced 0.06 grams per three plants. Evaluating biomass across herbicide rates, there was a break in control around 0.006lb ai/a. This research demonstrates that KIH-485 exhibits very high activity for the control of rigid ryegrass. Rates above this provided visual control above 90%. In the simulated rainfall study, delaying rainfall until 7 DAT reduced lolium visual control by 21%. This highlights the importance of timely rainfall for optimum activation of KIH-485. [51a]

JOINTED GOATGRASS RESEARCH IN COLORADO OVER ELEVEN YEARS. Philip Westra*, Todd Gaines, Pat Byrne, Sarah Ward, and Scott Nissen, Colorado State University, Ft. Collins; and Dale Shaner, USDA-ARS, Ft. Collins, CO.

Colorado wheat growers and weed scientists were heavily involved from the beginning in the process required to obtain special funding for 11 years of National Jointed Goatgrass funding. Over the lifetime of this project, multiple research and extension projects were conducted in Colorado. Mack Thompson at Colorado State University served as the second National Jointed Goatgrass extension coordinator, picking up where Brian Jenks finished his tenure in that position. Early project research focused on use of diverse cultural practices such as wheat variety, time of seeding, seeding rate, and fertilizer placement to manage jointed goatgrass in winter wheat. No combination of cultural practices provided sustainable reduction in jointed goatgrass density while optimizing wheat yields. For example, delayed wheat seeding allowed for fall control of jointed goatgrass, but it produced a wheat yield penalty due to known seeding time effects on wheat yields. Use of Clearfield wheat in crop rotations provided the most rapid and effective jointed goatgrass control, but jointed goatgrass densities in untreated areas were highly responsive to favorable growing conditions. We were able to

identify jointed goatgrass-wheat hybrids that carried the Clearfield gene from winter wheat. Over a nearly 10 year time frame, improved molecular techniques have regularly been used to assess the genetic diversity in jointed goatgrass populations. The National Jointed Goatgrass funding received at Colorado State University helped support excellent PhD graduate student projects as well as a Post Doc and a visiting scientist. These projects contributed much new fundamental knowledge to our understanding of jointed goatgrass and its impacts in wheat production systems. [53]

SIZE OF JOINTED GOATGRASS SEED VARIES BY FLORET POSITION. Lynn Fandrich* and Carol Mallory-Smith, Oregon State University, Corvallis.

The jointed goatgrass inflorescence is composed of spikelets arranged alternately along the main axis of a spike. Each spikelet produces between two and five florets, and seed are produced usually in the lower two positioned florets (primary and secondary). Many scientific journals, extension bulletins, and educational presentations report that the secondary positioned seed within the jointed goatgrass spikelet is larger than seed from the primary floret. Data that support this claim, however, have been difficult to obtain and not published in peer-reviewed form. We recorded seed production, length, width, and mass for seven jointed goatgrass populations gathered from infested winter wheat, winter barley, and spring wheat fields in northern Oregon and southern Washington. Seed were produced within primary, secondary, and tertiary florets for all populations. Seed produced within secondary florets were consistently larger than seed within primary florets. However, when tertiary seed were present, they were larger and heavier than seed from the other two positions. Two populations of jointed goatgrass, gathered from a common area in Washington, produced more seed in secondary and tertiary florets compared to the other populations. This trait persisted when the populations were grown together in common garden nurseries across locations and years. A better understanding of the reproductive biology of jointed goatgrass will lead to the development of more effective weed-management strategies. Future experiments should evaluate the survival and competitiveness of jointed goatgrass seedlings based on their floret position within the spikelet. [54]

JOINTED GOATGRASS MANAGEMENT STRATEGIES IN OKLAHOMA WINTER WHEAT. Thomas F. Peeper*, Oklahoma Stte University, Stillwater.

An experiment was conducted over a period of five years in northcentral Oklahoma to evaluate selected cultural practices and the frequency of use of imazamox for jointed goatgrass control in winter wheat. Annual moldboard plowing as the first tillage after wheat harvest reduced jointed goatgrass densities to near zero by the third year. Densities remained at very low levels the following two years indicating that moldboard plowing two years in a row did not return dormant seed to the surface. Applications of imazamox were scheduled for the fall months each year but frequently had to be delayed until spring because of dry fall weather that limited emergence of the jointed goatgrass until mid winter. Two consecutive annual applications of imazamox, in stubble mulch tillage, were inadequate to eliminate jointed goatgrass, but application a third year reduced jointed goatgrass to nondetectable levels. Applying imazamox for two consecutive years followed by no herbicide allowed jointed goatgrass density to recover. The data illustrated that either cultural practices or herbicide can be used to reduce jointed goatgrass, but limiting the use of imazamox to two consecutive years was not an adequate practice. Thus, combinations of chemical and cultural practices should be employed for jointed goatgrass management. Wheat growers are being encouraged to consider crop rotation to either winter canola or to a summer annual crop to increase their options for managing jointed goatgrass. Notill is increasing rapidly in Oklahoma, which will increase the need for jointed goatgrass management skills. [55]

WERA-077 MANAGING INVASIVE WEEDS IN WHEAT. Joe Yenish*, Washington State University, Pullman; Andy Hulting, Oregon State University, Corvalis; Andrew Kneiss, University of Wyoming, Larimie; Drew Lyon, University of Nebraska, Scottsbluff; and Phil Westra, Colorado State University, Fort Collins .

The Western Coordination Committee 077 (WCC077): Biology and Control of Winter Annual Grass Weeds in Winter Wheat was the group from which the National Jointed Goatgrass Research Program (NJGRP) originated. That group originated in 1990 and in 2004 became the Western Extension Research Activity 077 (WERA-077): Managing Invasive Weeds in Wheat. Invasive weeds currently infest more than 20 million acres of winter wheat in the Western United States, costing producers over $500 million annually. Heavy infestations of weeds can result in complete crop failure while lighter infestations decrease yield and harvest efficiency while increasing dockage. Developing best management practices for invasive weeds in wheat requires an understanding of weed biology, ecology, and genetics. Sharing research results and coordinating efforts among weed scientists in the western United States will accelerate understanding of invasive weeds and facilitate the rapid transmission of information to growers. The objectives of the WERA-077 include: 1. Coordinate research on the biology, ecology, and genetics of ryegrass, feral rye, and other invasive weeds in wheat. 2. Coordinate the evaluation of new management and wheat breeding technologies for controlling invasive weeds, development of best management practices (BMPs), and assessment of herbicide resistance management strategies in various cropping systems. 3. Develop educational outreach programs based on research findings regarding invasive weeds in wheat, including programs initiated by the National Jointed Goatgrass Research Program, targeting producers, crop consultants, extension personnel, or professional scientists. 4. Merge information from research studies into an effective technology transfer program to illustrate how these invasive species can affect net profits and to reduce the economic impact of ryegrass, feral rye and other invasive weed species in wheat. 5. Conduct surveys to monitor the extent and spread of weeds in wheat through surveys or similar methods. Additionally, expected outcomes and impacts of the WERA-077 include: 1. Increase knowledge regarding cultural control practices of invasive weeds in wheat. 2. Expanded scientific knowledge base for invasive weeds in wheat through the publication of peer reviewed journal articles and the development of accessible databases. 3. Growers understanding of the use of herbicide-resistant crop technology in an integrated weed management program. 4. Reduce the economic impact of invasive weeds in wheat through grower adoption of improved control strategies. [56]

INFLUENCE OF FALLOW TILLAGE ON JOINTED GOATGRASS EMERGENCE AND COMPETITION IN WINTER WHEAT. Daniel A. Ball*, Oregon State University, Dryland Research Station-Pendleton; Jack O. Evans, Utah State University, Logan; Gail A. Wicks, University of Nebraska, North Platte.

Studies were initiated at three locations where winter wheat – fallow is a predominant dryland crop rotation. The study objective was to evaluate the effects of post-harvest tillage of winter wheat stubble on subsequent jointed goatgrass (JGG) emergence in fallow and in the following winter wheat crop. The hypothesis is that tillage after winter wheat harvest will aid in germination of JGG during the fallow period more than delayed tillage or no-tillage. Studies were initiated in the 1998-1999 fallow year and repeated beginning in the 1999-2000 fallow year at North Platte, NB, Blue Creek, UT, and Moro, OR. Treatments included a post-harvest disking of winter wheat stubble once in August, October, March, or in May, a disking at all tillage times, and a no-tillage, standing stubble treatment. At the Nebraska sites, early initial tillage in the late summer or fall resulted in increased germination of JGG. No till resulted in the least germination of JGG in fallow, and resulted in more

JGG in the subsequent wheat crop. At the Utah and Oregon sites, tillage was inconsistent at stimulating JGG germination in fallow. Subsequent JGG infestations in winter wheat were not well correlated with JGG densities in fallow or fallow tillage timing. [57]

PACIFIC NORTHWEST EXTENSION ACTIVITIES ON JOINTED GOATGRASS. Joseph P. Yenish*, Roland Schirman, Doug Schmale, and Eric Zakarison, Washington State University, Pullman.

The National Jointed Goatgrass Research Program is a USDA-CREES program initiated to address a serious weed to the western wheat producing areas of the western U.S. Extension outreach has been a main focus of the National Jointed Goatgrass Research Program since its initiation. Initially, the focus of the extension program was awareness of the problem of jointed goatgrass infestations in winter wheat. An intensive kickoff of the program began in 1996 with grower seminars held at three locations intended to increase awareness in Idaho, Oregon, and Washington. A slide presentation and video tape were produced for county based extension faculty to use in their extension programming. The website, www.jointedgoatgrass.org, was developed to post current information. Additionally, an exhaustive literature review was conducted and a list of articles posted on the website. Over time, a number of articles designed for popular press publication were developed. These articles were updated over time as additional information became available. A series of extension bulletins have been developed which include an introduction to the problem along with information on jointed goatgrass ecology, genetics, gene-flow with wheat, control tactics and best management practices for its management in the Great Plains, Intermountain, and Pacific Northwest wheat producing regions. Over the years, the research program has worked closely with wheat growers associations of the affected states. A most recent program included developing a series of published inserts for the major grower publications of the Great Plains and Pacific Northwest wheat producing regions. These inserts have proved to be extremely effective. While the National Jointed Goatgrass Research Program is reaching its end, it is hoped that the information produced by program and the management programs developed will continue to be refined and improved with time. It is the wish of the research program that outreach for these continued efforts will effectively done through the website. [58]

COMPETITIVE WHEAT: A KEY COMPONENT IN INTEGRATED WEED MANAGEMENT. Steven Seefeldt, USDA-ARS, Fairbanks, AK and Alex Ogg*, USDA-ARS (retired), Ten Sleep, WY.

Jointed goatgrass (*Aegilops cylindrica*) is a troublesome weed in winter wheat. Two studies were supported by the National Jointed Goatgrass Research Program. One study used path analysis to determine plant traits that enhanced winter wheat competitiveness and the other measured the impact of winter wheat height on jointed goatgrass using near isolines with and without reduced height genes, Rht1 and/or Rht2. From the competitive traits study, it was determined that the rate of wheat height gain was positively correlated with winter wheat yield and negatively associated with jointed goatgrass seed yield. Therefore, a focus on breeding for winter wheats that increase height rapidly after seedling emergence should enhance winter wheat competitiveness against jointed goatgrass. In the wheat height study, the three different isolines were 50, 75, and 100 cm tall at maturity. It was determined that in jointed goatgrass free conditions, yield of the tallest wheat was reduced compared to the shorter isolines. When competing with jointed goatgrass, all isolines produced similar yields. However, jointed goatgrass seed production was double when growing with the shortest isoline compared to the tallest isoline. These results are important as they indicate that a taller winter wheat plant comes with yield costs when growing in weed free fields and that final winter wheat height is not as important as rate of winter wheat height gain. An additional advantage of a taller winter wheat

cultivar is that they can be harvested with the combine head cutting the wheat above most of the jointed goatgrass seed (maximum height about 80 cm), and thus there is less jointed goatgrass seed in the harvested grain. Breeding for winter wheat cultivars that gain height rapidly will increase crop competitiveness against jointed goatgrass, thus decreasing weed seed production and reducing seed contamination in harvested grain. Our conclusions are as follows: 1. Although rate of winter wheat height gain is an important trait of a competitive winter wheat, other traits, not revealed in this research, are also important. 2. In a field infested with JGG, the selection of a competitive winter wheat cultivar is a key first step in an integrated weed management system. 3. Multiple techniques that further improve wheat yield while reducing JGG seed production may result in an equilibrium where JGG populations are reduced to acceptable levels. [59]

JOINTED GOATGRASS BEST MANAGEMENT PRACTICES AND CLEARFIELD WHEAT RISK ASSESSMENT. Phillip W. Stahlman*, Patrick W. Geier, John C. Frihauf, and Anthony D. White. Kansas State University Agricultural Research Center-Hays; Monsanto Co., Hannibal, MO .

Long-term field studies were conducted at Hays, KS from 1997 to 2003 and at St. John, KS from 2001 to 2007 to assess the integration of multiple practices for the management of jointed goatgrass in dryland winter wheat-based cropping systems. The St. John study also assessed the risk of moving imidazolinone herbicide tolerance from Clearfield wheat into the local jointed goatgrass population. The timing and amount of fall precipitation greatly influenced jointed goatgrass density in both studies. At Hays, extending a 2-year wheat-fallow crop rotation to include grain sorghum (3-year rotation) or grain sorghum and sunflower (4-year rotation) had a greater effect on jointed goatgrass populations than method of fallow weed control (tillage vs. herbicide) or wheat cultivar. However, no one combination of practices proved consistently better than other combinations in all years. The St. John study demonstrated that integrating several cultural practices (increased seeding rate, narrow row spacing, large-sized seed, and in-furrow starter fertilizer) along with the Clearfield wheat system dramatically reduced jointed goatgrass populations compared to a conventional wheat production system. To monitor for possible movement of the trait conferring herbicide tolerance from wheat to jointed goatgrass, more than 104,000 plants from jointed goatgrass spikelets collected from within the experimental area were screened for tolerance to imazamox. Seven plants survived a 3X rate of imazamox; however, none produced a reproductive spikelet following vernalization. Nearly 1,300 winter wheat-jointed goatgrass hybrids were collected in four of six years. The percentage of hybrid spikelets producing viable seed ranged from 0.1 to 1.1% with an average of 0.6%. Several plants from those seed survived spraying with high rates of imazamox, but none produced viable seed. [60]

CONTROLLING JOINTED GOATGRASS IN THE CENTRAL GREAT PLAINS. Robert N. Klein* and Gordon E. Hanson, University of Nebraska West Central Research and Extension Center, North Platte, NE.

Several studies have been conducted in North Platte, NE since 1996 with the goal of managing jointed goatgrass (*Aegilops cylindrica*) growing in winter wheat (*Triticum aestivum*). Since 1996 long-term studies were conducted that examined the effects of altering crop rotations, wheat cultivars, no-till/till practices, tillage timing, selective grass herbicides, and plowing and burning as tools to manage jointed goatgrass (JGG) populations in a winter wheat-fallow rotation (W-F). Inserting row crops (corn) into the W-F rotation had the greatest effect on reducing JGG. The row crops allowed the use of herbicides effective in JGG control. The W-C-F and W-C-C-F rotations almost eliminated JGG from the succeeding wheat crop, with two years of row crops having the greatest effect; reducing the JGG seed bank more than one year of row crops. The effect of wheat cultivars in our study was minimal. The use of taller/more competitive cultivars may reduce the

number of JGG cylinders (the JGG seed structure) per JGG plant in the growing wheat, thus reducing the subsequent JGG seed rain. Cultivars that produce taller/denser crop residue interfere with JGG germination in subsequent crops in the rotation. However, much of this ungerminated JGG can remain dormant in the residue, and available to re-infest wheat later in the rotational cycle. The most effective use of cultivars is through the use of imazamox resistant wheat cultivars allowing the control of JGG in the growing wheat crop. Altering tillage timing has only a minor effect on JGG densities. In the tillage timing study, JGG density was far more affected by timely precipitation, regardless of tillage timing. While tillage did result in greater germination of JGG, the effect was not enough to subsequently reduce the number of JGG cylinders in the wheat phase of the crop rotation. Altering the method of tillage was far more effective than altering tillage timing. Plowing to a depth of 20 cm with complete soil inversion succeeded in burying the JGG cylinders deep enough that germination of JGG was prevented. No JGG cylinders were found less than 10 cm deep. Burning was also effective in preventing JGG cylinders from germinating, but not as effective as plowing. [61]

JOINTED GOATGRASS RESEARCH FROM WYOMING AND NEBRASKA. Stephen D. Miller*, Andrew R. Kniss, David W. Wilson, University of Wyoming, Laramie, and Drew J. Lyon, University of Nebraska, Scottsbluff.

More than ten years of research on the biology, ecology, and management of jointed goatgrass (*Aegilops cylindrica*) has been conducted at the University of Wyoming and University of Nebraska thanks to financial support from the National Jointed Goatgrass Research Program. Funded projects include: the effect of site and year variation on economic thresholds; the influence of cultural control practices such as fertilizer placement and wheat seeding density on jointed goatgrass competitive ability; technologies for studying jointed goatgrass seed viability and survival; jointed goatgrass seed survival across a range of environments; predation of jointed goatgrass seeds; and the effect of imidazolinone-resistant wheat technology in a winter wheat - fallow rotation. Four peer-reviewed research articles and three thesis/dissertation projects have resulted from this research. Many findings from these projects have direct relevance to management of this troublesome weed. For example, deep-banding of fertilizer near the wheat seed increases wheat competitiveness with jointed goatgrass. Increased wheat seeding rates can reduce jointed goatgrass biomass and reproductive tillers. Use of imazamox in imidazolinone-resistant winter wheat can reduce jointed goatgrass densities in the current year as well as subsequent crop years. These results, along with findings of other researchers, have elucidated cultural and chemical management practices that form the basis of an integrated jointed goatgrass management program. [62]

PREDICTION AND PREVENTION OF SEED PRODUCTION IN JOINTED GOATGRASS. Daniel A. Ball*, Oregon State University Columbia Basin Agricultural Research Center, Pendleton; and Alex G. Ogg Jr., USDA-ARS, Pullman, WA (retired).

Two study areas were established at Pullman, WA and Pendleton, OR to determine the relationship between growing degree-day accumulation and time to viable seed production in jointed goatgrass (JGG). A concurrent objective was to determine the effect of simulated mowing, glyphosate, or paraquat application timings on seed production of JGG, and to determine the timing necessary to prevent production of JGG seed. At the time of 50% seed head emergence from the flag leaf, application of glyphosate, paraquat, or mowing at this time prevented production of germinable JGG seed. Delayed application of glyphosate paraquat, or mowing until anthesis also prevented seed production of JGG. Delay of herbicide application or mowing until after JGG anthesis resulted in increasingly greater amounts of JGG seed production as the delay increased. The more rapid death of JGG from parquet or mowing provided reductions in JGG seed production for a greater period of time compared to glyphosate application. The results indicate that late application of non-selective

herbicides such as glyphosate or paraquat, or mowing may be effective at preventing or greatly reducing JGG seed production until time of JGG anthesis. [63]

SEED DORMANCY AND GERMINATION CHARACTERISTICS OF JOINTED GOATGRASS. Lynn Fandrich* and Carol Mallory-Smith, Oregon State University, Corvallis.

Although jointed goatgrass has been the subject of many studies, a thorough characterization of its seed dormancy and germination behavior has not been previously reported. These characteristics were evaluated in several jointed goatgrass populations of Oregon and Washington origin over multiple years. The effects of light, dark, maternal environment, seed structures, temperature, and time were evaluated. Germination was recorded by seed position within the spikelet. Some freshly harvested jointed goatgrass seed germinated when exposed to incubation temperatures that ranged from 5 to 30 C, but the greatest proportion of seed, between 80 and 90%, germinated at 25/15 C alternating day and night temperatures. Seed from primary and secondary florets were similarly affected by temperature. As the duration of after-ripening increased, jointed goatgrass seed germinated earlier, at faster rates, and to greater final percentages compared to dormant seed. Jointed goatgrass seed from both florets were completely nondormant after 16 wk after-ripening at 22 C. Germination of dormant seed from the secondary floret was dependent on temperature and photoperiod. More secondary seed germinated at low (15/15 C) rather than high (30/20 C) temperatures, and photoperiod influenced germination at high temperatures only. The effect of photoperiod was small compared to the effect of temperature. Removal of the spikelet structures improved germination of dormant seed, but not completely relieve dormancy. The effect of maternal environment was significant, and explained approximately 5-10% of the variation in germination. However, this variation was much less compared to the effects of after-ripening and incubation temperature. Because jointed goatgrass spikelets mature and shatter in July, seed from all secondary and most primary florets are capable of germination with moisture in September and October. Tillage and herbicide applications will be most effective in the fall when primary dormancy is lost, but before secondary dormancy is imposed. Dormancy cycling was not studied in our experiments; rather it was reported by Donald (1991). Most freshly harvested jointed goatgrass seed in the secondary floret are non-dormant, and contribute to a transient seedbank with a turnover rate of one year. Dormancy in field populations most likely results from seed in the primary positioned floret. This dormancy is relatively non-deep, most likely of physiological origin, and it is relieved by warm (22 C), dry conditions. [64]

DEVELOPING A JOINTED GOATGRASS MANAGEMENT PROGRAM FOR THE INTER-MOUNTAIN WEST. Ralph E. Whitesides*, Corey V. Ransom, Utah State University, Logan; and Don W. Morishita, University of Idaho, Twin Falls.

Jointed goatgrass (*Aegilops cylindrica*) is an annual invasive grass weed that infests winter wheat fields in the western United States, resulting in reduced wheat yield and quality. Native to southern Europe and Russia, jointed goatgrass is believed to have been introduced into the United States in contaminated wheat in the late 1800s. Jointed goatgrass infestations can reduce wheat yields up to 30%. In 2003, yield losses due to jointed goatgrass infestations for the Intermountain region, including Utah, southern Idaho, and parts of Nevada, were approximately 139,000 bushels of winter wheat. Jointed goatgrass management and identification are complex issues. Under conditions of adequate precipitation, wheat is more competitive for resources than jointed goatgrass. However, this relationship reverses once moisture becomes limiting. This is of particular concern in the Intermountain region because of severely limited moisture available for dryland cropping systems. In areas where annual precipitation is less than 15 inches per year, producers generally use a winter wheat-fallow rotation to ensure sufficient moisture for maximum crop yields. The best management

technique for control of jointed goatgrass is to avoid an infestation in the first place. Once jointed goatgrass is present, however, measures need to be taken to prevent spread to uninfested areas. The most important element in preventing jointed goatgrass infestations is education. Cultural control practices that have shown the most promise for control include crop rotation, fertilizer placement, cultivating competitive wheat varieties, higher seeding rate, large-sized seed, altered planting dates, and improved soil moisture management. Research in Utah and Idaho showed that by including safflower as an alternative crop in a wheat-fallow rotation, jointed goatgrass populations were reduced to near zero in two separate 5-year studies. In comparison, jointed goatgrass plant density in a wheat-fallow rotation (without safflower) continued to escalate and was 5.4 (study 1) to 9.5 (study 2) times higher in the fifth year than the initial density. No single control component alone and no single management program will eliminate jointed goatgrass or be effective on all populations of jointed goatgrass. Each situation is unique and may require a different course of action. Long-term studies extending for 6 to 12 years are necessary to evaluate management programs when cropping systems include a fallow season. The key to effective management is the integration of control tactics over multiple years. [65]

PACIFIC NORTHWEST USDA-ARS RESEARCH AND EXTENSION ACTIVITIES. Frank L. Young*, USDA-ARS, Pullman; Joseph P. Yenish, Laylah S. Sullivan, Washington State University, Pullman; Daniel A. Ball, Oregon State University, Pendleton; Donn C. Thill, and Robert S. Zemetra, University of Idaho, Moscow.

The USDA-ARS weed scientists have conducted research and extension activities on six research projects funded by the National Jointed Goatgrass Research Program (NJGGRP). This poster reviews the objectives and major research findings from these federally funded projects. Most of these projects were conducted in cooperation with research scientists and personnel from Washington State University, University of Idaho, and Oregon State University. The projects ranged from short-term single component to long-term integrated field projects. Short-term projects examined competitive winter wheat varieties, wheat seeding rate and seed size, natural selection of weed resistance, conventional versus no-till wheat planting methods, and date of spring wheat planting on weed seed viability. Three long-term (>5 yrs) projects were conducted which integrated numerous single-component studies conducted by Western Society of Weed Science researchers either prior to or during the early phase of the NJGGRP. The first long-term study, conducted in WA, OR, and ID, examined the effect of one-time stubble burning, length of time between winter wheat crops, and integrated planting practices for winter wheat (increase seed size and seeding rate). The second long-term project determined the effect of no-till, deep plowing, and herbicide-resistant winter wheat on JGG population dynamics. The third long-term study conducted in the low rainfall zone (winter wheat-fallow) and high rainfall zone (annual cropping region) evaluated the best crop rotation for JGG control using imidazolinone resistant wheat. Data from these NJGGRP studies were presented at professional regional, state, and international weed conferences; local field days; and in regional JGG bulletins. [66]

ASSESSING THE RISK OF GENE FLOW BETWEEN WHEAT AND JOINTED GOATGRASS. Z. Wang, M. Rehman, J. Hansen, and R.S. Zemetra, University of Idaho; A. Perez-Jones, L. Kroiss, H. Gandi, C. Watson, O. Riera-Lizarazu, M.I. Vales, and C. Mallory-Smith, Oregon State University.

Jointed goatgrass (*Aegilops cylindrica*) is a noxious weed in most wheat (*Triticum aestivum*) growing regions. Both species are polyploid with one genome (D) in common which allows successful hybridization to occur in the field. In the early 1990's, seed was found on hybrids which raised the question on whether genes from wheat could move into jointed goatgrass. Research by the University

of Idaho and Oregon State University addressed this question which became more important with the advent of herbicide resistant wheat. Results of this collaborative research include (1) Hybrids were partially female fertile and seed on hybrids were due to backcrossing, (2) Either species could serve as the recurrent backcross parent, (3) Partial self-fertility could be restored after two backcrosses to jointed goatgrass, (4) Backcrossing occurred in the field to produce BC_1 and BC_2 plants, (5) Recurrent backcross parent could be determined using genomic in situ hybridization and/or molecular markers, (6) Female parent of hybrid was primarily jointed goatgrass based on chloroplast molecular markers, (7) Introgression of genes on the D genome could occur with or without selection pressure, and (8) Placement of a transgene on the nonshared A or B genomes did not insure that gene movement would not occur. To minimize the risk of gene flow between the two species, it is critical to prevent the production of the BC_2 generation to prevent the restoration of self-fertility that would allow stable introgression of a wheat gene in jointed goatgrass. Management strategies were developed to achieve this goal. [67]

WEEDS OF RANGE AND FOREST

CONTROLLING CANADA THISTLE WITH AMINOPYRALID IN MOWED AND NON-MOWED SITES. Vanelle F. Peterson*, Mary B. Halstvedt, Dow AgroSciences, and Rod G. Lym, North Dakota State University.

Aminopyralid (Milestone® specialty herbicide) is a member of the pyridinecarboxylic acid family of herbicides and controls Canada thistle (*Cirsium arvense*) at lower use rates than other commonly used herbicides. Previous research has found that aminopyralid will control Canada thistle when applied in the spring prior to flowering or in the fall. Canada thistle is often found along roadsides and waste areas that are mowed during the summer, but the effect of mowing prior to aminopyralid application has had very little research. The purpose of this research was to evaluate aminopyralid applied in the spring or fall for Canada thistle control on plants that were mowed in mid-summer. In 2007 two trials were established in Fargo and Ekelson, North Dakota to assess the effect of a mowing in July on aminopyralid applications made in June, September and October. The Fargo location was on abandoned crop-land with little grass cover while Eckelson had a dense stand of grass. Broadcast applications were made with a CO2 backpack sprayer at 17.5 gpa on 10 X 30 ft plots in a randomized complete block design. Treatments were aminopyralid at 1.25 and 1.75 oz ae/A (5 and 7 fl oz/A) and picloram at 0.375 lb ae/A (1.5 pt/A). A non-ionic surfactant was added to each treatment at 0.25% v/v. Applications were made on June 5 (Fargo) or 20 (Ekelson), September 14 (Ekelson) or 19 (Fargo), October 1 and October 29, 2007. In June the Canada thistle plants were bolting to prebud (Ekelson) or early bud (Fargo). One-half of each plot was mowed on July 11, 2007. In September and early October Canada thistle plants were still green and had some basal growth. In late October plants were from 25% (Fargo) to 90% (Ekelson) brown from frost, except in the mowed plots which had green rosettes Evaluations of percent visual control of Canada thistle were made at 420 (Ekelson) or 442 (Fargo) days after the June application. Results differed by site so the data could not be combined. Results were analyzed separately using an ANOVA and Tukey's mean separation (P=0.05). Control of Canada thistle at Fargo was less in June for all treatments than fall applied herbicides At both sites there was no difference between mowed and unmowed treatments. Control from all aminopyralid treatments applied in late-October averaged 93 and 96% at Fargo and Eckelson, respectively, 10 months after treatment. Canada thistle control with picloram decreased at Fargo the later in the fall the treatment was applied, but not at Eckelson. Aminopyralid provided excellent Canada thistle control when applied in the fall, even after several killing frosts. Long-term control was enhanced when there was good grass cover to compete with Canada thistle regrowth compared to little or no cover especially at the June application timing. Mowing did not affect control regardless of application date or treatment. ®Registered trademark of Dow AgroSciences LLC [86]

CANADA THISTLE CONTROL WITH AMINOPYRALID AT MULTIPLE SUMMER APPLICATION TIMINGS. Mary B. Halstvedt*, Dow AgroSciences, Billings; Carlyle Holen, University of Minnesota Extension, Crookston; Bobby Holder, University of Minnesota, Crookston.

Canada thistle (*Cirsium arvense*) is a noxious weed that occurs on roadsides, non-cropland, Conservation Reserve Program (CRP) land, rangelands and pastures, and natural areas. This perennial plant is difficult to control and single applications of most herbicides usually offer only temporary suppression. Aminopyralid applied at rosette to bud stage of growth or fall re-growth provides longer term control of Canada thistle than any of the other products currently labeled for use. The purpose of this study was to determine if aminopyralid applications could be delayed later in

the summer to control Canada thistle at bud to post flowering stages. The study was established in 2007 on land enrolled in the Conservation Reserve Program infested with Canada thistle (approximately 6.5 stems/sq yd) and populated with grasses and other forbs. Aminopyralid at 1.25 and 1.75 oz ae/A (5 and 7 fl oz/A of product) was applied every two weeks from June 1 to August 20 for a total of seven applications. Plots were 30 x 30 ft arranged in a randomized complete block design with four replications. There was a 3 ft alley between plots and a 15 ft alley between replicates that was mowed and sprayed to reduce thistle encroachment. Application was made with a tractor mounted CO2 sprayer delivering 10 gallons per acre at 35 psi. Canada thistle stem density was determined in each plot prior to application in 2007 and on July 24, 2008. Percent Canada thistle control was calculated using these pre- and post spray stem densities. Aminopyralid provided excellent control (90 to 97%) at 1.25 and 1.75 oz ae/A on all but two of the application dates. Results from the first application timing on June 1 showed the lowest control (70 to 87%) with aminopyralid at 1.25 and 1.75 oz ae/A compared to the other application dates because of incomplete shoot emergence. From June 1 to June 15 there was a 44% increase in stems in non-treated plots, followed by an 18% increase in stems from June 15 to June 29 in non-treated plots. This illustrates how Canada thistle shoot emergence occurs continuously during the early summer. Dow AgroSciences recommends that aminopyralid application be delayed until most shoots emerge to optimize Canada thistle control. There was a trend for less control (82 to 90%) following the July 23, 2007 application date with aminopyralid at 1.25 and 1.75 oz ae/A possibly due to stress on the plants from hot conditions (100 degrees F) at application. Results from this study indicate aminopyralid will control Canada thistle when applied through August when plants are in the bud to flowering stages of development. There is a trend for aminopyralid applied at the maximum rate of 1.75 oz ae/A to provide more consistent control across all application dates, especially during periods of environmental stress. Additional studies have been established to confirm these results. [87]

HOUNDSTONGUE CONTROL WITH AMINOPYRALID AND METSULFURON. Daniel C. Cummings*, Mary B. Halstvedt, Dow AgroSciences; Stephen F. Enloe, Auburn University; K. George Beck, Colorado State University.

Houndstongue (*Cynoglossum officinale*) is an invasive noxious weed, capable of invading many rangeland habitats, especially those with greater than 10% bare ground. The plants are toxic to livestock and wildlife, and spread rapidly by prolific seed production. Cultural, biological, mechanical, and chemical control options currently exist, but are limited in sensitive areas or by the window of application. We tested a water dispersible granule containing both aminopyralid and metsulfuron-methyl (62% and 15% by weight, respectively) on the same granule for control of houndstongue in Wyoming and Colorado in 2007 and 2008. Use rates of aminopyralid + metsulfuron-methyl ranged from 1.5 to 3.3 oz product per acre. Treatments in 2007 included aminopyralid + metsulfuron methyl, metsulfuron methyl, aminopyralid alone, aminopyralid + 2,4-D, metsulfuron + chlorsulfuron, and an untreated check. Both Canada thistle (*Cirsium arvense*) and houndstongue occurred at the Wyoming site and herbicide treatments were applied on two different dates. The same treatments were applied in 2008 at two application timings in Colorado and Wyoming locations. Houndstongue control was > 90%, 50 to 70 DAT with all treatments except when aminopyralid was applied alone at the late bolt timing at the Wyoming site, and Canada thistle control was better with aminopyralid + metsulfuron methyl than metsulfuron alone or metsulfuron + chlorsulfuron. At Colorado and Wyoming sites 1 YAT, control with aminopyralid + metsulfuron methyl at 2.5 oz/A was similar to 0.5 oz/A of metsulfuron methyl and better than aminopyralid applied alone. Aminopyralid + metsulfuron methyl provides excellent control of a combination of

key noxious weeds, including both houndstongue and Canada thistle in a relatively low use rate product that can be applied in most rangeland sites including many natural area types. [88]

USING AMINOPYRALID TO WIDEN THE FALL APPLICATION WINDOW ON CANADA THISTLE. Byron B. Sleugh*, Dow AgroSciences, LLC, West Des Moines, IA; Mary Halstvedt, Dow AgroSciences, LLC, Billings, MT; Rod Lym, North Dakota State University, Fargo, ND; Robert G. Wilson, University of Nebraska, Scotts Bluff, NE; Mike Meochnig, South Dakota State University, Brookings, SD.

Autumn application of herbicides is often recommended to control many perennial weeds such as Canada thistle (*Cirsium arvense* L.). However, if the application is made too late in the autumn, treatment efficacy may be reduced. For many years, picloram (Tordon® 22K – picloram and Grazon® P+D – picloram+2,4-D), clopyralid (Transline®) and dicamba have been recommended for autumn weed control, but aminopyralid has shown superior efficacy compared to these herbicides. Experiments were established in Nebraska, North Dakota, and South Dakota to determine the response of Canada thistle to late autumn application timings of aminopyralid on Canada thistle control. Plots were arranged in a randomized complete block design with 4 replications. Treatments included aminopyralid (Milestone®) at 88 and 120 g ae ha-1 and picloram (Tordon® 22K) at 420 g ae ha-1 and were applied in mid to late September, October, November, and December. At the time of application, Canada thistle leaves were in varying states of necrosis from all green (September) to all brown (December). One year after treatment, both aminopyralid treatments at all sites consistently provided greater than 90% control though the 120 g treatment tended to be slightly better than the 88 g rate. Efficacy of the picloram treatment decreased compared to the aminopyralid treatments at the later application date (December 5). Canada thistle was controlled with aminopyralid applied as late as mid-November and the control was better and more consistent than that provided by picloram. ®Trademark of Dow AgroSciences, LLC. Tordon 22K is a Federally Restricted Use Pesticide. Please read and follow all label instructions. [89]

AMINOPYRALID + TRICLOPYR FOR CONTROL OF SALT CEDAR AND RUSSIAN OLIVE. Byron B. Sleugh*, Dow AgroSciences, LLC, West Des Moines, IA; Robert G. Wilson, University of Nebraska, Scotts Bluff, NE; Mary Halstvedt, Dow AgroSciences, Billings, MT.

Salt cedar (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia* L.) are invasive, hard-to-control woody plants that are becoming more problematic throughout a large geographic area in the US. Currently several herbicide actives are used to control these plants with varying degrees of success, including triclopyr amine (Garlon 3A), triclopyr ester (Remedy® Ultra/Garlon® 4 Ultra), imazapyr, glyphosate, and even 2,4-D. However, even though some plants may be controlled by the application of these herbicides unacceptable control, injury or death of desirable species may occur. In addition other invasive species under the canopy will likely not be controlled. Aminopyralid (Milestone®) has excellent activity on many noxious and invasive weeds such as Canada thistle (*Cirsium arvense* (L.) Scop.), musk thistle (*Carduus nutans* L.), spotted knapweed (*Centaurea maculosa* L.), but aminopyralid activity on salt cedar and Russian olive alone or in combination with triclopyr amine or ester is not known. Experiments were established near Scottsbluff, Nebraska to assess the efficacy of various aminopyralid and triclopyr combinations on salt cedar and Russian olive compared to industry standards. Plots, 25'x15', were established in a randomized complete block design with three replications. The core treatments were triclopyr amine and triclopyr ester at 2.0, 3.0, and 4.0 lb ae/acre plus aminopyralid at 0.07, 0.11, and 0.15 lb ae/acre, respectively. All treatments were applied mid June 2007 and evaluations were made at least one year after treatment. At 424 days after application (DAA), 2 and 3 lbs of triclopyr amine plus 0.07 and 0.11 lb ae aminopyralid per acre, respectively, provided excellent control (91%) of Russian olive compared to 2 to 4 lbs of triclopyr

amine alone (55 to 78%). Milestone® VM Plus at 1 gal/acre (1 lb triclopyr amine + 0.11 lb aminopyralid) provided 81% control. Adding imazapyr decreased the efficacy of triclopyr amine + aminopyralid combinations. Triclopyr ester at 2, 3, and 4 lbs/acre plus 0.07, 0.11, and 0.15 lb aminopyralid, respectively, provided 91 to 98% control of Russian olive 424 DAA compared to 66 to 83% with triclopyr ester alone. Adding aminopyralid at 0.07 and 0.11 lb/acre to 2 and 3 lbs/acre of triclopyr amine, respectively, provided better control of salt cedar than 2 to 4 lbs of triclopyr ester alone (23 to 60%) or 2 to 3 lbs of triclopyr amine alone (50 to77%) at 448 DAA. The combination of 0.07 and 0.11 lb/acre to 2 and 3 lbs/acre of triclopyr ester, respectively, significantly ($P<0.05$) improved (77 to 79%) salt cedar control compared to triclopyr ester alone (23 to 47%). Addition of aminopyralid to both triclopyr amine and triclopyr ester to increase control of Russian olive and salt cedar and could be considered as a part of integrated management strategy for these invasive species. ®Trademark of Dow AgroSciences, LLC. Please read and follow all label instructions. [90]

PLANT COMMUNITY AND FORB RESPONSE TO AMINOPYRALID. Mary B. Halstvedt*, Dow AgroSciences, Billings; and Peter M. Rice, University of Montana, Missoula .

Aminopyralid is a broadleaf weed management herbicide that has reduced risk to the environment compared with other commercially available herbicides, making it a desirable alternative for noxious and invasive weed control on rangeland and wildland sites. Effect of aminopyralid on desirable forbs is a consideration for land managers when making decisions about controlling invasive, non-native weeds. Research was established to determine long- term response of native plants to aminopyralid applied in autumn compared to existing growth regulator herbicides, and develop a tolerance/susceptibility guide for native and exotic species. Studies were established at three upland range sites in western Montana with spotted knapweed (*Centaurea biebersteinii*) occurring within a diverse native plant community. Plots were established in a randomized complete block design with five replications. Herbicide treatments included aminopyralid at 1.25 oz ae/A, clopyralid and picloram at 4 oz ae/A. Applications were made with a CO2 backpack sprayer delivering 15 GPA from October 11 through October 18, 2006. The summer prior to herbicide application, baseline data were collected along 4 transects within each replicate, with 9 frames (10 by 20 inch) per transect. Within each frame, 8 point intercepts of ground cover (basal vegetation, litter, wood, mineral soil, etc.) and species canopy cover was documented. First and second year post-application vegetation sampling was conducted in June and July of 2007 and 2008. Species richness was measured by counting the total number of individual plant species in each frame. Herbicides effectively controlled spotted knapweed 1 YAT (year after treatment) at the three sites. Aminopyralid reduced species richness 1 YAT to levels intermediate between picloram and clopyralid with picloram causing the greatest decline in species richness and clopyralid the least across sites. Individual herbicide tolerance ratings for 33 native forb species were developed using relative canopy cover of individual species for each herbicide treatment versus non-treated controls. Forb tolerance to autumn applications was ranked using the following criteria: susceptible (S) was 75% or more canopy cover reduction, moderately tolerant (MT) 74 to 16% reduction, and tolerant (T) was 15% or less canopy cover reduction. Clopyralid had the least impact on forbs with 3, 15, and 15 native species in S, MT, and T categories, respectively, 1 YAT, and 2, 14, and 17, respectively, 2 YAT. Susceptibility of forbs to aminopyralid was intermediate with 10, 11, and 12 species in S, MT, and T categories, respectively, 1YAT and 3, 9, and 21 species 2 YAT. Picloram was the least selective herbicide with 14, 10, and 9 species, respectively, in S, MT, and T categories 1 YAT and 7, 11, and 15 species 2 YAT. Recovery of forbs by the second year after treatment was observed within all herbicide treatments, but was greatest where aminopyralid and picloram had been applied. Historical data

suggests that by the third or fourth year post-application there would be little difference in non-target forb tolerance with only a few very sensitive forbs being adversely impacted in the long term. [91]

TIMING OF PROPOXYCARBAZONE-SODIUM APPLICATIONS ON INJURY TO NEWLY SEEDED PERENNIAL GRASSES. Gustavo M. Sbatella*, Robert G. Wilson, University of Nebraska, Scottsbluff; Stephen Enloe, Auburn University, Auburn, AL; and Charlie Hicks, Bayer Crop Science.

Two field studies were conducted near Scottsbluff, NE and Lingle, WY, to determine the response of perennial forage grass to different application timings of propoxycarbazone-sodium and imazapic. The study area was irrigated at both locations. Crested, western and intermediate wheatgrass, green needlegrass, smooth brome, Russian wildrye, sheep fescue, and orchardgrass were planted into wheat stubble in the last week of August 2007. Herbicide treatments for both locations included, propoxycarbazone-sodium (0.06 kg ae/ha) and imazapic (0.105 kg ae/ha) applied 120, 90 and 30 days before planting (DBP), at planting, and 30 days after planting (DAP). Forage grasses were evaluated for injury 30 and 60 DAP. Grass biomass was recorded on May 14, 2008 (Scottsbluff) and June 14, 2008 (Lingle) by harvesting a 0.092 m2 area. No grass injury was observed if treatments were applied 120 DBP. Injury by propoxycarbazone-sodium applied 90 DBP was significant for western wheatgrass and Russian wildrye (11 to 17 %). All species were significantly injured by both treatments when herbicides were applied 30 DBP, at planting or 30 DAP. Dry matter production of the majority of the grasses was not affected when treatments were applied either at 30, 90 or 120 DBP at both locations. Sheep fescue planted at Scottsbluff with a 26.5 % dry weight reduction was the exception. Visual evaluations done 30 and 60 DAT indicated significant levels of grass injury when propoxycarbazone-sodium and imazapic were applied 30 DBP. The absence of a significant dry weight reduction for this time of application suggests that grasses were capable of recovering from the early injury. [92]

SELECTED INVASIVE SPECIES CONTROL USING AMINOCYCLOPYRACHLOR. Brad Lindenmayer*, Philip Westra, and Galen Brunk, Colorado State University, Fort Collins, CO.

Aminocyclopyrachlor, a herbicide under development by DuPont, is formulated as the free acid (DPX-MAT28) and in a methyl-ester form (DPX-KJM44). Studies at Colorado State University are evaluating herbicide adsorption to soil particles, plant absorption and translocation, and efficacy in the field at different rates applied to several weed species. The soil adsorption study was conducted by applying radio-labeled DPX-KJM44 and DPX-MAT28 to six different soils which were sterilized with HgCl2 and repeated without HgCl2 to examine the effects of soil microbes on herbicide adsorption. Liquid scintillation spectroscopy (LSS) was performed to quantify the radioactivity remaining in solution after 24 hours and to calculate Kd values, which were then correlated with soil properties. Similarly, radio-labeled DPX-KJM44 and DPX-MAT28 were applied to three leaves on three hemp dogbane (*Apocynum cannabinum* L.) and three milkweed (*Asclepias syriaca* L.) plants to determine plant absorption and translocation. Leaves were harvested randomly from each plant at 24, 48, and 72 HAT increments and the radioactive herbicide remaining on the leaf surface after a rinse in a leaf-wash solution (90% water, 10% methanol, and 1% NIS v/v) was quantified using LSS. The leaves were then dried and oxidized to determine radioactivity physically in the leaf tissue. Translocation was also measured by oxidizing the untreated parts the plants. Field studies have focused on determining effective rates for controlling several weed species including Canada thistle

(*Cirsium arvense*), field bindweed (*Convolvulus arvensis* L.), leafy spurge (*Euphorbia esula* L.), Russian olive (*Elaeagnus angustifolia* L.), and tamarisk (*Tamarix ramosissima* Ledeb.). [93]

RESPONSE OF RUSH SKELETONWEED TO POSTEMERGENCE FOLIAR VS. SOIL TREATMENTS OF AMINOCYCLOPYRACHLOR, AMINOPYRALID, AND CLOPYRALID. Randall Stevens and Ian C. Burke, Washington State University, Pullman.

A greenhouse trial was conducted to examine response of rush skeletonweed to differential herbicide placement to determine whether more herbicide is absorbed by the root or shoot. The experiment was a two level factorial arranged in a RCBD with four replications. The first factor was herbicide: aminocyclopyrachlor (DPX-MAT28) (0.188 lb ae/A), aminopyralid (0.109 lb ae/A), or clopyralid (0.5 lb ae/A). The second factor was herbicide application placement: foliar only, soil only, or foliar plus soil; for nine total treatments. A nontreated check was included for comparison purposes. Herbicides were applied to rush skeletonweed (grown from rhizome fragments) at the 5 to 13 leaf rosette stage. Ratings, growth, and leaf number were recorded at intervals throughout the trial and entire plants were harvested for biomass at 40 days after treatment (DAT). Weighed harvested material was expressed as percent of the control. At 14 DAT, control was 100% when all three herbicides when applied to the foliar plus soil treatment. Control with aminopyralid and clopyralid was 100% at the foliar only application level, and control with aminocyclopyrachlor was 95%. When applied to the soil only, control was 74, 91, and 93 % for aminocyclopyrachlor, aminopyralid, and clopyralid, respectively, 14 DAT. At 40 DAT all treated plants where completely controlled. There was not a herbicide factor main effect or a herbicide factor by placement factor interaction. There was a placement main effect as plants treated with soil only aminocyclopyrachlor were larger (P=0.0011). In that treatment, symptoms and plant death occurred over a longer period. [94]

INTRODUCTION TO DUPONT'S NEW AMINOCYCLOPYRACHLOR HERBICIDE FOR VEGETATION MANAGEMENT WEED AND BRUSH CONTROL. Ronnie G. Turner*, Jerry R. Pitts, DuPont Crop Protection, Memphis, TN; and Edison Hidalgo, Albert J. Parsells, Rebecca M. Ashley, DuPont Crop Protection, Wilmington, DE.

Aminocyclopyrachlor, a new active ingredient herbicide from DuPont™, is currently under development for use in non-crop markets including rights-of-way, bareground, roadsides and invasive weed management. Aminocyclopyrachlor is a novel pyrimidine carboxylic acid herbicide which provides both postemergent and soil residual activity in controlling many annual and perennial broadleaf weeds and brush species. This low use rate auxin-type herbicide is absorbed by both leaves and roots of plants and is translocated throughout the plant via the xylem and phloem. Aminocyclopyrachlor provides broad spectrum control of many broadleaf weeds including Asteraceae, Fabaceae, Chenopodiaceae, Convolvulaceae, Solanaceae and Euphorbiaceae, and a number of woody plant species, such as, *Acer rubrum, Acer negundo*, *Celtis occidentalis*, *Salix alba*, *Nyssa sylvatica*, *Prosopis juliflora* and *Ulmus americana*. Aminocyclopyrachlor also controls important ALS, PPO, triazine and glyphosate resistant weeds such as, *Amaranthus* spp., *Kochia scoparia*, *Conyza canadensis*, *Ambrosia* spp., and *Salsola iberica*. Aminocyclopyrachlor has a very favorable toxicological (acute and subchronic toxicity testing complete) and environmental safety profile. Both the acute oral and dermal mammalian toxicity results have been determined to be at an LD50 of >5000 mg/kg bw. In the mammalian subchronic tests, no adverse effects have been observed in the developmental, reproductive or immune system studies and no adverse effects have been observed in the neurotoxic, genotoxic or mutagenic studies. Environmental toxicity testing to

date has provided very favorable end point results for aminocyclopryachlor across all studies. Aminocyclopyrachlor will provide a new standard for broadleaf and woody plant weed control in the roadside, invasive weed management, rights-of-way and bareground markets. [95]

ABSORPTION AND TRANSLOCATION OF AMINOCYCLOPYRACHLOR IN RUSH SKELETONWEED, PRICKLY LETTUCE, AND YELLOW STARTHISTLE. Jared Bell*, Randall Stevens, Washington State University, Pullman; Timothy Prather, University of Idaho, Moscow; and Ian C. Burke, Washington State University, Pullman.

Aminocyclopyrachlor is a new herbicide being developed for broadleaf weed control. Two formulations were studied, the acid (DPX-MAT28), and ester (DPX-KJM44). Absorption and translocation were evaluated on rush skeletonweed, prickly lettuce, and yellow starthistle. At the 4 to 5 leaf stage, 1 cm2 of the adaxial side of the newest fully expanded leaf was marked and covered. Plants were treated with a non-radiolabeled mixture containing 210 g ai/ha of either herbicide and a nonionic surfactant at 0.25% v/v using a carrier volume of 300 l/ha. After application, marked areas were treated with 3.33 kBq radioactive herbicide. Plants were harvested at 2, 4, 8, 24, or 72 h after treatment (HAT), divided into seven parts, dried, weighed, then oxidized using a biological oxidizer, recovering 14C. Absorption and translocation differed between formulation and species. In prickly lettuce, average total absorption of applied DPX-MAT28 was similar across intervals, never exceeding 5%. Absorption of DPX-KJM44 was 10% at 72 HAT. Average total translocation of applied DPX-MAT28 and DPX-KJM44 72 HAT was 0.3% and 1.4% respectively. In yellow starthistle, absorption of DPX-MAT28 and DPX-KJM44 was15% and 31% of applied material 72 HAT. Total translocated material was different between formulations, with10.9% of applied DPX-MAT28 and 19.2% DPX-KJM44 moving out of treated leaf 72 HAT. Absorption of both formulations by rush skeletonweed was greater, with 54% and 68% of applied DPX-MAT28 and DPX-KJM44 absorbed at 72 HAT. Translocation of applied DPX-MAT28 and DPX-KJM44 was 3.6% and 6.4%, 72 HAT respectively. [96]

COMPARING EFFICACY OF VARIOUS HERBICIDES FOR DOWNY BROME CONTROL ON WESTERN RANGELAND. Celestine Duncan*, Weed Management Services, Helena, MT; Mary Halstvedt, Billings, MT, Vanelle Peterson, Mulino, OR, and Byron Sleugh, Dow AgroSciences, Des Moines, IA.

Downy brome (*Bromus tectorum*), or cheatgrass, is an invasive annual grass occurring as a dominant component of the plant community on over 56 million acres of rangeland and wildland in western states of the US. Inconsistent efficacy of existing herbicides labeled for downy brome control on western rangeland warrants testing new herbicides for management options. Field trials were established in 2004 through 2006 to test efficacy of tebuthiuron and aminopyralid on downy brome compared to atrazine and imazapic applied in fall. Three field sites were established near Walla Walla, WA and two locations in western MT. Applications were made September 15, 2004, October 5, 2005, and October 6, 2006 in Washington, and on September 19 and 20, 2005 in western MT. Tebuthiuron was applied at rates of 8, 12, and 16 oz ae/A, aminopyralid at 1.75 oz ae/A, imazapic at 1.5 oz ae/A, and atrazine at 16 oz ae/A. Additional field trials were established in spring 2007 to determine efficacy of pyroxsulam at 0.27 and 0.43 oz ae/A, tebuthiuron at 8 oz ae/A, atrazine at 16 oz ae/A, and aminopyralid at 1.75oz ae/A on downy brome. Spring herbicide treatments were applied during the first two weeks in April at Walla Walla, WA, Darby, MT and Lingle, WY. Herbicide treatments were applied with a CO2 backpack sprayer at 13 to 20 gpa in a randomized complete block design with three to four replications per treatment. Visual percent control of downy brome

was taken 7 MAT (months after treatment) for fall applied herbicides, and 2 MAT and 13 MAT for spring applied treatments. Visual percent injury to perennial grasses was evaluated at Montana field locations for fall applied herbicides. Results of fall applied herbicide treatments 7 MAT indicate that tebuthiuron provided an average of 82, 98 and 96% control at 8 12, and 16 oz ae/A respectively and was similar to atrazine at 90% control and significantly ($P<0.05$) greater than imazapic at 71% control. Control with aminopyralid was highly variable among replications and between sites with an average of 52% control. At the WA locations, aminopyralid at 1.75 oz ae/A was applied prior to downy brome emergence and provided good control (85%) 7 MAT. In MT, aminopyralid applications were made when brome was at early post emergence and control averaged 15%. Perennial grass injury 7 MAT at Montana sites was less than 13% for all treatments except tebuthiuron at 12 and 16 oz ae/A which averaged 54% and 68%, respectively. Results for spring-applied treatments 2 MAT show pyroxsulam at 0.27 and 0.43 oz ae/A and tebuthiuron at 8 oz ae/A provided less than 35% control compared to atrazine at 16 oz ae/A with 85% control. The addition of aminopyralid to pyroxsulam did not significantly ($P<0.05$) increase downy brome control compared to pyroxsulam or aminopyralid alone in spring applied treatments. Results at 13 MAT (MT location) showed that tebuthiuron provided greater than 75% downy brome control compared to other herbicide treatments that provided less than 15% control. In conclusion, tebuthiuron alone applied in spring or fall, provides good downy brome control. Additional research is needed to quantify perennial grass injury and potential for reseeding desirable grasses in tebuthiuron-treated sites. Further field testing is being conducted to determine efficacy of aminopyralid on downy brome with fall applications. [97]

SUSCEPTIBILITY OF RESTORATION GRASS SPECIES TO AMINOCYCLOPYRACHLOR AND AMINOPYRALID. Cameron H. Douglass*, Joseph D. Vassios, Melissa Bridges, R. Bradley Lindenmayer, Colorado State University, Fort Collins; Ken Lair, Harvey Associates; Scott J. Nissen, Phil Westra, Colorado State University, Fort Collins.

Restoration following disturbances or removal of invasive plant species typically involves a re-vegetation component that seeks to build a diverse and beneficial plant community; however, perennial and annual weeds can often out compete restoration species. Aminopyralid (Milestone,TM, Dow Agrosciences) and aminocyclopyrachlor (DPX-KJM44, Dupont) are two herbicides that control many broadleaf weed species in rangelands, pastures and natural areas while facilitating the establishment of desired grass species. The objective of our study was to determine how aminopyralid and aminocyclopyrachlor application timing and herbicide rate would influence warm and cool season grass establishment. Pre-plant herbicide treatments were applied in June and September 2007 and seven cool and eight warm season grasses were seeded in February 2008. Post-emergence applications were applied to seedling and fully tillered grasses in the spring and summer of 2008. Aminopyralid was applied at 1.25 and 1.8 oz ai/ac, while aminocyclopyrachlor was applied at 2 and 4 oz ai/ac at each application timing. In general, warm season grasses were more tolerant than cool season grasses to both herbicides regardless of rate or application timing. Comparing similar rates of each herbicide, cool season grasses were most sensitive to aminocyclopyrachlor applied post-emergence at the seedling stage, while warm season grasses were most sensitive to aminopyralid applied pre-emergence in September. Individual species responded similarly to aminopyralid and aminocyclopyrachlor when compared at equivalent rates across all timings, meaning that a species was not sensitive to aminopyralid and tolerant to aminocyclopyrachlor. [98]

DENSITY AND DIVERSITY OF PERENNIAL GRASSES DO NOT AFFECT EARLY CHEATGRASS ESTABLISHMENT AND GROWTH. Erin Espeland*, USDA ARS NPARL, Sidney MT; and Elizabeth Leger, University of Nevada, Reno.

Diversity and density of native plantings may hypothetically prevent weed establishment and proliferation through space and resource pre-emption, crowding weeds out or preventing them from growing large. In a container experiment, we grew perennial grass species at high and low densities and in monocultures and mixes. We grew these treatments with and without cheatgrass (*Bromus tectorum*). None of the treatments reduced cheatgrass emergence or growth. No characteristic of the perennial grass plantings (density, biomass, diversity) impacted cheatgrass. Cheatgrass presence in the pots decreased survivorship of perennials: pots without cheatgrass averaged 92% survival, and pots with cheatgrass averaged 82% survival. Cheatgrass presence reduced perennial grass weight: there was a linear, negative relationship between number of cheatgrass plants in the pot and perennial grass biomass. However, cheatgrass biomass did not have an effect on perennial grass biomass: a single small cheatgrass plant had the same effect on perennial grass growth as a single large plant. The number of cheatgrass plants within each pot did not determine total biomass of cheatgrass: plants were able to exploit the resources within pots regardless of the number of individuals present. In contrast, perennial grass biomass increased as the number of plants in the pot increased, indicating that perennial grasses are not able to fully exploit pot resources as individuals. In this system, the target perennial species did not suppress cheatgrass, however, the opposite was true. Weed control would be more important than species diversity to increase productivity in these systems. [99]

QUANTIFYING PLANT COMMUNITY IMPACTS OF CENTAUREA BIEBERSTEINII AND BROMUS TECTORUM. Tanya C. Skurski*, Bruce D. Maxwell, and Lisa J. Rew, Montana State University, Bozeman.

The objective of this study was to quantify the response of plant communities to the presence and removal of downy brome (*Bromus tectorum* L.) and spotted knapweed (*Centaurea biebersteinii* DC.). We conducted an in-situ manipulation experiment with downy brome and knapweed, measuring the changes in plant richness, diversity and composition in response to treatments over time. Four treatments: (1) manual removal of target species, (2) ground disturbance equivalent to (1), (3) herbicide application (summer application of picloram (0.28 kg ai ha-1) for knapweed; fall application of imazapic (129 g ha-1) for brome) and (4) control, were randomly applied to 0.25 m2 plots with six replicates across four sites for knapweed (n= 24) and 10 replicates across three sites for downy brome (n= 30). We hypothesized a decrease in species richness and diversity and a significant shift in species composition in herbicide treatment plots; an increase in richness and diversity in the manual removal treatments; and, an increase in the exotic to native ratio in herbicide treatment plots. Our results one year post-treatment support the first hypothesis across all sites. An increase in richness (but not diversity) occurred in manual removal and disturbance plots at one of the four sites for knapweed and one of three sites for downy brome. The exotic to native ratio did not change in any treatments at any sites. This research highlights tradeoffs between different weed management approaches and the importance of site-specific assessments. We will continue to measure community response for two more years. [111]

SPECIES OF SALSOLA (RUSSIAN THISTLE) IN THE WESTERN USA AND PROSPECTS FOR BIOLOGICAL CONTROL. G. Frederic Hrusa, California Department of Food and Agriculture, Sacramento, CA; John F. Gaskin, USDA-ARS, Sidney, MT; and Lincoln Smith*, USDA-ARS, Albany, CA.

Russian thistle or tumbleweed is a common alien weed in many parts of the western USA. However, the taxonomy of this weed has been very confusing. In North America, at least 10 synonyms have been used despite the general, mistaken, assumption that only one species is involved. Even today, "*S. pestifer*" and "*S. iberica*" and "*S. kali*" are incorrectly used in popular weed manuals and scientific journals. Recent studies of plants found in California using morphological and molecular genetic

characters have revealed the existence of at least five distinct species. *Salsola tragus* L. (sometimes called "type A", 2n=36), is the most common and widespread tumbleweed. *Salsola australis* R. Brown (sometimes called "type B", 2n=18) occurs primarily in California, Arizona and Mexico and also occurs in South Africa and Australia, and surprisingly may be native to the latter continent. *Salsola ryanii* Hrusa & Gaskin (sometimes called "type C", 2n=54) appears to be an allopolyploid derivation involving tetraploid *S. tragus* and diploid *S. australis*. *Salsola paulsenii* Litv. (barbwire Russian thistle, or “spinose form”, 2n=36) occurs in dry sandy desert conditions. *Salsola* x *gobicola* (sometimes called “lax” form of *S. paulsenii*, 2n=54) appears to be a derivative of hybridization between *S. tragus* and *S. paulsenii*. Other *Salsola* species occurring in N. America include *Salsola collina* Pall., which occurs east of the Sierra and Rocky Mountains; *S. kali* L., which is restricted to east and south coast seashores; and *S. soda* L, which is mostly restricted to west coast seashores. *Salsola vermiculata* L. (a perennial plant) occurs at one site in California and is the target of eradication. Thus, a "tumbleweed" could be one of at least six possible species, which may differ in important biological characters, including habitat preference, phenology, and resistance to herbicide. Some of these species, particularly the hybrid derivatives, are challenging to identify using only morphological characters, so it is extremely important for scientists working with these plants to obtain expert identifications and to save voucher herbarium specimens to document their work. Several species of arthropods have been evaluated as prospective biological control agents. The most promising of these is the eriophyid mite, *Aceria salsolae*, which has a narrow host range and high potential impact on *S. tragus*. A release permit for this mite was requested in 2005 and hopefully will soon be issued. [112]

CHANGES IN THE DISTRIBUTION OF CHEATGRASS IN ROCKY MOUNTAIN NATIONAL PARK OVER THE PAST DECADE. Jim Bromberg*, Cynthia Brown and Sunil Kumar, Colorado State University, Fort Collins.

Cheatgrass, an invasive winter annual grass, may be increasing in extent and abundance at high elevations in the western United States. However, data to track this species in high elevation environments are limited. To address changes in the distribution and abundance of cheatgrass, we used traditional statistical methods and computer modeling. We re-sampled plots established in 1993 and 1996 in Rocky Mountain National Park (RMNP) for occurrence and cover of cheatgrass. We assessed changes in the species’ presence and abundance over time. While not all comparisons between years demonstrated significant changes in cheatgrass abundance, the mean cover of cheatgrass increased nearly five-fold from 1993 (0.73%) to 2007 (3.64%) in one of the two vegetation surveys ($p=0.02$). Cheatgrass was present in 50% more of the plots in 1999 than in 1993 ($p=0.01$). In the second survey, cheatgrass was present in 30% more of the plots in 2007 than in 1996, however this increase was less significant ($p=0.07$). Maxent, a species environmental matching model, predicted similar distributions and probabilities of cheatgrass occurrence over three sampling time periods using the survey data. The results of the model demonstrate Maxent’s utility for accurately predicting the species’ potential range with limited data. The model found that distance to roads, elevation and vegetation community influenced the predictions most. The response of this species to interannual environmental variability makes detecting change challenging. However, our results suggest that cheatgrass is likely increasing in frequency and abundance in RMNP. Continued sampling will be necessary to verify this trend. [113]

PRELIMINARY RESULTS OF HERBICIDAL CONTROL OF BUFFELGRASS. John H. Brock*, Arizona State University Polytechnic, Mesa, AZ.

Buffelgrass (*Pennisetum cilare* L. Link) is an introduced subtropical grass. It was introduced to the southwestern USA and northern Mexico beginning in the 1940s. The grass is noticeably spreading

along roadsides and other transportation corridors. It is easily wind dispersed and is often found mountain slopes. Buffelgrass is a great risk to native flora, not only from it competitive nature, but because it provides a perennial fine fuel, where historically, fire was a rare event. Buffelgrass is fire adapted. Biological control agents have not been developed. Pulling and removal of buffelgrass with hand tools is effective in small areas. Except for glyphosate, little information exists concerning chemical control of this plant. In the summer of 2008 herbicides were applied to buffelgrass at two Arizona locations. A set of ten herbicide treatments were applied to an old field in Avra Valley approximately 15 miles west of Tucson. Twelve herbicide treatments were applied to buffelgrass on the northern edge of the Arizona State University (ASU) campus at Tempe. One month following treatment, mono-sodium methyl arsenate showed the greatest effect on the Avra Valley buffelgrass. At the ASU location, the herbicide with the greatest initial effect was fenoxaprop, closely followed by sethoxydim and a combination of sulfometuron and chlorsulfuron. Evaluation of these plots in the spring of 2009 is looked upon with anticipation. Herbicide treatments at these two research sites for this invasive grass are being planned for the summer of 2009. [114]

THE EFFECTS OF NITROGEN FERTILIZER ON FOXTAIL BARLEY (*HORDEUM JUBATUM* L.) CONTROL. Randall D. Violett*, Abdel O. Mesbah, and Stephen D. Miller, University of Wyoming, Laramie.

A field study was conducted in 2008 at Big Horn Basin, Wyoming to evaluate the effect of spring applications of nitrogen fertilizer and herbicides on foxtail barley control in irrigated pasture. Treatments consisted of three rates of urea fertilizer (0, 60, and 120 lb/A) applied on April 15 and three herbicides; glyphosate (0.70 lb ae/A), imazapic (0.12 lb ae/A), and propoxycarbazone (0.05 lb ai/A) applied on May 30. A randomized complete block design with a split plot arrangement and four replications was used. Main plots (150x60 feet) consisted of fertility treatments, while sub-plots (60x30 feet) consisted of herbicide treatments. With all treatments, nitrogen fertility had a significant effect on foxtail barley control. The average foxtail barley control and biomass reduction increased from 49 to 78% and 43 to 72%, respectively, as nitrogen fertility increased from 0 to 120 lb/A. Excellent foxtail barley control (>91%) was achieved by tank-mixing glyphosate with imazapic or propoxycarbazone in plots that received 120 lb/A of nitrogen. The same treatments reduced foxtail barley biomass by more than 90%, not only in plots that received 120 lb/A but also in those that received 60 lb/A. Foxtail barley control with imazapic or propoxycarbazone applied alone increased as nitrogen fertility increased but were less than when these two herbicides were tank-mixed with glyphosate. This study showed that herbicide effectiveness was significantly enhanced by nitrogen fertility and rate. Therefore, a foxtail barley management program that combines herbicides with nitrogen fertility will be very effective. [115]

DEVELOPMENTS IN HERBICIDE BALLISTIC TECHNOLOGY. James Leary*, University of Hawaii, Manoa.

An important component to all invasive weed management strategies is to efficiently and effectively mitigate the spread of incipient satellite populations from becoming major infestations. However, incipient weed control tends to be less efficient when covering large areas and difficult terrain. Herbicide Ballistic Technology (HBT) is designed to improve the efficiency of incipient weed management with accurate long-range delivery of effective herbicide doses. The recreational paintball industry has contributed to the technological advancements of liquid encapsulation and pneumatic ballistics. These technologies have been adopted in the development of HBT with the basic concept of encapsulating herbicidal aliquots into 0.68 caliber gelatin projectiles that can be delivered to specific weed targets with a pneumatic applicator. HBT is a new technology for assisting field crews with safer pesticide handling, improved application technique and an enhanced

management strategy. Encapsulated HBT projectiles are by design ready-to-use and will eliminate the need for handling and mixing liquid pesticides in the field. Furthermore, there is also a reduction in water requirements needed in field operations. The long range accuracy of HBT allows for directed applications to multiple weed targets within a 20 m radius, which improves time efficiency and also reduces disturbance to a site. We have demonstrated the ability to target incipient weed populations residing on steep cliffs and deep ravines, thus expanding the range of weed targets that would otherwise be untreatable and without putting the applicator at risk. We have also successfully demonstrated the use of HBT as a compliment to helicopter spray ball operations, which can contribute to flight safety and lower operating costs. Pilot fatigue can be reduced by diverting application responsibilities to a dedicated HBT applicator, while flight time and fuel costs may be reduced as a result from increasing target efficiency. [116]

WEEDS OF HORTICULTURAL CROPS

WEED CONTROL IN POTATOES WITH FOMESAFEN TANK MIXTURES. Brent R. Beutler* and Pamela J.S. Hutchinson, University of Idaho, Aberdeen.

Fomesafen herbicide is currently registered for use in cotton, soybeans and other crops and is being investigated as a potential potato herbicide. Studies were conducted in Aberdeen, Idaho in 2007 and 2008 to determine the efficacy and crop safety of fomesafen use in potatoes. Fomesafen was applied preemergence alone at 0.25 lb ai/A and in tank mixtures at 0.25 and 0.125 lb ai/A. Tank mix partners included s-metolachlor at 1.3 lb ai/A and s-metolachlor + metribuzin at 1.3 and 0.3 lb ai/A. In 2007, slight potato injury, less than 5%, was noted while no crop injury was visible in 2008. In 2007, at 4 weeks after treatment (WAT), common lambsquarters control was 87% with fomesafen alone and 97% at either rate when tank mixed with s-metolachlor + metribuzin. Redroot pigweed control was 75% for fomesafen alone and ranged from 80 to 87% with tank mixtures. Hairy nightshade control was 80% or above for tank mixtures with the high rate of fomesafen but only 50% alone and 70% in the low rate tank mixture. In 2008, at 4 WAT, all broadleaf weed control was greater than 90%. In both years potato tuber yield was greatly improved compared to the untreated check and was approximately equal across herbicide treatments. In 2007, compared to the untreated check, all herbicide treatments resulted in approximately a 60% increase in US 1 tuber yields and a 45% increase in total tuber yields. In 2008, the approximate increases were 160% and 150%, respectively. [100]

EVALUATION OF IMAZOSULFURON (V10142) FOR YELLOW NUTSEDGE CONTROL IN POTATO. Joel Felix*, Oregon State University/Malheur Experiment Station, Ontario, OR; and Rick A. Boydston, USDA-ARS, Prosser, WA.

Field studies were conducted on silt loam soil near Ontario, OR and a sandy soil near Paterson, WA in 2008 to evaluate yellow nutsedge control and potato tolerance to imazosulfuron. The rates tested were 0.22, 0.34, and 0.45 kg ai/ha and 0.34, 0.45, and 0.56 kg ai/ha applied preemergence (PRE) at Ontario and Paterson, respectively, PRE followed by postemergence (POST), and POST following standard treatments of s-metolachlor and rimsulfuron applied PRE. The Ontario trial was conducted in a commercial field naturally infested with yellow nutsedge. The Paterson study was conducted in a field free of yellow nutsedge. Potato variety ‘Ranger Russet’ was planted April 4 and March 19 in rows spaced 91 cm and 86 cm, harvested on September 15 and 8, 2008 at Ontario and Paterson, respectively. POST treatments were applied 20 days after PRE treatments when potatoes were about

15 cm and emerged yellow nutsedge plants about 10 cm tall. No herbicide injury symptoms were evident on potato at Ontario and it was transient at Paterson ranging from 6 to 15% and <4% at 6 and 15 days after POST application, respectively. Imazosulfuron PRE followed by POST application provided greater yellow nutsedge control compared to PRE application alone. Sequential applications of imazosulfuron or in combination with Dual Magnum controlled yellow nutsedge >94% and >74% at 34 and 100 days after POST application, respectively, at Ontario. Broadleaf weed control was 65% or greater at both sites. Imazosulfuron provided season long control of hard to control weeds such as common mallow at Ontario. Potato US#1 yield at Ontario ranged from 51 to 60 T/ha with imazosulfuron 0.22 kg ai/ha providing the lowest yield mainly due to poor weed control in this treatment. Potato US#1 yield at Paterson ranged from 41 to 58 T/ha for sequential treatments and 32 to 37 T/ha for imazosulfuron PRE stand alone treatments. Stand alone treatments of imazosulfuron PRE provided only partial control of hairy nightshade at Paterson. Imazosulfuron has potential to become a valuable tool for yellow nutsedge management in potato. Studies are needed to evaluate the potential for imazosulfuron carryover in the soil, which will determine its suitability in different crop rotation systems. [101]

WEED CONTROL IN POTATOES WITH DIMETHENAMID-P TANK MIXTURES CHEMIGATED PRE OR EPOST. Pamela J.S. Hutchinson*, Brent Beutler, and JaNan Farr, University of Idaho, Aberdeen Research and Extension Center.

In 2008, Russet Burbank potatoes were planted and hilled May 14 and 26, respectively, in a loam soil with 1.5% O.M. and pH 8.2 at the Aberdeen Research and Extension Center. Dimethenamid-p alone at 0.84 lb ai/A, or combined with pendimethalin, metribuzin, or EPTC at 1.0, 0.5, or 5.3 lb ai/A, respectively, were chemigated in 0.25 inches irrigation water followed immediately by another 0.25 inches water (PRE) or early postemergence (EPOST) on May 31 or June 21, respectively. No potato or weeds were exposed during the PRE application. At the EPOST timing, potatoes were 3 to 6 inches tall; AMARE, CHEAL, and SOLSA were 0.25 to 0.5 inches tall and present at 3 plants each per sq ft; and 0.5 to 1 inch tall SETVI was present at 5 per sq ft. Season-long CHEAL control by dimethenamid-p alone chemigated PRE or EPOST was 67 or 30%, respectively. Tank-mixing with pendimethalin or metribuzin PRE improved control to 100% while these two treatments applied EPOST improved control to 85 or 100%, respectively. Dimethenamid-p + EPTC chemigated PRE improved CHEAL control to 93%, however, control by the same combination applied EPOST only was 57%, which was greater than control by dimethenamid-p alone EPOST but not PRE. Otherwise, season-long AMARE, SOLSA, and SETVI control by dimethenamid-p alone or tank-mixed was similar and ranged from 93 to 100%. Crop injury was less than 5% at row closure regardless of treatment and not evident 2 to 3 wks later. CHEAL control seemingly affected yields since dimethenamid-p combined with pendimethalin or metribuzin PRE or metribuzin EPOST were the only treatments resulting in U.S. No. 1 and total tuber yields greater than weedy check yields. [102]

BROADLEAF WEED CONTROL IN TREE FRUIT AND NUT CROPS WITH SAFLUFENACIL. Philip H. Munger*, Kyle E. Keller, Max Landes, Brandie Penrose, Dan E. Westberg, BASF Corporation, Research Triangle Park, NC.

Consistent, effective control of key broadleaf weeds frequently presents a major challenge to growers of tree fruit and nut crops in California. A new herbicide under development by BASF, saflufenacil (BAS 800H), has demonstrated excellent postemergence control of important broadleaf weeds and crop safety in field trials. Laboratory and greenhouse studies have demonstrated plant uptake of the active ingredient via foliage, shoots, and plant roots. In multi-year field trials, postemergence applications of saflufenacil at 25 to 50 g ai/ha plus glyphosate (840 g ai/ha) controlled a wide spectrum of broadleaf and grass weeds with significantly improved control of hairy fleabane,

horseweed, little mallow, common mallow, panicle willowherb, redstem filaree, and burning nettle compared with treatments of glyphosate alone. Treatments with saflufenacil plus glyphosate were also more effective in controlling hairy fleabane and horseweed than combinations of glyphosate plus flumioxazin or oxyfluorfen. Currently, saflufenacil is under development in over 90 different crops, including citrus, tree fruit and tree nut crops. Trials are also in progress to ascertain the safety of saflufenacil in additional orchard crops. The initial registration of saflufenacil is anticipated in the second quarter of 2009. [103]

THE BIOLOGY AND MANAGEMENT OF CONYZA SP. IN THE SAN JOAQUIN VALLEY. Anil Shrestha*, California State University, Fresno; Kurt J. Hembree, University of California Cooperative Extension, Fresno; Steven D. Wright, University of California Cooperative Extension, Tulare.

In recent years, increasing populations of horseweed or mare's tail (*Conyza canadensis*) and hairy or flax-leaved fleabane (*Conyza bonariensis*) have been observed in vineyards, orchards, canal banks, and roadsides in California, especially in the Central Valley. Numerous growers, pest control consultants, and managers have complained that the recommended rates of some postemergent herbicides, such as glyphosate, are no longer effective on these weeds. Since glyphosate-resistant biotypes of these species have now been confirmed, alternate integrated techniques need to be employed to effectively manage resistant and non-resistant biotype populations and to prevent the further development of herbicide resistance. Basic information on the biology and ecology of these weeds has been developed and is being continued to be developed. Increased efforts have been directed towards providing this information to growers and land managers in different parts of the San Joaquin Valley. An integrated research and extension approach has been taken to control these species. An extension article has been published by the University of California, Division of Agriculture and Natural Resources Publications. The article contains illustrations, information on the biology and ecology, and lists chemical and non-chemical options for control and management of the two species in cropped and non-crop systems in California. The article is available online at http://ucanr.org/freepubs/docs/8314.pdf. [104]

PERFORMANCE OF A NEW PRONAMIDE FORMULATION IN CALIFORNIA AND ARIZONA LETTUCE. Jesse M. Richardson*, Dow AgroSciences, Hesperia, CA; Barry R. Tickes, University of Arizona Cooperative Extension, Yuma; and Rick K. Mann, Dow AgroSciences, Indianapolis, IN.

Beginning in 2004, sprinkler application of pronamide (Kerb® 50-W herbicide) through overhead sprinklers has become commonplace in lettuce, particularly in the low desert production areas of Arizona and Southern California. Growers in these areas have learned that sprinkler application provides more dependable weed control than ground application. From 2006 through 2008, studies were established in Imperial Valley, CA, Bard, CA and Yuma, AZ to test a new pronamide formulation – a 3.3 lb/gallon suspension concentrate (SC). The new formulation was tested against the commercially available 50% wettable powder formulation, comparing identical rates. Rates that were tested through the sprinklers ranged from 0.375 to 1.0 lb a.i./acre. In general, the pronamide treatments were injected into the sprinkler irrigation stream in water volumes ranging from 0.1 to 0.15 in. Following injection, the treatments received 0.4 to 0.5 in water for incorporation. Assessments were made 13 to 45 days after application. The level of weed control was determined by either counting the number of plants of each weed species over a given length of crop bed, or by

harvesting the above-ground portion of each weed species and recording fresh weights. Crop safety was determined by visual assessment, using a 0-100 scale. Results suggest that control of nettleleaf goosefoot (*Chenopodium murale*), annual sowthistle (*Sonchus oleraceus*), common purslane (*Portulaca oleracea*), shepherd's-purse (*Capsella bursa-pastoris*), and California burclover (*Medicago polymorpha*) was similar with each formulation. Crop safety assessments with both formulations were similar in most cases. However, the SC was found to be safer than the commercial formulation in two assessments, from two different studies. Commercial-sized plots were also established with the SC formulation in lettuce fields in Yuma, AZ, Coachella, CA and Santa Maria, CA. In addition to excellent weed control, growers and pest control advisors reported that handling and application characteristics were more desirable with the SC formulation than the WP formulation. ®Trademark of Dow AgroSciences LLC. Kerb® 50-W is a Federally Restricted Use Pesticide. [105]

CALLISTO: UPDATE ON MINOR CROP REGISTRATIONS. Christopher Clemens*, Gordon Vail, Ven Lengkeek, and Marty Schraer, Syngenta Crop Protection, Greensboro, NC.

No abstract. [106]

CONTROL OF CANADA THISTLE IN RED RASPBERRY USING CLOPYRALID AND DICLOBENIL. Timothy W. Miller* and Carl R. Libbey, Washington State University, Mount Vernon.

A project was conducted during 2007-08 to evaluate two formulations of diclobenil (Casoron 4G and Casoron CS) and clopyralid applied early or late postemergence (EPOST or LPOST, respectively) to red raspberries. Plots were established in healthy 'Meeker' raspberries at Washington State University Northwestern Washington Reaearch and Extension Center. The same plots were treated for two years, with herbicide application either as a directed spray to the base of the canes (liquid diclobenil or clopyralid) or sprinkled among the canes (granular diclobenil). Floricanes were just beginning to bloom at the time of the EPOST applications, and first green berries were present at the time of the LPOST (late flowers still present). As this was a young raspberry planting (planted in 2006), few weeds were present on which to evaluate weed control (nontreated plots were 90 and 95% free of weeds in 2007 and 2008, respectively). Still, weed control in treated plots was slightly improved, with control rated at 96 to 100% both years. Floricanes were not significantly injured by any herbicide application either year, and berry yield was also not significantly affected. Primocane injury was noted after most treatments with the highest injury resulting from treatment with LPOST diclobenil in 2007. While the liquid dichlobenil formulation at either timing in caused a similar level of primocane injury as granular dichlobenil in 2008 (ranging from 11 to 19%), injury from the 2007 LPOST liquid dichlobenil (18%) was only about half as severe as observed with the other dichlobenil application timings. Clopyralid caused only slight injury to primocanes either year (0 to 8% in 2007, 10 to 13% in 2008). [107]

DEGRADABLE MULCH EVALUATION IN WATERMELON PRODUCTION. Rick A. Boydston*, USDA-ARS, Prosser, WA and Carol Miles, Washington State University, Mt. Vernon.

Plastic mulch has become a standard practice for producers of melons to control weeds, shorten time to harvest, and increase plant growth. Despite advantages of using plastic mulch, removal and disposal of mulch is expensive, labor intensive, and an environmental concern. Two biodegradable cornstarch based mulches, Biofilm NF01U/P15 and NF803/P15 (both 0.6 ml thickness) were tested and compared to standard black plastic (0.9 ml) at Prosser and Mt. Vernon, WA in 2008. At Prosser, mulches were laid May 9, watermelon transplanted June 23, and harvested from August 11 through August 29 in a commercial production field. The Mt. Vernon trial was conducted under organic

production and mulches were laid May 28, watermelon transplanted June 23, and harvested September 11 and September 26. At Prosser, noticeable tears began to appear in biodegradable mulches by mid June and early July, but all mulches were still controlling weeds well. Total number and weight of mature fruit harvested were similar among mulch treatments averaging 97.9 MT/ha. Watermelons grown on biodegradable mulches frequently had undesirable mulch residues on the surface of the harvested melons. At Mt. Vernon, both biodegradable mulches remained intact and suppressed weeds well for the first 8 weeks. By July 30, quality of NF01U/P15 was less than black plastic and NF803/P15. Quality of NF803/P15 began to decline in August and by September 6 was less than black plastic. Verticillium symptoms on watermelon appeared initially in black plastic treatments and shortly thereafter in biodegradable mulches. Melon yield was similar among mulch treatments averaging 16.2 MT/ha. [108]

EFFECT OF QUINCLORAC RATE AND TIMING ON RHUBARB, BINDWEED, AND CANADA THISTLE. Ed Peachey*, Oregon State University, Corvallis; and Robert McReynolds, NWREC, Aurora, OR.

Field bindweed (*Convolvulus arvensis*), hedge bindweed (*Calystegia sepium*), and Canada thistle (*Cirsium arvense*) are difficult weeds to control in perennial crops such as rhubarb. Quinclorac controls or suppresses bindweed, while plants such as rhubarb of the Polygonaceae family are tolerant to quinclorac. The objective of this project was to determine rhubarb crop response to quinclorac when applied at times compatible with rhubarb culture, and to evaluate the potential of suppressing or controlling field and hedge bindweed and Canada thistle. Experiments were located at 3 sites. The rhubarb plot at the North Willamette Research and Extension Center (NWREC) near Aurora was kept nearly weed-free so that crop response to quinclorac could be measured. Hedge bindweed had completely over-run the field at the Dayton site, and Canada thistle covered nearly half of the field at the site near Needy. Quinclorac was applied to rhubarb in the fall, early in the spring as soon as the target weeds had emerged, and again after the first harvest. The rate of quinclorac was 0.375 or 0.75 lbs ai/A in 20 GPA water with 1% MSO and 2.5% UAN. Rhubarb was harvested twice from small areas within 10 by 20 foot plots, and after each harvest the crop was mowed to the ground to simulate a full field harvest. Rhubarb was tolerant to quinclorac at 0.75 lbs ai/A in weeded plots, and provided 88 to 91% control of hedge bindweed. Quinclorac suppressed Canada thistle by as much as 50% when applied in the spring at 0.75 lbs ai/A. Sequential applications may be needed to eradicate Canada thistle with quinclorac. [109]

EVALUATION OF ORGANIC HERBICIDES. Tom Lanini* and Shosha Capps, Univeristy of California, Davis.

One of the largest production cost for specialty crop growers is weed control. Very few herbicides are available for specialty crops, and thus growers must rely on alternative methods. The objective of this research was to evaluate organic herbicides for weed control and potential for application in specialty crops. We evaluated various concentrations of commercial formulations of acetic acid, citric acid, d-limonene, clove oil, clove oil + cinnamon oil, lemongrass oil, and ammonium nonanoate in a grape vineyard, in tomatoes and in lettuce. Spray volume was either 35 gpa or 70 gpa for all applications. Treatments were applied a single time or two times at a two week interval. Temperature at the time of treatment was 13C (grapes), 23C (tomatoes), and 27C (lettuce). Concentration required for 70% or better weed control varied by material, with citric acid needing the highest concentration (50%), and ammonium nonanoate the least (6%). Spray volume was more important than concentration, with 70 gpa consistently providing better weed control than 35 gpa. Temperature affected organic herbicide performance, with the best control occurring in lettuce, when

temperatures were 27C. Weed size and type also influenced control, with seedling broadleaf weeds being easier to control than large and/or grass weeds. [110]

WEEDS OF AGRONOMIC CROPS

MOLECULAR EVIDENCE FOR GENETIC STRUCTURE IN JOINTED GOATGRASS (*AEGILOPS CYLINDRICA*). Bethany F. Econopouly*, John K. McKay, Harald Meimberg, Scott Reid, and Philip Westra, Colorado State University, Fort Collins.

Polymorphic microsatellites were used to analyze accessions of jointed goatgrass (*Aegilops cylindrica*) in both its native and introduced range. Ninety-six individuals representing 12 western U.S. states and 230 individuals from 28 Eurasian countries were screened using fragment analysis. Results imply that genetic structure exists at a small scale within states or countries rather than between these regions. This suggests the presence of gene flow between regions in both ranges and multiple introductions of the species into the U.S. Our results will help to clarify the processes driving the evolution of invasive species, while also contributing knowledge towards improving weed management practices. [72]

COMMON LAMBSQUARTERS CHARACTERISTICS THAT INFLUENCE CONTROL WITH GLYPHOSATE. Andrew R. Kniss, University of Wyoming, Laramie.

Common lambsquarters (*Chenopodium album*) control with glyphosate can be variable, but no clear mechanism has yet been elucidated to explain this variability. A field study was conducted in Laramie, Wyoming in 2008 to investigate common lambsquarters characteristics that might influence control with glyphosate. Newly emerged common lambsquarters plants were located along transects and tagged over a 4 week period. Data for each individual plant were collected, then the entire plot area was treated with glyphosate at 840 g/ha with or without ammonium sulfate. Data collection included date of emergence, height from soil to apical meristem, width of branching, number of nodes, available calcium and magnesium on the leaf surface, and amount of calcium and magnesium in leaf tissue. Mortality was then recorded 10 d after herbicide treatment. Logistic regression was utilized to determine which parameters related to common lambsquarters mortality by starting with the maximal model (all parameters included) and sequentially removing non-significant terms and testing for significant increases in deviance. Following model reduction, three parameters were found to significantly influence common lambsquarters mortality after treatment with glyphosate; these parameters are 1) available magnesium on the leaf surface 2) date of emergence, and 3) number of nodes. Concentration of calcium or magnesium within leaf tissue did not relate to common lambsquarters mortality. As available magnesium on the leaf surface increased, probability of survival also increased. Earlier emerging plants had a higher probability of survival. However, as the number of nodes increased, probability of survival decreased. [73]

COMPARING JOINTED GOATGRASS (AEGILOPS CYLINDRICA) AND ITS PARENTAL SPECIES USING NUCLEAR AND CHLOROPLAST SEQUENCES. Elena Sanchez-Olguin*, Jeffrey Leonard, Oscar Riera-Lizarazu, Carol Mallory-Smith, Oregon State University, Corvallis.

Jointed goatgrass (*Aegilops cylindrica* Host; genome CCDD) is an allotetraploid formed by hybridization between the diploid species *Ae. tauschii* Coss. (genome DD) and *Ae. markgrafii* (Greuter) Hammer (genome CC). This species was introduced in the USA in the late 1800s but did not become a problematic weed in wheat fields until the 1970s. A better understanding of the evolutionary history of *Ae. cylindrica* could help explain its recent rapid expansion. To this end, we isolated and sequenced a 1,517-bp region of the nuclear Acc-1 gene and two plastidic intergenic regions [trnF-ndhJ (715-bp) and atpI-atpH (702-bp)] from various accessions of *Ae. cylindrica*, *Ae. markgrafii*, *Ae. tauschii* ssp. *tauschii*, and *Ae. tauschii* spp *strangulata*. An analysis of the plastidic

sequences revealed two chloroplast haplotypes in *Ae. cylindrica*; one associated with *Ae. markgrafii* (type C) and another with *Ae. tauschii* (type D). This is in agreement with previous molecular studies that suggested that both *Ae. tauschii* and *Ae. markgrafii* contributed their cytoplasms to *Ae. cylindrica*. An analysis of Acc-1 sequences also corroborated research suggesting that the D genome in *Ae. cylindrica* was derived from *Ae. tauschii* ssp. *tauschii*. Furthermore, the presence of two distinct nuclear (Acc-1) haplotypes in *Ae. cylindrica* provides evidence that *Ae. cylindrica* formed recurrently through multiple hybridization events. A more comprehensive analysis with additional sequencing data is ongoing. [74]

PINOXADEN + FLORASULAM: A NEW PREMIX FOR GRASS AND BROADLEAF WEED CONTROL IN WHEAT AND BARLEY. Stephen M. Schraer*, Donald J. Porter, Peter C. Forster, and Jason C. Sanders, Syngenta Crop Protection Inc., Greenboro, NC.

Pinoxaden + florasulam premix is a new Syngenta selective postemergence herbicide for the US market that will provide control of a broad spectrum of troublesome grass and broadleaf weeds in wheat and barley. The brand name for this new premix is Axial® TBC. This premix combines two active ingredients: pinoxaden, which provides grass weed control by inhibiting acetyl-CoA carboxylase (ACCase) and florasulam, which provides broadleaf weed control by inhibiting acetolactate synthase (ALS). Axial TBC at the recommended use rate of 8.85 fl. oz/A + Adigor adjuvant at 9.6 fl. oz/A, will provide excellent broad spectrum grass control as well as a solid foundation for control of broadleaf weeds. Additional broadleaf herbicides may be tank mixed with the product to broaden the weed control spectrum. Axial TBC provides excellent crop safety and rotational crop flexibility and may be applied to all varieties of spring wheat (excluding durum), winter wheat and barley. Axial TBC will be launched in the US market in 2009. [75]

TOLERANCE OF FOXTAIL BARLEY AND SIX DESIRABLE PASTURE GRASSES TO ALS HERBICIDES. Karl R. Israelsen* and Corey V. Ransom, Utah State University, Logan.

A greenhouse study was conducted to determine the tolerance of foxtail barley and six desirable pasture grasses to four ALS herbicides. Grass species included in the study were ‘Palaton’ reed canarygrass (*Phalaris arundinacea*), ‘Climax’ timothy (*Phleum pratense*), ‘Mustang’ altai wildrye (*Leymus angustus*), ‘Fawn’ tall fescue (*Festuca arundinaceae*), ‘Alkar’ tall wheatgrass (*Thinopyrum ponticum*), ‘Potomic’ orchardgrass (*Dactylis glomerata*), ‘Garrison’ creeping foxtail (*Alopecurus arundinaceus*), and foxtail barley (*Hordeum jubatum*). Grasses were planted individually into Cone-tainers filled with peatmoss and vermiculite on May 29, 2008. Plants were hand watered daily with tap water until seedlings emerged. Grasses were cut to a uniform height and allowed to re-grow two weeks before herbicide treatments were applied on July 29, 2008. Each herbicide was applied at five rates using an enclosed research track sprayer calibrated to deliver 187 l/ha at 207 kPa. The herbicides used were: imazapic, propoxycarbazone, sulfosulfuron, and flucarbazone at rates of 10, 25, 50, 100, and 200 g ai/ha. Grass biomass was harvested on August 26, 2008 and re-growth was harvested two weeks later. Biomass from both harvests was combined and regressed against herbicide dose using a 4-parameter logistic equation. Herbicide tolerance differed significantly among grass species. LD50 values for grass biomass ranged from less than 1 g/ha to greater than 60 g/ha. Creeping foxtail, reed canarygrass, and tall fescue were highly susceptible to all herbicides tested. Foxtail barley and timothy showed some tolerance to flucarbazone. Tall wheatgrass was extremely tolerant to flucarbazone with an LD50 value beyond the maximum rate evaluated. Propoxycarbazone and sulfosulfuron were effective against foxtail barley with LD50 values of 9 and 18 g/ha, respectively. Orchardgrass exhibited tolerance to propoxycarbazone with an LD50 value of 60 g/ha. Propoxycarbazone may have potential to selectively remove foxtail barley from orchardgrass and should be further investigated. With the exception of orchardgrass tolerance to

propoxycarbazone, there appears to be little possibility for selective removal of foxtail barley from the grasses evaluated using postemergent ALS herbicide applications. [76]

WILD OAT AND BROADLEAF WEED CONTROL WITH PYROXSULAM IN IRRIGATED SPRING WHEAT. Don W. Morishita, J. Daniel Henningsen and Donald L. Shouse, University of Idaho, Twin Falls.

Studies were conducted at the University of Idaho Research and Extension Center near Kimberly, Idaho in 2007 and 2008 to compare pyroxsulam with other herbicides for wild oat and broadleaf weed control in irrigated spring wheat ('Centennial' and 'Westbred 936'). The wheat was planted March 31, 2007 and April 8, 2008 at 100 lb/A. Herbicides were applied on May 11 and 29, 2007 and 2008, respectively. Wild oat, kochia, and common lambsquarters were the primary weed species. Grain was harvested July 31, 2007 and August 13, 2008 with a small-plot combine. In 2007, no crop injury was observed, but in 2008 crop injury ranged from 5 to 19% 5 days after application. In 2007, the best wild oat control at 63 DAA was generally best with GF-1847 (pyroxsulam alone) plus methylated seed oil and GF-1848 (florasulam & fluroxypyr & pyroxsulam). Wild oat control with GF-1848 was equal to or better than clodinafop, fenoxaprop, flucarbazone, pinoxaden, and propoxycarbazone & mesosulfuron. Kochia control at mid-season ranged from 95 to 100% with GF-1848. Without fluroxypyr, kochia control with GF-1847 was generally good with most combinations of adjuvants. Common lambsquarters control was >80% with all GF-1847 and GF-1848 treatments with the exception of GF-1847 applied with mineral oil or without an adjuvant. Nearly all GF-1847 and GF-1848 treatments had grain yields ≥90 bu/A, as did the registered herbicide treatments. [77]

SUNFLOWER DESICCATION WITH SAFLUFENACIL. Brian M. Jenks, Gary P. Willoughby, Shanna A. Mazurek, and Jordan L. Hoefing*, North Dakota State University, Minot; and Phillip W. Stahlman and Patrick W. Geier, Kansas State University Agricultural Research Center, Hays.

Saflufenacil is an experimental broadleaf herbicide that has potential for use as a sunflower desiccant. Studies were conducted at Minot, ND and Hays, KS in 2008 to evaluate the effects of adjuvant and spray volume on sunflower desiccation with saflufenacil. At both locations, saflufenacil was applied at 25 g/ha with methylated seed oil (MSO) at 1% v/v, petroleum oil concentrate (PO) at 1% v/v, or non-ionic surfactant (NIS) at 0.25% v/v when sunflower seed moisture was approximately 35%. These treatments were applied at 94 L/ha with ammonium sulfate (AMS) at 2% w/v. To evaluate the effect of spray volume, one additional treatment was applied at 19 L/ha with MSO and AMS to roughly simulate an aerial application. At Hays, one additional treatment was included: saflufenacil at 25 g/ha tank mixed with MSO + AMS + glyphosate (840 g/ha) applied at 94 L/ha. All treatments were evaluated by visual estimation of sunflower leaf, receptacle, and stalk desiccation compared to an untreated check. Treatments were evaluated at 4, 7, 11, and 14 days after treatment (DAT) at Minot, and 4, 8, 15, and 21 DAT at Hays. At Minot, XR8001 flat fan nozzles and 20-inch nozzle spacing were used to achieve 94 L/ha. For 19 L/ha, we used XR8001 nozzles, 40-inch nozzle spacing, and adjusted speed and boom height. At Hays, spray volume of 94 L/ha was achieved using TurboTee 110015 spray tips, whereas the 19 L/ha treatment was achieved using TeeJet 730039 flat fan spray tips. Nozzle spacing was the same for both spray volumes, but travel speed differed. Data were arcsine transformed to normalize variance when necessary. At Minot 7 DAT, sunflower leaf and receptacle desiccation with saflufenacil + MSO was 3-11% greater than desiccation with saflufenacil + PO or NIS. Stalk desiccation at 7 DAT was 16-22% greater with MSO compared to PO or NIS. At 14 DAT, sunflower desiccation with MSO was 2-4, 7-8, and 8-10% higher than PO or NIS on leaves, receptacles, and stalks, respectively. By 14 DAT, saflufenacil + MSO reached 96, 93, and 79% desiccation on sunflower leaves, receptacles, and stalks, respectively. Desiccation with saflufenacil applied at the lower spray volume (19 L/ha) was 10-30% slower compared to the higher

spray volume (94 L/ha). At Hays 8 DAT, desiccation of sunflower receptacles and stalks by saflufenacil + NIS was 15 and 20% less, respectively, compared to saflufenacil + MSO; saflufenacil + PO was intermediate. Similarly, desiccation of receptacles and stalks with saflufenacil + glyphosate + MSO was 12 and 15% less, respectively, compared to saflufenacil + MSO without glyphosate. However, there was little or no biological difference between adjuvants or treatments with and without glyphosate at 15 or 21 DAT. Also, desiccation occurred more slowly at the lower spray volume, but all treatments resulted in complete desiccation at 21 DAT. Results at both locations indicated more rapid desiccation with use of MSO compared to PO or NIS and for the higher spray volume, but differences lessened over time. [78]

WEED CONTROL AND ROTATIONAL CROP TOLERANCE WITH PYROXSULAM. Edward Davis*, Montana State University, Bozeman.

Pyroxsulam is a new group 2 herbicide with grass and broadleaf weed activity brought to the winter wheat and spring wheat market by Dow AgroScience in 2008. Field trials were conducted at several locations in Montana from 2006-08 to evaluate weed control efficacy, wheat tolerance, and rotational crop response to pyroxsulam. Winter wheat and spring wheat injury ranged from 0 -10%, depending on adjuvant system used, and dissipated quickly without impacting grain yield. Fall applied Pyroxsulam (GF-1274) at 18.5 g ai/ha provided 84% control of downy brome compared to 80% for Propoxycarbazone at 44 g ai/ha and 66% for propoxycarbazone (16.5 g ai/ha) + mesosulfuron (11 g ai/ha). Spring applied pyroxsulam provided 78% control of downy brome compared to 69% for propoxycarbazone and 81% for propoxycarbazone + mesosulfuron. Pyroxsulam control of tansy mustard and field pennycress was similar to other group 2 herbicides and was superior on corn gromwell. Wild oat control and spring annual broadleaf weed control in spring wheat with pyroxsulam (GF-1848, premix formulation of pyroxsulam + florasulam + fluroxypyr) was similar to commercial standard tank-mixes of group 1 and group 2 wild oat herbicides plus a broadleaf herbicide partner. Rotational crops including lentil, pea, chickpea, flax, safflower, and camelina showed no phytotoxic response to pyroxsulam applied to winter wheat at 1X, 2X, and 4X rates 10 months prior to seeding rotational crops. Likewise, rotational crops including lentil, pea, canola, barley, oat, and camelina showed no phytotoxic response to pyroxsulam applied to spring wheat at 1X, 2X, and 4X rates 11 months prior to seeding rotational crops. [79]

PERFORMANCE OF GOLDSKY HERBICIDE ON GRASS AND BROADLEAF WEEDS IN SPRING WHEAT. Brett M. Oemichen*, Roger E. Gast, Monte R. Weimer, and Marcin D. Dzikowski, Dow AgroSciences LLC, Indianapolis, IN 46268.

Pyroxsulam is a new triazolopyrimidine sulfonamide herbicide that provides broad spectrum postemergence grass and broadleaf weed control in wheat. The control spectrum includes key annual grasses occurring across the global wheat markets such as blackgrass (*Alopecurus* sp.), windgrass (*Apera spica-venti*), wild oat (*Avena* sp.), annual bromes (*Bromus* sp.), ryegrass (*Lolium* sp). and canarygrass (*Phalaris* sp.), and certain broadleaf species. GoldSkyTM herbicide is an oil dispersion premix formulation (coded GF-1848) containing pyroxsulam, florasulam and fluroxypyr-meptyl designed to deliver full spectrum control of key annual weeds in the U.S. spring wheat market. The label use rate of one pint formulated product A-1 delivers 15 + 2.5 + 100 gae ha-1 of each component, respectively. Replicated field research trials were conducted in 2007 and 2008 at 29 locations across the northern spring wheat states of North Dakota, Montana and Idaho to determine the relative performance of GF-1848 compared to current standard grass and broadleaf herbicide tank mix treatments. GF-1848 was applied at the labeled rate with a non-ionic surfactant at 0.5% v/v plus ammonium sulfate fertilizer at a rate of 1.7 kg ha-1. Comparison grass herbicide treatments included clodinafop, fenoxaprop, pinoxaden, flucarbazone, and the premix of mesosulfuron plus

propoxycarbazone, all applied at typical label rates. GF-1848 provided 91% mean late season control of wild oats over 12 locations, similar to the clodinafop (92%) and pinoxaden (94%) treatments. Wild oat control with other comparision treatments was lower. Fenoxaprop control ranged from 62% to 86% and mesosulfuron plus propoxycarbazone 83% to 87% depending on tank mix partners, and flucarbazone plus 2,4-D averaged 82%. Yellow foxtail late season control with GF-1848 was 92%, comparable to pinoxaden (94%), and was higher than all other comparison treatments. Green foxtail control with GF-1848 was 76%, similar to clodinafop and flucarbazone at 81% and 71%, respectively. Both treatments provided less green foxtail control than pinoxaden or fenoxaprop treatments. GF-1848 provided excellent control of key broadleaf weeds such as kochia (92%), Russian thistle (88%), wild mustard (98%), wild buckwheat (90%), redroot pigweed (99%) and common lambsquarters (92%). Spring wheat tolerance to GF-1848, up to the double label rate, was excellent in all weed free trials with no significant yield losses observed. Rotational studies conducted on the key rotational crops indicate that all tested crops can be planted the season following application of GF-1848. The results of these trials indicate that GoldSky provides unique one pass, cross-spectrum control of key weeds in spring wheat delivered in a single formulation. TM Trademark of Dow AgroSciences LLC [80]

SAFLUFENACIL AND 2,4-D AMINE DOSE RESPONSE OF WINTER WHEAT AND ANNUAL BROADLEAF WEEDS. John C. Frihauf*, Kansas State University, Manhattan; Phillip W. Stahlman, Kansas State University Agricultural Research Center-Hays; Dallas E. Peterson, Kansas State University, Manhattan; and Kassim Al-Khatib, Kansas State University, Manhattan.

Saflufenacil is an experimental herbicide developed for burndown and preemergence control of broadleaf weeds. Previous research found that foliar crop injury caused by postemergence-applied saflufenacil was reduced when mixed with 2,4-D amine without adjuvant. Greenhouse experiments were conducted during the spring of 2008 to further investigate interactions between saflufenacil and 2,4-D amine. Saflufenacil was applied postemergence without adjuvant to wheat, henbit, kochia, and flixweed at 0, 13, 25, and 50 g/ha alone or tank-mixed with 2,4-D amine at 0, 67, 133, 267, 533, or 1066 g ae/ha. Averaged over 2,4-D amine rate, wheat dry weight was reduced only by the 50 g/ha rate of saflufenacil. Averaged over saflufenacil rates, wheat dry weight was not affected by the addition of 2,4-D at rates of 133 g/ha or less, but rates of 267 g/ha and higher reduced wheat dry weight by 10 to 14%. Henbit dry weight gradually decreased with increasing saflufenacil and 2,4-D amine rates, but no saflufenacil plus 2,4-D amine treatment resulted in plant death. Flixweed death was achieved with 13, 25, or 50 g/ha of saflufenacil when mixed with 2,4-D at 67 to 1066 g/ha. Kochia dry weight decreased as saflufenacil and 2,4-D amine rates increased. Dry weight of kochia was lowest (greatest control) when saflufenacil at 25 or 50 g/ha was mixed with 267 g/ha or higher rates of 2,4-D amine. Saflufenacil at 13 g/ha mixed with 2,4-D amine at 533 or 1066 g/h reduced kochia dry weight >90%. [81]

SAFLUFENACIL USE PREEMERGENCE IN WHEAT. Kirk Howatt*, Ronald Roach, and Janet Davidson, North Dakota State University, Fargo.

Saflufenacil is a new herbicide with anticipated registration for use preemergence in wheat. Saflufenacil may control some emerged weeds in direct-seeding systems as well as provide residual activity; however, efficacy information and wheat response to saflufenacil is not well documented in North Dakota. Two experiments with different treatment lists were conducted to evaluate control of emerged field pennycress and curly dock and spring wheat response with saflufenacil and other herbicides. For each experiment, saflufenacil, glyphosate, and combinations of glyphosate with saflufenacil, 2,4-D, or carfentrazone were applied to weeds that were 4 to 8 inches tall 7 d before spring wheat seeding. Herbicide treatments did not cause visible response in wheat or reduce wheat

height or grain yield, but nontreated curly dock resulted in very low yield, 7 bu/A in one experiment. Saflufenacil alone did not give greater than 75% control of either weed. Glyphosate alone was slow to kill weeds but the curly dock did not recover. When saflufenacil or carfentrazone was included with glyphosate, weed response was more rapid but control was less complete. Glyphosate plus saflufenacil or carfentrazone provided 93 to 97% control of curly dock on June 20, but control was 81% or less on July 14. Post treatment emergence of weeds did not occur in these experiments. Saflufenacil may improve control of exposed foliage with glyphosate, but when translocation is necessary to control biennial or perennial weeds, such as curly dock in these experiments, the enhanced injury caused by products such as saflufenacil or carfentrazone may result in less translocation and allow partial recovery as indicated by less control in these experiments. [82]

EVALUATION OF PYROXASULFONE (KIH-485) FOR GRASS WEED MANAGEMENT IN WINTER WHEAT. Andrew G. Hulting*, Barbara Hinds-Cook, Daniel Curtis, Bill Brewster and Carol Mallory-Smith, Oregon State University, Corvallis.

Pyroxasulfone (KIH-485) is a new soil-applied herbicide with the potential to control many broadleaf and grass weed species in several crops including corn and winter wheat. The mode of action of pyroxasulfone has been reported to be similar to that of Group 15 inhibitors of very-long-chain fatty acid synthesis. A series of field experiments were conducted during 2007-2009 near Corvallis, OR, to evaluate the potential for Italian ryegrass control in winter wheat with preemergence and early postemergence applications of pyroxasulfone. Application rates of preemergence treatments ranged from 0.045 to 0.178 lbs ai/A and from 0.067 to 0.089 lbs ai/A for early postemergence treatments. Early postemergence treatments were generally applied during late fall at the 1 to 3 leaf growth stage of winter wheat which corresponded with 1 to 2 leaf Italian ryegrass. All of these treatments were compared to standard Italian ryegrass soil-applied herbicide programs in winter wheat that included the use of products such as diuron, flufenacet, flufenacet +metribuzin and diclofop. Visual evaluations of percent Italian ryegrass control and winter wheat injury were made at regular intervals following applications. Winter wheat yields were quantified at grain maturity. Percent Italian ryegrass control following pyroxasulfone applications ranged from 85 to 90 % and was equal to control achieved with flufenacet and flufenacet +metribuzin treatments and greater than that achieved with diuron applications in most studies. Percent winter wheat injury from pyroxasulfone ranged 0 to 10 % and was associated with the higher application rates evaluated (0.089-0.178 lbs ai/A) and preemergence application timings. No yield loss in winter wheat from any of the pyroxasulfone treatments and timings was quantified. Pyroxasulfone, when applied at the rates and timings in these studies, appears to have potential as a soil-applied grass weed management product in winter wheat based on a high level of activity on grass weed species such as Italian ryegrass and excellent crop safety. [83]

RESIDUAL WEED CONTROL FROM PYROXASULFONE. Ryan L. Hunt* and Richard K. Zollinger, North Dakota State University, Fargo.

Two field experiments were established in 2008 to evaluate the longevity of weed control from KIH-485. Study one, KIH-485 was applied as an early preplant (EPP) at 125, 166, 209, and 332 g ai/ha with a 4.5 lb ae/gal glyphosate at 870 g ae/ha. Study two, KIH-485 was applied preemergence (PRE) at 83, 125, 166, and 209 g ai/ha with a 4.5 lb ae/gal glyphosate at 870 g ae/ha. No weeds were present at the time of the EPP application on May 8. Weeds present at the time of the PRE application on June 17 included yellow foxtail, wild mustard, marshelder, common lambsquarters, hairy nightshade, and common ragweed. No crop was planted in either study. Following the EPP application approximately 0.74 cm of rainfall was received through May 24. At this time a weed control rating of 0 was made for all treatments. During the next 3 weeks 16 cm of rainfall was

received. An evaluation performed June 17 demonstrated the reach-back ability of KIH-485 when herbicide activation occurs following emergence and vegetative growth of weeds. Yellow foxtail control was 83-99%, wild mustard control was 44-81%, marshelder control was 31-61%, common lambsquarters control was 72-90%, hairy nightshade control was 88-98%, and common ragweed control was 50-83%. An evaluation on July 14 showed weed control decreased, but was still visible. After PRE treatments were applied on June 17, 9.4 cm of rainfall was received leading up to the rating date of July 14. This resulted in activation of KIH-485 in the soil. In conjunction with glyphosate, wild mustard, marshelder, common lambsquarters, and hairy nightshade control was 99% at all KIH-485 rates. KIH-485 with glyphosate showed 83-99% control of redroot pigweed compared to 22% control by glyphosate alone. Yellow foxtail control with glyphosate alone was 10%, while KIH-485 plus glyphosate ranged from 38-83%. Common ragweed control with glyphosate alone was 68%, with KIH-485 added it increased up to 88% at 209 g ai/ha. [84]

THE CRITICAL PERIOD OF WEED CONTROL IN LENTIL AND CHICKPEA. Jamin Smitchger*, Joseph P. Yenish, and Ian C. Burke, Washington State University, Pullman.

Knowledge of the critical period of weed control in chickpea is essential to formulate weed management strategies. The critical period of weed control is the time interval when it is crucial to maintain a weed-free environment to prevent unacceptable yield loss. Because there are limited broadleaf post-emergence herbicides registered, broadleaf weed control in chickpea relies on preplant and pre-emergence herbicides to control weeds through the critical period. Studies in Asia indicate the critical weed-free period in chickpea is 25 to 54 days after emergence, but weed species, climate, and other factors in Asia differ from those in the Pacific Northwest. Two field trials were conducted at the Cook Agronomy Farm located near Pullman, WA in 2008 using a randomized complete block design and consisting of 'Dylan' and 'Sierra' chickpea varieties, which have fern and simple leaf arrangement, respectively. Trials included 14 treatments which consisted of weedy or weed-free durations ranging from 0 to 105 days after crop emergence. Weed competition reduced mature biomass yield of 'Dylan' and 'Sierra' by 87.8% and 42.1% respectively. The disproportionate yield loss in 'Dylan' was caused by 73% lower crop emergence relative to 'Sierra'. The combined biomass of both chickpea and weeds remained constant, but chickpea biomass decreased proportionally as weed biomass increased. Based on a 5% yield loss threshold, critical periods of weed control are 28 to 52 and 20 to 54 days after emergence for the 'Dylan' and 'Sierra' varieties respectively. [85]

INTRODUCTION TO WOLVERINE - A NEW HERBICIDE FOR GRASS AND BROADLEAF WEED CONTROL IN NORTHERN PLAINS CEREALS. Dean W. Maruska*, Kevin B. Thorsness, Mary D. Paulsgrove, Michael C. Smith, George S. Simkins, and Mark Wrucke, Field Development and Technical Service Representatives, Product Development Manager, and Market Support Manager, Bayer CropScience, Research Triangle Park, NC 27709.

Wolverine herbicide is a new postemergence grass and broadleaf herbicide that has been developed by Bayer CropScience for use in spring wheat, durum, winter wheat, and barley. Wolverine has a very favorable ecological, ecotoxicological, and environmental profile with low acute mammalian toxicity and no genotoxic, mutagenic or oncogenic properties noted. Wolverine is a pre-formulated mixture containing the novel active ingredient, pyrasulfotole, with bromoxynil, fenoxaprop p-ethyl and the highly effective herbicide safener, mefenpyr-diethyl. This unique combination of active ingredients provides consistent broad spectrum grass and broadleaf weed control with excellent crop tolerance. Rapid microbial degradation is the primary degradation pathway for pyrasulfotole in the soil environment, with no soil activity from fenoxaprop and bromoxynil. Therefore, Wolverine has an excellent crop rotation profile, allowing re-cropping to all of the major crops grown in the northern cereal production area. Wolverine is specially formulated as an emulsifiable concentrate for

easy handling and optimized for grass and broadleaf weed control. Apply Wolverine after the cereal crop has emerged and before flag leaf emergence. Grass weeds should be treated with Wolverine between the 1 leaf and 2 tiller stage of growth and broadleaf weeds should be treated with Wolverine between the 1 - 8 leaf stage of growth depending on weed species. Wolverine will be labeled on 63 different weed species with many of them common in the northern cereal production area of the United States. Wolverine provides excellent control of key grass and broadleaf weeds such as wild oat, yellow foxtail, green foxtail, kochia, pigweed sp., wild buckwheat, common lambsquarters, mustard sp., Russian thistle, field pennycress, prickly lettuce, common waterhemp, white cockle, and nightshade sp. Excellent control of sulfonylurea resistant weeds such as kochia, prickly lettuce and Russian thistle biotypes has been confirmed with Wolverine in field trials. Wolverine has been tested on spring wheat, durum wheat, and barley varieties and crop tolerance was excellent on all varieties tested. Broad spectrum weed control across a wide range of grass and broadleaf weeds, excellent crop safety, and very favorable toxicological, ecotoxicological and environmental properties make Wolverine a safe and easy to use tool for cereal grain farmers. [126]

WINTER RYE AND ITALIAN RYEGRASS CONTROL OPTIONS WITH A WINTER WHEAT AND WINTER CANOLA ROTATION. Joshua A. Bushong* and Thomas F. Peeper, Oklahoma State University, Stillwater.

Limited control options and herbicide resistance have increased winter rye (*Secale cereale*) and Italian ryegrass (*Lolium multiforum*) problems in wheat in Oklahoma. A rotation with winter canola would increase control options. Field experiments are underway to evaluate herbicide programs in a wheat–canola rotation. An experiment was established in the fall of 2007 at four sites throughout central Oklahoma. The sites were uniformly overseeded with rye and ryegrass. The experimental design at each site is a randomized block with a factorial arrangement of treatments. Factors include the herbicide treatment applied to wheat in year one (i.e. untreated, imazamox, or pinoxaden) and the crop-herbicide combination for the second year. Crop-herbicide combinations in year two include a second year of wheat with the same herbicide treatment as the first year or canola with eight herbicide treatments. Treatments on winter canola include untreated, trifluralin PPI alone and followed by clethodim or quizalofop, and clethodim, glyphosate (once or twice) or quizalofop postemergence. All herbicides were applied at labeled rates with appropriate additives. First year pinoxaden treatments controlled Italian ryegrass 90 to 98%, did not control rye, and increased wheat yields 7 to 22%. In contrast imazamox treatments reduced ryegrass 39 to 60%, controlled rye 57 to 98%, and increased wheat yields 14 to 27%. Visual ratings in the second crop indicate that all canola herbicide treatments are reducing Italian ryegrass. Harvest data from the second crop and final weed density data in the third crop will determine the optimal weed management programs. [127]

SUNFLOWER RESPONSE TO KIH-485 OVER MULTIPLE YEARS. Brian Olson*, Kansas State University Research and Extension, Colby; Richard Zollinger, North Dakota State University, Fargo; Brian Jenks, North Dakota State University, Minot; Darrell Deneke, South Dakota State University, Brookings; Phillip Stahlman, Kansas State University Agrictultural Research Center-Hays; Alan Helm, Colorado State University Cooperative Extension, Holyoke; Curtis Thompson and Dallas Peterson, Kansas State University Research and Extension, Manhattan.

KIH-485 (pyroxasulfone) is an experimental seedling-growth inhibiting herbicide developed by Kumiai America that has the potential of controlling weeds in sunflowers. Weed control in sunflowers is still problematic with limited herbicide options available to farmers. In recent years, the addition of Spartan (sulfentrazone) has been a valuable tool to control weeds in sunflowers. Even with this addition, there are still weed control gaps. The addition of KIH-485 to the market segment will benefit farmers by improving weed control options and increasing market competition.

However, little is known about how this new experimental herbicide will interact with various soil types and environments when combined with Spartan. Therefore, the objective of this research was to evaluate KIH-485 at various rates with the addition of Spartan for the control of weeds and potential sunflower injury across the sunflower production area.

A multi-site study was initiated in the spring of 2008 to evaluate KIH-485 at several rates alone or in tank mixture with Spartan. Herbicide treatments consisted of KIH-485 and Spartan application rates adjusted to soil type. These herbicides were applied alone and as a tank-mix combination at various rates ranging from 80% of the 1X application up to the projected 2X application rate for that particular site's soil type. Each study was setup as a randomized complete block with three to four replications. Sunflower injury was taken at all sites except the site near Brookings, SD and percent weed control were taken at all sites 4 WAT. Yield was taken at sites near Colby, Hays, and Manhattan, KS along with Minot, ND and Brookings, SD.

Data was statistically analyzed across sites and no site by herbicide treatment interaction was apparent for sunflower injury. Very low sunflower injury was recorded 4 WAT with injury ranging between 0 to 4% for all treatments. Spartan did not increase potential injury from KIH-485.

Sunflower yield was affected by the various herbicide treatments due to decreased weed competition, but there was no site by treatment interaction. The lowest sunflower yields recorded were for the untreated check and the lowest rate of KIH-485 by itself. There was no difference among the other treatments of KIH-485 or Spartan by itself or in combination with each other.

[128]

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

Research plots were established on June 3, 2008, at the Agricultural Science Center, Farmington, New Mexico, to evaluate the response of tribenuron tolerant sunflower (var. Pioneer 63N82) and annual broadleaf weeds to preemergence followed by sequential postemergence 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 4, 34 in rows 30 ft long. Sunflower was planted with flexi-planters equipped with disk openers on June 3. Preemergence treatments were applied on June 3 and immediately incorporated with 0.75 in of sprinkler-applied water. Postemergence treatments were applied on July 3 when sunflowers were in the V3 to V4 leaf stage and weeds were <3 in tall. All postemergence treatments had crop oil concentrate applied at 1.0% v/v. Black nightshade, prostrate and redroot pigweed, were heavy, common lambsquarters were moderate and Russian thistle infestations were light throughout the experimental area. Treatments were evaluated on July August 4. Sulfentrazone applied preemergence at 0.14 lb ai/A had the highest sunflower injury ratings of 4. All preemergence treatments followed by a postemergence treatment of tribenuron at either 0.007 or 0.015 lb ai/A gave good to excellent control of broadleaf weeds. Tribenuron applied preemergence at 0.031 and 0.062 lb ai/A gave 96% or better control of broadleaf weeds employed in this study. Yields were 2176 to 2336 lb/A higher in the herbicide treated plots as compared to the weedy check. [129]

HERBICIDE PROGRAMS TOOLS FOR MANAGING ALS AND/OR GLYPHOSATE RESISTANT WEEDS IN OPTIMUM® GAT® CROPS. Raymond Forney*, David W. Saunders, John Beitler, Stephan D. Strachan. DuPont Crop Protection, Johnston, IA.

As new herbicide tolerance traits are commercialized in row crops, a broader range of herbicide tools for managing resistant weeds will be possible. Improved management tools from DuPont will allow for: a) the choice of the most efficacious active ingredients within an herbicide family independent of native crop tolerance; b) the introduction of new herbicidal modes-of-action not presently available for use on a particular weed problem; and c) the development of new herbicide programs that will integrate multiple herbicide families and sequential application timings to fit local agronomic practices. Weed control strategies developed for managing weed resistance problems in crops containing the Optimum® GAT® trait are founded on three simple fundamentals: 1) Use an effective alternate mode-of-action (MOA) herbicide in addition to ALS and/or glyphosate to control known herbicide-resistant weeds; 2) Include an effective alternate MOA at least every-other year for "at-risk" weeds (per local University experts); and 3) Scout fields to monitor effectiveness of the herbicide program. Products with the Optimum GAT trait will be available for sale pending regulatory approvals and field testing. New DuPont herbicides for the Optimum GAT trait are not currently registered for sale or use in the United States. [130]

DUPONT HERBICIDES WITH MULTIPLE MODES OF ACTION AND FLEXIBLE UTILITY FOR USE ON OPTIMUM® GAT® CORN AND SOYBEAN. D. Saunders*, H. Flanigan, M. Holm, K. Hahn, L. Hageman, and W. Schumacher, DuPont Crop Protection, Dallas Center, IA.

Corn hybrids and soybean varieties containing the Optimum® GAT® trait will be tolerant to applications of glyphosate as well as a wide range of ALS-inhibitor herbicides. This broad herbicide tolerance will allow the development of new DuPont herbicide blends designed to meet changing weed control needs in row crops. Data will be presented supporting the development of DuPontTM DiligentTM, InstigateTM and TrigateTM herbicides that will deliver broader-spectrum weed control, soil-residual activity plus additional herbicidal modes-of-action for difficult-to-control weeds and many herbicide resistant weeds. Weed control data will also be presented which supports the development of DuPontTM TraverseTM and FreestyleTM herbicides. These herbicides will provide additional broader spectrum weed control while maintaining crop rotation and expanded application flexibility. Seed products with the Optimum GAT trait will be available for sale pending regulatory approvals and field testing. New DuPont herbicides for the Optimum GAT trait are not currently registered for sale or use in the United States. [131]

2008 UNIVERSITY TRIALS WITH HERBICIDES DESIGNED FOR USE ON OPTIMUM® GAT® CORN AND SOYBEAN CROPS. James D. Harbour*, Susan K. Rick, Michael T. Edwards, David W. Saunders. DuPont Crop Protection, Johnston, IA.

Weed control programs designed for use on corn and soybean crops containing the Optimum® GAT® trait are under development. Integrated herbicide programs making use of preemergence, postemergence, and 2-pass weed control strategies were evaluated by 25 universities in 2008. Data will be presented supporting the use of Optimum GAT trait crops as new tools for managing weed control needs across the United States. Seed products with the Optimum GAT trait will be available for sale pending regulatory approvals and field testing. New DuPont herbicides for the Optimum GAT trait are not currently registered for sale or use in the United States. [132]

EXPERIENCES WITH ISOXAFLUTOLE FOR WEED CONTROL IN CORN PLANTED IN LOW ORGANIC MATTER HIGH PH SOILS. Robert Wilson* and Gustavo Sbatella, University of Nebraska, Scottsbluff, NE.

Experiments were conducted near Scottsbluff, NE in 2007 and 2008 to evaluate the effectiveness of the crop safener cyprosulfamide in combination with isoxaflutole for selective weed control in corn.

Isoxaflutole alone or with the safener were applied preemergence at 70 g/ha with or without atrazine at 560 g/ha. Corn was planted in a sandy loam soil with 1% organic matter and a pH of 8 in early May. In 2007, isoxaflutole plus atrazine resulted in 61% early season corn injury while adding the safener reduced corn injury to 13%. This same treatment in 2008 caused 39% injury and the addition of the safener reduced injury to 3%. In both years the early season corn injury from isoxaflutole was evident throughout the growing season and resulted in a reduction of grain yield of 33 and 15% in 2007 and 2008, respectively. Weed control was similar in areas treated with isoxaflutole plus atrazine with or without the safener. The addition of cyprosulfamide to isoxaflutole also safened corn to early postemergence treatments of isoxaflutole plus atrazine. [133]

A NEW SAFENER-CONTAINING FORMULATION OF ISOXAFLUTOLE FOR PREEMERGENCE WEED CONTROL IN WESTERN CORN. Charles P. Hicks* and Brent D. Philbook, Bayer CropScience, Research Triangle Park, NC.

Isoxaflutole has been a unique and highly effective herbicide in dent corn for preemergence weed control. Bayer CropScience has now formulated Isoxaflutole with the new proprietary herbicide safener Cyprosulfamide to provide enhanced crop safety and permit continued application to emerging corn. This new herbicide formulation can be applied from prior to planting through the second leaf-collar stage of corn. Field studies have demonstrated enhanced safety of the new Isoxaflutole formulation including exaggerated rates across many soil types, and the utility of the product for control of key dicot and monocot weed species in corn. [134]

IMPACT OF HAIL AND GLYPHOSATE-RESISTANT VOLUNTEER CORN IN IRRIGATED CORN. Randall S. Currie, Kansas State University, Garden City; Phillip Westra, Colorado State University, Ft. Collins; and Mike Moechnig, South Dakota State University, Brookings.

The increasing popularity of glyphosate-resistant corn hybrids has led to concern among growers about the effect of volunteer corn on subsequent irrigated corn crops. To determine the economic threshold for this problem, five studies were conducted in 2007 using a range of volunteer corn populations. (Proc. WSWS. 61:58). These studies were repeated in 2008 at three more locations. In the early winter of 2008, naturally dropped ears were collected from a field planted with a glyphosate-resistant corn hybrid in the 2007 growing season. A portion of these ears were shelled, and the balances of these ears were broken into three pieces. In Garden City, KS, during the first week in May 2008, a commercially available glyphosate-resistant corn hybrid was planted with no-till techniques at 32,000 kernels/A. To simulate volunteer corn, seed from shelled ears was stab planted randomly by hand over eight plots/block to populations ranging from 4,800 to 58,000 kernels/A in a randomized complete block design with four replicates. In an additional five plots/block, broken ears were planted with a hoe and trod in to simulate 650 dropped ears/A. These plots were then seeded with the shelled corn to simulate corn populations of 14,000 to 58,000 kernels per/A. Previous work at two locations showed that one source of variation in the data was yield elevations with the addition of volunteer corn. Therefore, at the Garden City location, corn was harvested from each volunteer corn plant or clump prior to combine harvest of the non-volunteer corn. This experiment was repeated using conventional tillage near Fort Collins, CO, and Brookings, SD. Volunteer corn populations were established from 4,000 to 86,000 plants/A at Fort Collins and 4,000 to 36,000 plants/A at Brookings. All locations—with and without dropped ears—were fertilized and irrigated for maximum yield, except the Brookings location, which was not irrigated. Plots were maintained weed free by a PRE application of acetochlor and atrazine and POST applications of glyphosate as needed. Yield of individual volunteer corn plants or clumps was not harvested at these locations. There was a broad range of variation within and among locations.

Nonirrigated corn was consistently injured more by volunteer corn than irrigated corn. Simple linear regression equations from these locations combined with previous work (Proc. WSWS. 61:58) were used to predict the level of volunteer corn needed to produce a 10% yield loss. In plots without simulated dropped ears, an average volunteer corn population of 13,000 kernels/A with a 95% confidence interval of 4,300 kernels/A and range of 8,600 to 22,200 kernels/A produced a 10% yield loss. In plots with dropped ears, simple linear regression models predicted 10% yield loss at an average volunteer corn population of 11,500 kernels/A with a 95% confidence interval of 4,700 kernels/A and range of 4,000 to 17,000 kernels/A. On June 26 2008, hail defoliated corn at the V7 stage at Garden City. The non-volunteer corn recovered to produce yields of 106 to 126 bu/A. Volunteer corn plants at all levels had some yield. Yield of these plants increased linearly with increasing population from 0 to 31 bu/A and was well described by the equation: volunteer corn yield = 0.0006 (volunteer corn plants/A) + 1.97 with an R2 of 0.97 in plots without clumps. Although yield elevation was not as great in plots with clumps, it increased linearly with increasing population from .1 to 25 bu/A and was well described by the equation: volunteer corn yield = 0.0004 (volunteer corn plants/A) + 2.2 with an R2 of 0.96. It is unknown how much of this corn yield could have been machine harvested. Although it is not known whether similar results would be achieved without hail, reduction in the impact of hail on irrigated corn with increasing corn population has been reported (Weed Technol. 22:448-452). Also, some variation at the Garden City location in 2007 was attributed to inconsistent elevation of yield by volunteer corn. Complex environmental factors as well as harvest methods may affect the impact of volunteer corn. [135]

IMPACT OF ISOXAFLUTOLE ON KOCHIA POPULATIONS IN CONTINUOUS CORN. Gustavo M. Sbatella* and Robert G. Wilson, University of Nebraska, Scottsbluff.

Kochia (*Bassia scoparia*) control in continuous corn became increasingly difficult in experimental plots where isoxaflutole was used as a preemergence herbicide for 8 years. A series of studies were conducted to determine if poor kochia control could be explained by: a) An escape mechanism based on different germination rates or b) Differences in tolerance to isoxaflutole among populations. Weed seed from plants present in the experimental plot were harvest in 2006 and 2007. At the same time seeds from plants growing in rangeland and an adjacent production corn field where isoxaflutole had not been utilized for weed control were collected. A germination study was conducted to determine the dormancy levels and possible differences among populations. All populations were incubated at constant temperatures of 5, 10, 15, 20, 25, 30, 35 and 40 C and treated with a solution of KNO3 as a treatment to release dormancy. Seeds collected from the isoxaflutole treated area did not exceed 20 % germination at temperatures below 25 C. A second study was conducted to determine the optimal alternating temperatures to release dormancy. Seeds were grown at alternating night-day temperatures of 5-15, 15-25, 20-30 and 25-35 C. The greatest germination of seeds from the isoxaflutole treated area was obtained with alternating temperatures of 25-35 C. Results suggest that seeds from the isoxaflutole treated area have higher dormancy levels and require higher temperatures to germinate when compare to other populations never exposed to isoxaflutole or cropping situations. In a third study kochia plants were grown in hydroponic solutions different levels of isoxaflutole added to the nutrient solution, and chlorophyll content were measured to determine the population tolerance to isoxaflutole. [136]

WEED CONTROL IN SORGHUM WITH HUSKIE HERBICIDE. Greg W. Hudec*, Charles P. Hicks, Mary D. Paulsgrove, Russ R. Perkins, Gary L. Schwarzlose, Kevin K. Watteyne and Michael Weber, Bayer CropScience, Research Triangle Park, NC .

In the major grain sorghum growing areas, weed control failures have been common with current herbicides used for broadleaf control in grain sorghum. This includes ALS-inhibitors, glyphosate,

and photosystem II inhibitors. An optimized formulation containing pyrasulfotole, bromoxynil and safener mefenpyr-diethyl has been developed by Bayer CropScience for use in small grains. This product called Huskie, is also being tested in grain sorghum and can provide a new mode of action for the control of important broadleaf weeds in sorghum as well as in small grains. Studies were conducted in 2007 and 2008 by Bayer CropScience and all major Midwestern universities in major grain sorghum growing states. Commercial targeted Huskie rates are 199 – 271 g ai/ha-1 or 11-15 fluid ounces of product per acre in sorghum. 72 – 289 g ai /ha-1 Huskie with 1.43 kg/ha AMS and with or without 560 g ai/ha -1 atrazine were tested in both years. Weed control was good to excellent on hard to control weeds in sorghum including ALS resistant weeds: palmer amaranth, pigweed, puncturevine, velvetleaf, Russian thistle, ivyleaf morningglory, and tall waterhemp. Regulatory work toward registration of Huskie in sorghum is in progress. [137]

EFFECT OF SPRAY VOLUME, PH, AND HARD WATER ON HERBICIDES. Rich Zollinger* and John Nalewaja, North Dakota State University, Fargo.

Studies were conducted in 2008 investigating affect of hard water salts on dicamba, glufosinate, tembotrione, aminopyralid. All herbicides were applied with 0, 250, and 500 ppm of a natural water source containing 194 ppm calcium and 304 ppm magnesium. Herbicide treatments were applied perpendicular to seeded bioassay species of foxtail millet, forage barley, corn, flax, tame buckwheat, amaranth, quinoa, soybean, and sunflower which were 8 to 26 inches tall at application. Dicamba, in the formulation of Status, was enhanced as follows: MSO>NIS>AMS, weed control was antagonized as water hardness increased, 4.25 and 8.5 lb/100 gallons ammonium sulfate (AMS) was sufficient to maximize weed control, 17 lb/100 occasionally antagonized Status as compared to 8.5 lb/100 AMS, and AMS overcame hard water antagonism and enhanced weed control. Weed control from tembotrione was antagonized with hard water. Without hard water, AMS at 4.25 lb/100 gallon water was the optimum rate with higher AMS rates showing less enhancement of tembotrione. In the presence of hard water AMS overcame antagonism from hard water and weed control from tembotrione increased as AMS rates increased. Milestone activity increased as AMS rate increased independent of hard water level. Results of hard water on glufosinate was not consistent. Glufosinate did not appear to be antagonized by hard water. However, weed control increased as AMS increased regardless of concentration of hard water salts. [144]

THE INFLUENCE OF SPRAY COMPONENTS AND NOZZLE TYPE ON SPRAY DISTRIBUTION AND COVERAGE. Gregory K. Dahl*, Joe V. Gednalske and Eric Spandl, Winfield Solutions LLC, St. Paul, MN .

The influence of herbicide, formulation, adjuvant system, nozzle type and size can greatly affect the size and distribution of spray droplets. Comparisons were made between an XR 11004 extended range flat fan nozzle, an AI 11004 air induction nozzle and an AIXR 11004 air induction extended range nozzle. Mixtures sprayed through each of the nozzles included water alone, an adjuvant system that simulated the spray droplet size distribution of fully loaded K-salt glyphosate herbicides, the simulated glyphosate adjuvant system along with a modified vegetable oil deposition aid and drift control adjuvant and the simulated glyphosate adjuvant system with a guar type spray thickener drift control adjuvant. All treatments were applied at 10 gpa. The XR flat fan and the AIXR nozzles were sprayed at 30 psi and the AI nozzle was sprayed at 50 psi. Each spray mixture by nozzle comparison was conducted with no wind present and then again with a 7.5 to 8 mph wind. A high speed photograph was taken of each spray mixture, nozzle type and wind combination. The camera used was a Hasselblad 553 medium format camera with a Leaf 65 digital back. The lens used was a Zeiss Sonnar 120 mm. Shots were taken at f 8.5 at 1/500 second shutter speed. The pictures were backlit with a Prism SPOT strobe using a 500 nanosecond flash. The high speed photography provided

excellent detail of the spray droplets in the spray patterns. The XR flat fan pattern contained smaller droplets than the patterns for the AI or AIXR nozzles. The simulated glyphosate adjuvant system contained many more very small droplets than water or the other mixtures and this was most evident with the XR flat fan nozzle. Both mixtures with deposition and drift reduction had fewer fines than the simulated glyphosate adjuvant alone mixture when using the XR flat fan nozzle. The mixture with modified vegetable oil deposition and drift control had fewer fines than the simulated glyphosate adjuvant alone when sprayed through the AI and AIXR nozzles. The guar type spray thickener drift control adjuvant greatly decreased the spray angle demonstrating why it should not be used with AI or AIXR nozzles. [145]

HOW NOZZLE TYPE, SIZE AND PRESSURE AFFECT PESTICIDE PENETRATION INTO THE PLANT CANOPY. Robert N. Klein*, Jeffrey A. Golus and Kelli L. Nelms, University of Nebraska West Central Research and Extension Center, North Platte, NE.

Spraying of pesticides on crops during the growing season has been on the increase. The effects of pests in corn, winter wheat and soybeans can be reduced with proper timing and proper application of products. One important factor is penetration into the crop canopy. Asian rust in soybeans begins toward the bottom of plant, thus getting as much product as possible through the canopy to that area is essential. Studies have been conducted in soybeans from 2005 through 2008 to examine the effect of spray droplet size on canopy penetration. Several different nozzle tips and setups were selected to produce different droplet sizes. These nozzles were analyzed with a laser particle size analyzer to obtain the volume median diameter (VMD). The nozzles and setups were then evaluated in growing soybeans. White indicating cards were placed in the lower, middle and upper third of the canopy and dyed water sprayed over the top. The cards were then analyzed with DropletScan software to obtain card VMD, percent coverage and other data. In general there were few significant differences among the nozzles in percent coverage of the card placed low in the canopy. With this in mind, nozzles producing larger drops should be selected to reduce drift potential while performing as well as those producing smaller drops. This research will also assist in improving control of weeds in dense canopies. [146]

LESQUERELLA TOLERANCE TO PRE- AND POSTEMERGENCE HERBICIDES. William B. McCloskey*,University of Arizona, Tucson; and David Dierig, USDA-ARS, Maricopa, AZ.

The oil seed crop, *Lesquerella fendleri* (Gray) S. Wats., is a fall-planted, broadcast-seeded plant native to the Southwestern United States and Mexico. Lesquerella is severely affected by weed competition due to its slow growth during establishment and its short stature. The objective of several studies in 2006 to 2008 was to determine the tolerance of lesquerella to several postemergence herbicides and to several preemergence herbicides applied at various times after planting and successive irrigations during establishment. Experiments were conducting using a randomized complete block design with 4 to 6 replications and the herbicides were applied with a CO2 pressurized backpack with a 6 nozzle boom. One experiment was sprinkler irrigated three times and then flood irrigated for the remainder of the season and all other experiments were flood irrigated. Lesquerella density in the sprinkler irrigated experiment was 561 plants/m2 in the untreated control and 185 and 291 plants/m2 in the benefin (1.34 kg/ha) and pendimethalin (1.06 kg/ha) PPI treatments, respectively. In a flood irrigated experiment, lesquerella density in the untreated control was 135 plants/m2 and 58 and 32 plants/m2 in the benefin and pendimethalin PPI treatments, respectively. The preemergence pendimethalin (Prowl H2O at 1.06 and 2.13 kg/ha), oxyfluorfen

(GoalTender at 1.4 and 2.24 kg/ha) and flumixazin (0.21 and 0.43 kg/ha) treatments almost completely eliminated lesquerella emergence when the herbicides were applied prior to the first or second sprinkler irrigation but crop emergence was similar to the untreated control when the herbicides were applied prior to the third sprinkler irrigation. These herbicides also severely reduced (pendimethalin at 1.06 kg/ha) or eliminated lesquerella emergence when they were applied preemergence after planting and incorporated with flood irrigation. Metolachlor (0.71 and 1.4 kg/ha), bensulide (4.5 and 6.7 kg/ha) and pronamide (1.12 and 2.24 kg/ha) had more complicated injury patterns; bensulide reduced lesquerella emergence the least and had little effect on yield. Metolachlor and pronamide reduced emergence and yield the most when incorporated by the second sprinkler irrigation, caused intermediate injury following the first sprinkler irrigation and had no effect on emergence or yield when incorporated by the third sprinkler irrigation. The postemergence herbicide treatments included a nonionic surfactant at 0.5% v/v and were applied to 6 to 10 leaf lesquerella (<1.5 cm in diameter) after 3 flood irrigations established the crop. The unsprayed control had 161 plants/m2 (63 DAP) and yielded 224 g/m2. Clopyralid did not reduce stand counts and the treatments yielded 243, 215 and 173 g/m2 at 0.28, 0.56 and 0.84 kg ae/ha, respectively. The herbicide 2,4-DB slightly reduced stand counts and the treatments yielded 246, 157 and 196 g/m2 at 0.28, 0.56 and 1.12 kg ae/ha, respectively. Dicamba reduced stand counts 20 to 50% and the treatments yielded 133, 141, 120 g/m2 at 0.28, 0.56 and 0.84 kg ae/ha, respectively. Carfentrazone reduced stand counts almost 50% and the treatments yielded 0.015, 0.018 and 0.28 kg/ha, respectively. Flumioxazin reduced stand counts 28 to 34% and the treatments yielded 215, 168 and 180 g/m2 at 0.036, 0.071 and 0.107 kg/ha, respectively. Oxyfluorfen reduced stand counts 0, 29 and 15% and the treatments yielded 259, 237 and 191 g/m2 at 0.28, 0.56 and 0.112 kg/ha, respectively. Prometryn reduced stand counts 42, 43 and 94% and the treatments yielded 127, 155 and 58 g/m2 at 0.67, 0.1.34 and 2.02 kg/ha, respectively, and a tank mix of diuron and linuron (Layby Pro) at 0.56, 1.12 and 1.68 kg/ha severely reduced stand counts and yield over 95%. The tolerance of lesquerella to preemergence and postemergence herbicides is limited and more research is needed to develop weed management programs that can be utilized by growers. Contact: W.B. McCloskey, Dept. of Plant Sciences, PO Box 20036, University of Arizona, Tucson, AZ 85718, USA. Tel: 621-621-7613. E-mail: wmcclosk@ag.arizona.edu. [147]

HERBICIDE EVALUATION FOR CAMELINA SATIVA IN THE CENTRAL GREAT PLAINS. Alan Helm*,Colorado State University Extension, Julesburg: Drew Lyon, University of Nebraska, Scottsbluff; Curtis Thompson, Kansas State University, Manhattan.

Crop production for renewable energy is of national importance to reduce the dependency upon imported fossil fuel sources. Camelina is a potential oilseed crop that has shown promise for use in dryland production systems. Camelina currently has no nationally labeled pesticides for use in crop production. In the fall of 2004, greenhouse research was initiated at Colorado State University to screen for possible herbicides to be used in future field trials. Two separate screens were initiated to evaluate 22 candidate herbicides, 11 of which were PRE or PPI, and 11 were POST. The PRE/PPI screen included pendimethalin, trifluralin, ethalfluralin, dimethenamid-P, S-metolachlor, cycloate, clomazone, flumioxazin, sulfentrazone, DCPA, and ethofumesate. The POST screen included dimethenamid-P, ethofumesate, pendimethalin, flumioxazin, sulfentrazone, oxyfluorfen, bentazon, picloram, bromoxynil, halosulfuron, and S-metolachlor. Emergence, stand establishment, and injury data were collected to determine which candidates would be carried forward for field experiments. The dinitroanalin (DNA) herbicides, dimethenamid-P, and DCPA provided the best level of safety in the PRE/PPI screen, in the POST screen dimethenamid-P, ethofumesate, pendimethalin, bentazon, and halosulfuron provided the least amount of injury to camelina. Out of the 22 candidate herbicides

screened, 6 were chosen for field trials and included: trifluralin, ethalfluralin, pendimethalin, clomazone, dimethenamid-P, and S-metolachlor. Although DCPA provided a relatively high level of crop safety at emergence, it was not used in field experiments due to the high cost of the herbicide. In the spring of 2007 field trials were established in Kansas and Colorado to evaluate the six candidate herbicides as well as three preharvest candidates (carfentrazone, paraquat, and glyphosate). A randomized block design with a plot size of 10 X 30 ft with 4 replications was used. Applications were made at 15 gallons per acre (GPA). Visual weed control and dessication ratings were taken as well as camelina stand counts at the Kansas site. In 2008 field trials were initiated in Kansas, Colorado, and Nebraska. At the Kansas and Colorado sites two rates of trifluralin, ethalfluralin, and pendimethalin (0.75 and 1.5 lb ai/A) were applied to determine the level of crop safety provided by these herbicides. Camelina stand counts as well as weed stand density counts by species were collected at all sites. All treatments received an application of glyphosate prior to planting in both years to eliminate any existing weeds. At both sites in 2007 the dinitroanalin (DNA) and chloroacetamide herbicides provided adequate control of redroot pigweed. At the Colorado site the DNA herbicides and S-metolachlor provided above 50% control of kochia and Russian thistle. Preharvest applications of paraquat (82%) and glyphosate (90%) provided significantly better control of all weed species compared to carfentrazone (26%). Glyphosate (95%) applied preharvest at the Colorado site provided significantly better control of Russian thistle compared to paraquat (83%) and carfentrazone (84%). Stand counts collected in 2008 indicated at the Kansas and Colorado site that the DNA herbicides were not significantly affecting emergence, however, at the Nebraska site ethalfluralin caused significantly less affect on emergence when compared to the other DNA herbicides. Kochia control at the Kansas and Nebraska sites was not significantly different between the DNA herbicides. Redroot pigweed control was not significantly different among the DNA and chloroacetamide treatments at the Kansas site. At the Colorado site the DNA herbicides provided significantly better control of kochia compared to the chloroacetamides. At the Nebraska site there was no significant difference between the DNA treatments for Russian thistle control. Paraquat provided significantly better dessication of camelina compared to glyphosate at the Nebraska site. At the Colorado site both paraquat and carfentrazone provided significantly better dessication over glyphosate. Based on these research trials, the DNA family of herbicides provide adequate safety and early season weed control. Future plans are to register on or all of the DNA herbicides tested through the IR-4. [148]

TOLERANCE OF PERENNIAL RYEGRASS AND TALL FESCUE GROWN FOR SEED TO AMINOCYCLOPYRACHLOR (DPX KJM-44). Daniel W. Curtis*, Barbara J. Hinds-Cook, Bill D. Brewster, Andrew G. Hulting and Carol A. Mallory-Smith, Oregon State University, Corvallis, OR.

A study initiated in the fall of 2005 near Corvallis, OR, indicated that DPX KJM-44 (aminocyclopyrachlor) provided 95% wild carrot control through the growing season when applied at 0.268 lb ai/A the previous September in established perennial ryegrass grown for seed. No visible injury to the perennial ryegrass was observed and the seed yield was not reduced by the aminocyclopyrachlor treatment in this preliminary study. In two non-crop studies initiated March 6, 2007, and May 15, 2007, aminocyclopyrachlor applied at 0.125 lb ai/A to two to six inch diameter rosettes (March) and two to eight inch diameter rosettes (May), provided 100 and 80% control of wild carrot, respectively. Based on these efficacy studies utilizing aminocyclopyrachlor, crop tolerance studies were initiated in established perennial ryegrass and in established tall fescue. The perennial ryegrass stand was in the second year of seed production and the tall fescue stand was in the first year of seed production having been planted the previous spring. Aminocyclopyrachlor was

applied at 0.0625, 0.125, 0.25 and 0.5 lb ai/A on March 23, 2007, to the perennial ryegrass. Aminocyclopyrachlor was applied at 0.125, 0.25 and 0.5 lb ai/A to the tall fescue on March 6, 2008, and at a second timing to different plots on April 16, 2008. Aminocyclopyrachlor applied at 0.5 lb ai/A reduced perennial ryegrass seed yield from 1529 lb/A in the untreated check to 1187 lb/A. Tall fescue seed yields were reduced by aminocyclopyrachlor applied at 0.5 lb ai/A in March from 1252 to 874 lb/A, and from 1252 to 894 lb/A at the April timing. The 0.25 lb ai/A treatment at the April timing reduced tall fescue seed yield from 1252 to 931 lb/A. Perennial ryegrass seed germination was reduced 60 % by the 0.5 lb ai/A treatment. Tall fescue seed germination was reduced 12 % by the 0.5 lb ai/A April aminocyclopyrachlor treatment. Yields and seed germination were not reduced in either crop by 0.125 lb ai/A aminocyclopyrachlor treatment. These results indicate that aminocyclopyrachlor may be a useful tool for broadleaf weed management in grass grown for seed, particularly for difficult to control species such as wild carrot. [149]

HUSKIE HERBICIDE - OVERVIEW OF 2008 PERFORMANCE IN THE PACIFIC NORTHWEST. Monte Anderson*, Dean Christie, and Kelly Luff, Bayer CropScience.

Over 500,000 acres of Huskie herbicide containing pyrasulfotole, bromoxynil, and mefenpyr-diethyl were applied in its first commercial use year in the Pacific Northwest's spring wheat, spring barley, and winter wheat. Herbicide performance on broadleaf weeds at 11 to 15 oz/A rates was uniformly excellent in all areas and crops. Huskie was positioned in all spring wheat and barley areas as a stand alone herbicide for broadleaf weed control. Crop safety was excellent from just Huskie plus adjuvants in spring cereals. In a few instances when Huskie plus an adjuvant and a graminicide were tank mixed, there was temporary crop discoloration. Adjuvant is not required in these combinations on spring cereals. In most areas of PNW winter wheat, Huskie was tank mixed with additional broadleaf herbicides as per common practice for control of a wide spectrum of broadleaf weeds. Adjuvant uses were only recommended if required by tank mix partners. Huskie combinations with other broadleaf and grass herbicides provided excellent crop safety and weed control in winter wheat. Various herbicide, adjuvant, and fertilizer tank mix recommendations will be separated according to whether applications are made in spring cereals or winter wheat in the different geographies of the Pacific Northwest. [150]

TIMING OF WEED REMOVAL IN GLYPHOSATE RESISTANT SUGARBEETS. Abdel O. Mesbah*, Randy Violett, and Calvin Odero, University of Wyoming Research and Extension Center, Powell, WY.

Field experiments were conducted in 2008 at the University of Wyoming Research and Extension Center, Powell, Wyoming to evaluate the benefit of early removal of weeds in glyphosate resistant sugarbeet system as well as sugarbeet response to early applications (cotyledon stage) using higher glyphosate rates. Herbicides treatments consisted of several applications of glyphosate starting with 22 or 32 oz/A at four different weed heights (<1", 1-2", 2-3", or 3-4"). All treatments were compared to two hand weeded checks and a weedy check. Weed infestations at the experimental site varied from heavy to light depending on the weed species. No injury was recorded with any of the treatments. Early applications (cotyledon stage) using glyphosate at 22 or 32 oz/A did not have any effect on sugarbeet population. In general, weed control was excellent (95 to 100%) with all the treatments except for wild buckwheat. Excellent wild buckwheat control (98-100%) was when weeds 0-2" tall at time of application. However, when glyphosate was applied at 2-4" tall wild buckwheat the control was reduced to (82-94%). Regardless of the rate, sugarbeet root yields using three

applications when the weeds were 0-1” or 1-2” tall were similar and averaged more than 29 tons/A. However, sugarbeet root yield was reduced by at least 1.5 and 2.8 tons/A when weeds were 2-3” or 3-4” tall, respectively. Since weed control in general was excellent, this yield reduction could be caused mostly by early weed competition. No apparent effect was recorded with any of the treatments concerning sucrose content. [151]

COMMON LAMBSQUARTERS (*CHENOPODIUM ALBUM*) CONTROL WITH GLYPHOSATE AND ETHOFUMESATE IN GLYPHOSATE-RESISTANT SUGARBEET (*BETA VULGARIS*). Dennis C. Odero*, Andrew R. Kniss, University of Wyoming, Laramie; and Abdel O. Mesbah, Powell Research and Extension Center, Powell, WY.

Sugarbeet growers have recently adopted the cultivation of glyphosate-resistant sugarbeet. Glyphosate-resistant sugarbeet presents growers with the opportunity to achieve broad spectrum weed control at reduced cost using glyphosate. Sugarbeet growers who have been using glyphosate-resistant crops in their rotations are now faced with the prospect of exclusively using glyphosate in up to three crops in their rotations for chemical weed control. However, continuous use of glyphosate has been shown to result in a shift to weed species inherently tolerant to glyphosate such as common lambsquarters. Ethofumesate is an herbicide that is currently labeled for PRE and POST use in sugarbeet. Greenhouse experiments were conducted to determine whether POST application of ethofumesate enhances the efficacy of glyphosate in controlling common lambsquarters. Common lambsquarters plants at the six-leaf stage of growth were treated with a tank-mix of 0.2 to 3.4 kg ae ha-1 of glyphosate and 0.01 to 1.1 kg ai ha-1 of ethofumesate. Plants were harvested at 21 days after treatment, dried and weighed to obtain shoot biomass. Overall, common lambsquarters shoot biomass decreased as rates of either glyphosate or ethofumesate applied alone increased. An additive response in controlling common lambsquarters with glyphosate plus ethofumesate was observed. Shoot biomass reduction of common lambsquarters increased when glyphosate was applied with ethofumesate. These results suggest that tank-mixing glyphosate with ethofumesate show potential for increasing control of common lambsquarters in glyphosate-resistant sugarbeet. Additional studies will be conducted to corroborate these results. [152]

A NEW APPROACH TO INCREASE WINTER CANOLA ACRES IN OKLAHOMA. B. Heath Sanders*, Mark C. Boyles, and Thomas F. Peeper, Oklahoma State University, Stillwater.

Continuous annual winter wheat production has dominated Oklahoma cropland for several decades. The lack of crop rotation has led to increasing problems with winter annual grass weeds and increased dependency on herbicides for their control. As new adapted varieties of winter canola have been developed, winter canola has become a more profitable option for farmers in Oklahoma and southern Kansas. Wheat growers are increasingly recognizing the need for a winter crop rotation in their farming operation. Production research was initiated with winter canola in 2002 at Oklahoma State University and has expanded each year. In 2003, the OKANOLA Project, designed to rapidly introduce winter canola to OK wheat growers, was launched. Due to their lack of experience with the crop many growers have been reluctant to try winter canola. The Okanola Project has assisted farmers with all aspects of production, particularly those that differ substantially from wheat, such as harvesting, insect infestations, and no-till-production. In addition, it has been necessary to work with grain handling facilities who have had to learn to grade the crop upon arrival. The USDA- Risk Management Agency has played a vital role by offering multiperil crop insurance for growers. The major problem of lack of a major local market was overcome when Producers Cooperative Oil Mill in Oklahoma City modified their cotton seed mill to begin crushing canola this past year. With more pieces of the puzzle coming together, more expertise on the ground to work directly with winter canola producers was needed. In the spring of 2008 The U. S. Canola Association (USCA) requested

proposals focused on increasing winter canola acreage. A successful proposal combined resources from the USCA, Bayer CropScience, Croplan Genetics, John Deere, Monsanto, Producers Cooperative Oil Mill, Syngenta and Oklahoma State University to fund a full-time extension assistant for winter canola. For maximum access to growers, the position was located at the Cooperative Extension Service Area Office in Enid, effective July 2008. This individual has assisted producers with all aspects of canola production including field selection, seedbed preparation, fertility, calibration of seeding equipment, planting procedures, stand establishment observations, and weed and insect management. Since the focus is one-on-one education, growers receive follow up visits to their fields as the season progresses to observe crop progress. This new extension assistant position has given new producers additional confidence that they can receive personal assistance at their farm with any problem they may have as they learn how to grow winter canola. Thus it has encouraged acreage expansion. As wheat growers face increasingly difficult weed management decisions, the acreage of winter canola is expected to increase significantly. [153]

WETLANDS AND WILDLANDS

SAGO PONDWEED CONTROL IN IRRIGATION CANALS USING ENDOTHALL. Cody J. Gray*, United Phosphorus Inc., Peyton, CO and Gerald Adrian, United Phosphorus Inc., King Of Prussia, PA.

The task of controlling aquatic vegetation in irrigation canals is an extremely important venture, especially in the western United States. The waters supplied by these canals are the primary, and in some locations the only, source of water for irrigating agronomic crops. In other locations, these waters supply industrial water users as well. Therefore, the control of aquatic weeds in irrigation canals becomes extremely critical; however, the tools available to canal managers for weed control are limited. Grass carp are used in some locations, but the task of keeping the carp in the desired location is difficult, and they do not provide adequate control of some aquatic weeds. Dredging and chaining canals can be employed for weed removal; however, these tactics are dangerous, very labor intensive, expensive, and offer only a temporary solution to the problem. The final option is the use of herbicides for weed control. Herbicides currently labeled for use in irrigation canals are acrolein, xylene, and copper formulations. The copper formulations are effective in removing problematic algae infestations, but provide minimal control of vascular plants. Acrolein and xylene have label restrictions that do not allow their use in some canal locations, and they are not labeled in all states. In addition, these products are extremely hazardous to applicators and handlers. At recommended labeled rates, these products are toxic to fish and other aquatic organisms. Endothall has been used since the 1960's for controlling aquatic vegetation in ponds, lakes, and streams. In recent months, residue trials (EPA Guidelines, OPPTS 860.1500 Crop Residue Trials) have been conducted for endothall as required for an EPA approved unrestricted FIFRA Section 3 label to allow treated water to be used on irrigated crops during herbicide applications. Sago pondweed [*Stuckenia pectinatus* (L.) Börner] is a native aquatic perennial that forms dense troublesome infestations in irrigation canals and drainage ditches; thereby, not allowing for proper water delivery or flow. In 2007 and 2008, experimental trials were conducted to evaluate endothall efficacy for sago pondweed control in irrigation canals. Treatments resulted in greater than 95% sago pondweed control for up to 16 weeks after treatment. Additional trials resulted in endothall residues traveling up to 20 miles from the initial injection site providing extended downstream sago pondweed control. Results from these trials indicate endothall will provide a safer, more effective tool for controlling aquatic weeds in irrigation canals compared to other alternative control methods. [117]

ACTIVE MANAGEMENT AIDS RECOVERY OF BURNT NATURAL AREAS. Carl E. Bell*, University of California Cooperative Extension, San Diego, CA; Edith Allen, Milt McGiffen, Jr., and Kristen Weathers, Department of Botany and Plant Sciences, University of California, Riverside, CA.

Wildfires have had a great and often negative impact on native vegetation and habitats in San Diego County. Recovering these areas to natural conditions is difficult given the current vegetation management approach to fire impacted areas. Without adequate recovery, the goal of preserving significant portions of San Diego County natural areas as functioning conservation habitat for native flora and fauna is at risk. Exacerbating this situation is the lack of available scientific literature which could provide adequate restoration practices for land managers on habitat restoration in southern California. Manipulative research was initiated in March 2006 to determine if active vegetation restoration practices, specifically the control of invasive plants and planting native vegetation, contribute to improved natural habitats for native flora and fauna, when compared to passive management (the no-action alternative). Treatments within the experiments are designed to evaluate various habitat restoration practices with regard to: effects on native vegetation; effects on non-native vegetation; and their cost, feasibility, and non-target impacts. The information developed will be used to create Best Management Practices (BMP's) that can be utilized by public and private organizations on conserved properties throughout San Diego County. [119]

INTEGRATING CHEMICAL CONTROL AND RESTORATION OF SITES INVADED BY JAPANESE KNOTWEED. Melody Rudenko*, Andrew Hulting and Carol Mallory-Smith, Oregon State University, Corvallis.

Japanese knotweed is an invasive perennial shrub that dominates riparian ecosystems. Repeated herbicide applications are used for control. Restoration of native plant communities may prevent re-infestation of knotweed, but is typically delayed until chemical management ends. A field experiment was initiated to evaluate the integration of chemical knotweed management with plant community restoration. The experimental design was a randomized complete block, encompassing 9m2 plots randomly assigned a herbicide treatment further subdivided into 3m2 subplots each of which was assigned a grass seeding rate treatment. Native grasses were seeded into the subplots on May 1st, 2008, at two rates (10kg/ha and 40kg/ha) respectively. Grass seedling densities were quantified on June 14th and October 24th, 2008. Foliar herbicide applications of glyphosate (4.21 kg ae/ha), imazapyr (1.12 kg ae/ha), triclopyr (10.1 kg ae/ha) and 2,4-D (4.26 kg ae/ha) were applied October 14th, 2008. Percent knotweed injury from the treatments was evaluated 11 and 32 days after treatment (DAT). The 4 fold increase in seeding rate resulted in a 2.4 fold increase in grass seedling density. Triclopyr and 2,4-D treatments resulted in the greatest knotweed injury. Percent injury was 35% and 78% for the triclopyr treatment 11 and 32 DAT, respectively. The 2,4-D treatment resulted

in 34% knotweed injury 32 DAT. These results indicate a greater probability of grass establishment with the use of high seeding rates for native grasses at restoration sites. Additionally, use of triclopyr should be considered when planning coincident knotweed restoration and management activities. [120]

BASIC SCIENCES

WHO'S YOUR DADDY? MOLECULAR MARKERS AND GENE FLOW IN THE BENTGRASS COMPLEX. Maria L. Zapiola* and Carol A. Mallory-Smith, Oregon State University, Corvallis.

The bentgrass complex consists of several related compatible species, most of which are polyploid, outcrossing, and perennial. Identification of species within the complex based on morphological characteristics is difficult and even more challenging when interspecific hybrids are involved. Transgenic glyphosate-resistant creeping bentgrass (*Agrostis stolonifera* L.), which is one of the species in the complex, was planted within a control area near Madras, Oregon, USA. Because the study of gene flow is critical for risk analysis of transgenic crops, we conducted a 4 yr survey of transgenic vs. non-transgenic bentgrass in the Madras area, where we collected tissue and panicle samples from species in the complex. Seeds from panicles collected were planted in the greenhouse; seedlings produced were evaluated to determine the degree of gene flow and interspecific hybridization in situ. Due to the difficulty of confirming putative resistant hybrids based on morphology, molecular markers were developed to determine parentage. Chloroplast microsatellite markers were developed based on the publicly available fully sequenced creeping bentgrass chloroplast genome. Nuclear microsatellite markers were developed from bentgrass expressed sequence tags public databases. The use of chloroplast markers to determine the maternal parent was effective in the majority of the cases, while the use of nuclear markers to confirm the paternal parent was less straightforward. However, nuclear markers confirmed an intergeneric hybrid where creeping bentgrass was the maternal plant and rabbitfoot grass (*Polypogon monspeliensis* (L.) Desfontaines) was the pollen donor. The molecular markers confirmed the great diversity and promiscuity of the bentgrass complex. [121]

DEVELOPMENT AND CHARACTERIZATION OF FUNCTIONAL SSR MARKERS IN PRICKLY LETTUCE (*LACTUCA SERRIOLA*). Dilpreet S. Riar*, Sachin Rustgi, Ian C. Burke, Kulvinder S. Gill and Joseph P. Yenish.

Prickly lettuce (*Lactuca serriola*) is a very well adapted and a major weed of Pacific Northwest (PNW) region. Prickly lettuce represents a threat to the wheat production, as it deteriorates quality and adds significantly to the production-cost of wheat. Recently, prickly lettuce has developed resistance against the synthetic auxin herbicide 2,4-D, which will be a serious problem in foreseeable future, thus suggesting an urgent need to study genetics of this trait. To find markers linked to 2,4-D resistance, 4472 genic-SSRs (simple sequence repeats) including mono-, di-, tri-, tetra-, penta-, hexa-, and hepta-nucleotide repeats were identified from expressed sequence tags (ESTs) of prickly lettuce. Out of 4472 SSRs a set of 100 di- and tri-nucleotide SSRs were used to screen individuals from resistant and susceptible prickly lettuce accessions. Among resistant and susceptible accessions, 33% of the SSRs showed polymorphism. Out of these SSRs 27.78% showed length variation and 72.22% showed presence or absence of band(s). The observed level of the polymorphism in prickly lettuce is consistent with the level of polymorphism studied in other plant species using genic-SSRs.

The accessions showing maximum variation among resistant and susceptible plants were utilized for crossing and a F2 population was raised in greenhouse, which is currently being used for bulk-segregant analysis. [122]

MOLECULAR BASIS OF GLYPHOSATE RESISTANCE IN *PALMER AMARANTH*. Todd Gaines*, Philip Westra, Dale Shaner, Scott Nissen, Sarah Ward, Jan Leach, Steve Chisholm, Colorado State University, Ft. Collins; and Chris Preston, University of Adelaide, Adelaide, Australia.

Glyphosate resistance has recently been reported in *Palmer amaranth* populations from Georgia and several other southern states. The molecular basis of the resistance mechanism is unknown. Candidate resistance mechanisms include target-site mutations in 5-enolpyruvylshikimate 3-phosphate synthase (EPSPS) and over-expression of EPSPS. Glyphosate selection in cell culture is known to result in EPSPS gene amplification. Southern blots of *Palmer amaranth* DNA showed far greater hybridization intensity in resistant with an EPSPS probe, but similar hybridization intensity with a probe for the acetolactate synthase (ALS) gene. Quantitative real-time PCR (qRT-PCR) on genomic DNA was used to measure copy number of EPSPS and ALS. Resistant and susceptible had the same threshold cycle (Ct) for ALS, and susceptible plants had the same Ct for ALS and EPSPS. Resistant plants had Ct for EPSPS that was six to seven cycles earlier than the Ct for ALS. Using qRT-PCR on cDNA from resistant and susceptible plants, EPSPS was expressed at a higher level in resistant plants. The increased EPSPS copy number was inherited in two different F2 populations and higher copy number was correlated with resistance. The molecular basis of resistance is most likely due to over-expression of EPSPS due to gene amplification. The possibility exists that one or a few genomic copies have higher expression due to promoter changes, or that one or a few genomic copies have a target-site mutation that has not yet been detected. This is the first documented occurrence of EPSPS gene amplification in a weed population under glyphosate selection pressure. Current research will determine if *Palmer amaranth* plants with higher EPSPS gene copy numbers in fact naturally produce correspondingly higher actual levels of the EPSPS protein, and whether or not these plants also produce higher levels of free amino acids as a result of a more robust and active EPSPS enzyme activity in resistant plants. [123]

EFFECT OF IMAZAMOX ON FERAL RYE AT DIFFERENT PHYSIOLOGICAL STAGES. Melissa Bridges*, Phil Westra, Colorado State University, Fort Collins, CO; and Dale L. Shaner, USDA-ARS, Fort Collins, CO.

Research and anecdotal observations of temporal and spatial variation of feral rye tolerance to imazamox in imidazolinone-resistant winter wheat have recently been reported throughout the Great Plains. We aimed to 1) identify under what condition(s) feral rye plants are more tolerant to imazamox and 2) investigate possible mechanisms for this increased tolerance. We hypothesized the physiological stage of a feral rye plant at the time of imazamox application would affect tolerance. Whole plant dose response experiments were conducted in a greenhouse and in a vernalization chamber. Plants treated with imazamox just prior to vernalization had significantly higher LD50 doses as compared to plants treated after vernalization or those not vernalized. A possible mechanism explaining variation in tolerance could be decreased acetolactate synthase (ALS) activity coupled with the ability to metabolize imazamox under cool temperatures. In vitro ALS assays were performed on feral rye subjected to both warm (22 C) and cool (4 C) temperatures, and radiolabeled imazamox was used to determine the rate of metabolism in leaf tissue under these temperature regimes over 144 hours. Results from our ALS assays were unclear due to high variability in enzyme activity between two experiments. Although rates of imazamox metabolism for plants differed between temperature treatments, those subjected to cool temperatures did show a significant decrease

in imazamox over 144 hours. We are the first to illustrate that feral rye can metabolize imazamox at cool temperatures and that physiological stage at the application time could contribute to feral rye's variation in tolerance to this herbicide. [124]

VARIATION IN IMAZAMOX RESPONSE AMONG COLORADO FERAL RYE POPULATIONS. Mike Ostlie*, Philip Westra, Galen Brunk, Todd Gaines, Melissa Bridges, and Brad Lindenmayer, Colorado State University, Fort Collins, CO; and Dale Shaner, USDA-ARS, Fort Collins, CO.

Feral rye (*Secale cereal* L.), a weed species with similar growth habits to winter wheat, is a recurrent management problem among Colorado small grain growers. Feral rye has been known to exhibit differing levels of imazamox susceptibility. An experiment was conducted in which feral rye seed was collected from 95 locations across Colorado and planted in greenhouse conditions for evaluation of variance in imazamox response. Imazamox was applied at 11.5, 23, and 35 (field use rate) g ai/ha at the feral rye three leaf stage. Log-logistic analysis was performed to calculate lethal dose (LD) values. The LD values showed that herbicide efficacy varied greatly among feral rye accessions. LD50 values ranged from 11.7 to 22.8 g ai/ha. Nine accessions displayed an LD90 below 17.5 g ai/ha (half of the field use rate), which could be considered very susceptible. Of the 95 accessions evaluated, 83 of them reached LD90 levels at or before 35 g ai/ha imazamox. [125]

SYMPOSIUM:

A SUCCESSFUL NATIONAL PROGRAM: THE JOINTED GOATGRASS PROGRAM

NATIONAL JOINTED GOATGRASS RESARCH PROGRAM: HISTORY, POLITICS AND ADMINISTRATION. Darrell L. Hanavan*, Executive Director, Colorado Wheat Administrative Committee, Centennial, CO and Alex G. Ogg, Jr., Research Coordinator, National Jointed Goatgrass Program, Ten Sleep, WY.

The National Jointed Goatgrass Research Program was founded in 1994 when a special grant of $350,000 was received from the US Congress through CSREES-USDA. Washington State University was designated as the lead agency for this grant. The purpose of this grant was to provide funding to develop improved integrated management systems for jointed goatgrass in 10 western states where the weed was causing significant losses in wheat yields and farm profitability. Key factors in getting this program established was involving wheat producers in the planning of the Program and its oversight through a national steering committee, having producer support at the local, state and national levels, and identifying a US Congressman who would support the appropriation of funds during the life of the Program. Another important factor to the success of this Program was the seven regional workshops that were held in the early years in all major areas in the western US where jointed goatgrass occurred in wheat. These workshops helped increase producer awareness of the problem and helped to identify data gaps for new research projects. During the 13-year life of the Program, a total of $4.15 million was awarded to projects in 10 western states. Typically, there were 15 to 20 proposals funded each year. About 32% of the funds were spent on developing integrated management systems. About 30% was spent on developing systems to manage herbicide-resistant wheat and gene flow between wheat and jointed goatgrass, and another 18% was spent on technology transfer activities and publications. Only 5% of the funds were spent administrating the Program. A Research Coordinator was hired to oversee the Program, to arrange an annual review of all projects each year and to arrange for the publication of an annual progress report

each year. A national Extension Coordinator was hired to transfer the latest research findings to producers. Early in the life of the Program, a web site www.jointed goatgrass.org was established to provide easy access to all progress reports, scientific publications, and technology transfer publications and activities. Plans are in place to support and maintain the web site through 2012. In 2000, a 5-year plan was developed to bring the Program to an orderly conclusion. Included in this plan were plans to publish four national bulletins on the state of the science of jointed goatgrass and four regional bulletins that provide guidelines to wheat producers to develop integrated management systems for this weed. This Program will conclude in August 2009 when the final research projects are completed, but the benefits to agriculture and science will continue for many years. Because of the success of this national program, it will serve as a model for future national programs. [138]

CLIMATIC VARIABILITY AS A DRIVING FORCE FOR INTEGRATED WEED MANAGEMENT. Douglas L. Schmale*, Great Plains Extension Coordinator, National Jointed Goatgrass Research Program, Lodgepole, NE and Randy L. Anderson, Research Agronomist, ARS-USDA, Brookings, SD.

The climate in many regions of the western U.S. is characterized by low average annual precipitation, high variability in precipitation between different years, and high variability in precipitation for any specific period when compared to the same period in different years. In addition, some regions exhibit a summer dry season or temperatures incompatible with many crops. Extreme weather events such as destructive hail also occur. Producers of dryland crops have adjusted to this climate with practices such as fallow and crop selection; winter wheat is the major crop. Jointed goatgrass management for these producers has also been influenced by climate, with the climatic variability requiring a multi-practice approach for successful jointed goatgrass control. In numerous studies conducted during the National Jointed Goatgrass Research Program, when only one practice was used to control jointed goatgrass, effectiveness was often reduced by drought or other variability in weather. When several practices were combined, jointed goatgrass control was improved. This was especially true if multi-year practices were used. Although not studied, it is reasonable to hypothesize that combining multiple practices would also enhance rangeland or other non-crop weed control in the same regions or in other regions with high variability in climatic conditions. [139]

INTEGRATED MANAGEMENT OF JOINTED GOATGRASS IN THE PACIFIC NORTHWEST. Frank L. Young*, USDA-ARS, Pullman; Joseph P. Yenish, Washington State University, Pullman; Daniel A. Ball, Oregon State University, Pendleton; and Donn C. Thill, University of Idaho, Moscow.

Jointed goatgrass (JGG) was first discovered in Washington near Hay in 1917. In the Pacific Northwest (PNW) JGG decreases soil health, grain quantity and quality, and increases marketing expenses. Since the initiation of the National Jointed Goatgrass Research Program in the western United States, funds have been available for scientists to conduct biology, ecology, production, genetics, and integrated management studies to reduce the economic impact of JGG on winter wheat-based production systems. Numerous single-component studies have been conducted in the past 10 to 15 years and many of the strategies from these studies have been integrated into three PNW long-term integrated weed management (IWM) field experiments to control JGG. Strategies that have been integrated include: plant competitive wheat varieties, increase wheat seeding rate and seed size, delay spring wheat seeding, burn wheat stubble (once), fertilize wheat at the time of planting, till fields lightly (annually), include broadleaf crop and/or reduce the frequency of planting winter wheat in rotations, and plant herbicide-resistant winter wheat varieties. In the 3-state IWM study, the best combination of treatments for crop yield and reduced JGG population was a one-time stubble burn,

3-years out of winter wheat, and integrated practices for planting winter wheat. In the IWM tillage study, a treatment of one-time deep-plowing followed by annual reduced tillage crops decreased JGG spikelets more than a one-time deep plow, followed by annual no-till crops. These studies indicate that integrating several management strategies into wheat-based cropping systems reduce the impact of JGG. [140]

INTEGRATED JOINTED GOATGRASS MANAGEMENT SYSTEMS IN THE CENTRAL AND SOUTHERN GREAT PLAINS. Phillip W. Stahlman and Patrick W. Geier; Kansas State University, Hays; Thomas F. Peeper, Oklahoma State University, Stillwater; Drew J. Lyon, University of Nebraska, Scottsbluff; Stephen D. Miller, University of Wyoming, Laramie; Philip Westra, Colorado State University, Ft. Collins; and Gail W. Wicks, University of Nebraska, North Platte (deceased).

Weed scientists from five central and southern Great Plains states (CO, KS, NE, OK, WY) have completed several cooperative, regional studies that were funded in part by the National Jointed Goatgrass Research Program. Some studies investigated the impact of single practices on jointed goatgrass growth and competitiveness as a component of more complex systems that integrate various cultural and chemical practices into conventional and imazamox-tolerant (Clearfield) winter wheat production systems. Several studies from Wyoming to Oklahoma assessed the effectiveness of multi-practice integrated systems. Generally, extended crop rotations that included one or more summer crops and lengthened the interval between winter wheat crops were more effective in reducing jointed goatgrass populations than most other practices. When crop rotations are not feasible, use of imazamox-tolerant wheat has proven an effective alternative, especially when coupled with other practices know to enhance crop competitiveness. Jointed goatgrass densities in wheat the year following spraying with imazamox typically remained low, indicating the benefits of using Clearfield technology extend beyond the year of use. Infrequent deep plowing of fields with low risk of erosion was effective in reducing dense infestations as long as complete soil inversion was achieved. Reduced row spacing, increased wheat seeding rates, and placement of nitrogen fertilizer in the soil below or adjacent to wheat rows were found to reduce jointed goatgrass competitiveness, reproductive capacity, and dockage in harvested grain. Broadcasting nitrogen fertilizer benefited jointed goatgrass as much or more than wheat. Competitive winter wheat cultivars are an important component of integrated weed management systems. Wheat cultivars with characteristics of rapid emergence and growth, early canopy closure, and tall stature generally are more competitive with jointed goatgrass than cultivars without many of those characteristics. Although several studies demonstrated the benefits of using multiple practices to manage jointed goatgrass compared to one or two practices, no one combination of practices proved consistently better than other combinations in all years. [141]

IMPACT OF WEED GENETICS ON WEED MANAGEMENT: JOINTED GOATGRASS IN WHEAT--A CASE STUDY. Carol Mallory-Smith*, Oregon State University, Corvallis; and Robert Zemetra*, University of Idaho, Moscow.

Jointed goatgrass is a noxious weed in most states where wheat is grown. Both species are polyploid with the D genome in common which allows successful hybridization. Hybrids between the two species were collected that had produced viable seed raising the question of gene flow from wheat to jointed goatgrass. This question became more important with the development of herbicide resistant wheat and the potential of transfer of resistance to jointed goatgrass. This concern lead to a series of cooperative projects between the University of Idaho and Oregon State University to address the question of gene flow from wheat to jointed goatgrass. Findings from this collaboration included: seed set on hybrids was due to partial female fertility of the hybrid with seed production due to

backcrossing, the female parent of the hybrid was usually jointed goatgrass, partial self fertility could be restored in the BC2 generation with jointed goatgrass as the recurrent parent indicating it was critical to prevent the BC1 generation to prevent gene flow, backcrossing and restoration of self fertility could occur in the field, the majority of backcross seed produced in the field had wheat as the recurrent parent reducing the risk of gene flow, genes on the shared D genome could move between the two species, and that placement of a herbicide resistance gene on an unshared genome did not prevent movement of a gene from wheat to jointed goatgrass. Based on this body of work methods of management tools were developed to minimize the potential of gene movement between the two species and maintain the use of herbicide resistance as an option to control this noxious weed. [142]

HOW THE PRINCIPLES DEVELOPED IN THIS NATIONAL PROGRAM CAN BE APPLIED TO OTHER INVASIVE WEED PROBLEMS: A BRAINSTORMING SESSION. Phil Westra*, Colorado State University, Ft. Collins and Drew Lyon, University of Nebraska, Scottsbluff, NE.

The following points were offered by attendees as their evaluation for the key principles leading to the success of the National Jointed Goatgrass program and points for future programs include or pitfalls to avoid.

Common Problem: The target species had significant economic impact over a large geographic area.

Documented range: Define the known distribution, its impact and the potential to invade/expand to other areas.

Started w/ limited Knowledge: Outline what is known and data gaps or missing research information needed for management decisions.

Importance of long term studies: Seasonal variation as well as shifts in the micro ecology of a site have major impacts on weed management systems so that there is a requirement for extended duration of projects to develop a sustainable approach. This must be emphasized in research project design and development/evaluation of grant funding.

Integrated approaches needed – may vary by region: A holistic view of the problem must be maintained with integration of multiple factors. If factors are area specific, note them.

Be open to wide range approaches: Since there is a problem, what changes in conventional thinking / management can be attempted? Be open to evaluate all management options.

Don't forget what we learned: Make sure knowledge gained is well documented in scientific and Extension publications.

Involve producers and industry from start through completion: Involving the end user at all stages from problem description to on site evaluation is a must. In this project the regional workshops at beginning built a strong user/scientist relationship.

Collaboration among scientists: Design program that will develop teamwork across disciplines and geographic regions.

Involve graduate students: Students can be a source of enthusiasm, non-conventional approaches and focused study.

Avoid internal politics: Internal politics has been the downfall of many well intentioned programs and playing political games should be avoided..

Avoid hijacking of project: Monitor to assure individual funding/study is applied to problem, not administrative hot topic.

Know the politics: When seeking funding, know who are the key leaders and fully inform them when seeking their support.

Are earmarks dead? A question in 2009 that was felt there would be a name change in future funding cycles.

Land-grant collaborative on increased ag funding: There needs to be a strong national effort to secure greater federal funding for agricultural research, similar to what has happened in recent years for NIH.
Working with multiple ag interest groups/commissions: A broad base of support is desired to demonstrate need of project. Encourage groups to support an ecosystem approach to the problem. Look for opportunities to work w/ environmental as well as commodity groups.
Work with other disciplines for integrated systems: Weed problems require integrated approaches and greater federal funding is being directed to multidisciplinary research efforts.
Dryland cropping systems: The importance of integrated systems for the rain fed crop production areas of the western US has been demonstrated, therefore many of our most important weed species will rely on improved integrated dryland cropping systems for successful management.
Weed resistance a growing issue: Herbicide resistance in weeds is an issue of growing concern and has been highlighted as an area in need of greater research by the EPA and APHIS.
Stewardship: Land stewardship has been gaining increasing importance to US citizens and the governmental agencies. Weed control is an important aspect of this concept.
AFRI Planning grants: There is potential funding through the AFRI program to support symposia and workshops to help lay the groundwork for future research efforts. [143]

SYMPOSIUM: BIOLOGICAL CONTROL OF INVASIVE PLANTS

OVERVIEW OF BIOLOGICAL CONTROL OF INVASIVE WEEDS – HISTORICAL PERSPECTIVE AND APPROPRIATE USES. David Thompson, New Mexico State University, Las Cruces, NM.

The flood of exotic plants being introduced into North America has decreased due to increased education and legislation providing resources to monitor and reduce the intentional and accidental introduction of unwanted plants. However, we are facing a massive increase in invasive weed problems as the plants introduced over the past 100 years become adapted and spread. New exotic weeds will continue to be introduced into the United States and ultimately into southwestern rangelands and riparian areas. Some exotic weed problems will be unique to the Southwest and others will simply spread from severely infested sites in northern and western states. Understanding the influence of biotic factors on the population ecology of weed communities is vital for effective integrated weed management strategies to succeed. The whole discipline of biological control of weeds depends on the efficiency of biotic factors to restrict or destroy weed populations. Classical biological control is still the most effective technique to control some exotic invasive weeds. Insects and pathogens are collected from plants in the country where the exotic weed originated, carefully studied to insure host specificity and damage potential, and finally released onto target weed populations in the country it has invaded. There have been numerous successful biological control programs throughout the world. St. Johnswort (*Hypericum perforatum*), skeleton weed (*Chondrilla juncea*), tansy ragwort *(Senecio jacobacea*), leafy spurge (*Euphorbia esula*), and musk thistle (*Carduus nutans*), have either been completely or substantially controlled in a significant portion of their former range in the United States. The development of a new classical biological control

program for a given weed takes 10 to 20 scientist years prior to release. Biological control of weeds programs have always placed great importance in host specificity to avoid the dangers of non-target attack on economically important agronomic crops and more recently, environmentally sensitive plants including T&E species. Over time, strict protocols were developed for host-range testing, host plant lists for testing, and a wide variety of formal tests to be used were standardized. After over a century of weed biological control work throughout the world there are only eight examples of damage to non-target plants, the majority of these having been predicted by the original pre-release testing. The decision to release was made with the knowledge that such non-target attack would cause much less damage than the great damage caused by the invasive weeds. To date, there has not been a case of non-target impact resulting in serious economic or environmental impact. [158]

APHIS PERMITTING AUTHORITIES AND REQUIREMENTS, TECHNICAL ADVISORY GROUP (TAG) FUNCTION, AND TEST PLANT LIST PETITION RECOMMENDATIONS. Robert S. Johnson, USDA-APHIS-PPQ, Riverdale, MD.

The USDA APHIS Plant Protection and Quarantine (PPQ) program has statutory and regulatory authority over the importation and interstate movement of biological control agents. PPQ exercises this authority by the regulated organism permitting process. PPQ has the following environmental document requirements to issue a permit for first time release of a non-indigenous biological control agent of a weed; 1) Technical Advisory Group (TAG) Petition for a host test plant list, 2) TAG petition to release a biological control agent of a weed, 3) TAG Recommendation to release a biological control agent of a weed, 4) Environmental Assessment, 5) Endangered Species Act Section 7 effects determination, 6) Finding of No Significant Impact, and 7) Native American Tribal review. The TAG function serves to provide PPQ with an objective recommendation for permitting, detailed environmental impact information for Environmental Assessments, and a mechanism to share information with neighboring countries, partner agencies, and Native American sovereign nations. The test plant list recommendations for biological control of weeds can be found in Appendix E of the TAG reviewer's manual available online at http://www.aphis.usda.gov/plant_health/permits/tag/. The recommended strategy for developing a test plant list for evaluating biological control agents of weeds is based on Wapshere, S.J. 1974, *A Strategy for Evaluating the Safety of Organisms for Biological Weed Control*, published in the Annals of Applied Biology 77: 201-211. The strategy is a phylogenetic approach where closely related species are hypothesized to be at greater risk than distantly related species. [159]

ROLE OF US FISH AND WILDLIFE SERVICE IN REVIEW (SECTION 7 CONSULTATION). Delfinia Montano, U.S. Fish and Wildlife Service, Albuquerque, NM.

Section 7 of the Endangered Species Act (Act) [16 U.S.C. 1531 et seq] outlines the procedures for Federal interagency cooperation to conserve Federally listed species and designated critical habitats. Section 7(a)(1) directs the Secretary of the Interior (Secretary) to review other programs administered by them and utilize such programs to further the purposes of the Act. It also directs all other Federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of species listed pursuant to the Act. This section of the Act makes it clear that all Federal agencies should take a proactive approach in the conservation and recovery of listed

threatened and endangered species. Section 7(a)(2) states that each Federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. This section of the Act defines the consultation process. [160]

COMBINING BIOCONTROL WITH HERBICIDES OR GRAZING. Rodney G. Lym, North Dakota State University, Fargo, ND.

Invasive weeds can thrive in a variety of environments and ecological niches. Biological agents introduced to control these weeds have been successful in some but often not all the areas the plant is found. For instance, an insect species may work well when the weed occurs in open sandy areas, but may not be effective in shaded or mesic locations. Site specific weed control can be improved when biological control agents are integrated with other methods. The leafy spurge (*Euphorbia esula* L.) control program is an example of a successful integrated effort that utilized biological control agents with herbicides and grazing. The leafy spurge gall midge (*Spurgia esula* Gagné) reduced seed production in wooded areas while herbicides were applied outside the tree line to prevent further spread. Traditional methods were also used directly with biological control agents to decrease the time needed to achieve a satisfactory level of control. For instance, incorporation of *Aphthona* spp. with herbicides resulted in more rapid and complete leafy spurge control than either method used alone. Also, the insect population often increased following herbicide treatment, especially in areas where *Aphthona* spp. were established for several years but had been ineffective. Herbicides have been combined with *Gallerucella* spp. for purple loosestrife (*Lythrum salicaria* L.) control which increased plant mortality compared to either method used alone. Herbicide application must be timed to be least disruptive to the biocontrol agent while maximizing weed mortality. For instance, seed head weevil *[Rhinocyllus conicus* (Frolich)] larvae were killed when musk thistle (*Carduus nutans* L.) was treated with 2,4-D within 48 h of ovipositon. Incorporation of *Aphthona* spp. with sheep or goat grazing resulted in a larger decline in leafy spurge production than insects alone and a greater reduction in weed density than grazing alone. Even though biological control integrated with other methods can increase and/or improve site specific weed control, such integrated approaches have not been widely utilized. [161]

MOWING COMBINED WITH BIOLOGICAL CONTROL FOR FIELD BINDWEED MANAGEMENT. Jerry Michels, Professor of Entomology, Texas AgriLife Research, Texas A&M University System, Amarillo, TX.

Aceria malherbae, the bindweed mite, can be an effective biocontrol agent in the fight to control field bindweed. The mite stunts and distorts mature bindweed, causes flowering to cease, and even mature bindweed eventually dies from the infestation. Seedling and young bindweed plants can be killed in one season. The mites overwinter on bindweed roots, which further stress the plants. Although it can be effective, the bindweed mite does not move rapidly from one plant to another, and its ability to spread over large areas naturally seems to be limited. Therefore, we examined other ways to spread the mite. Collecting mite-infested bindweed clippings by mowing bindweed plots

yielded important results. First, freshly-harvested clippings could be used to infest new bindweed stands, and are a simple way to establish nurseries. Second, mite-infested clippings could be stored for up to two weeks at 4oC and harbor sufficient mites to infest 50% of the samples on which they were placed. At seven weeks at 2 or 4^{o}C, 25% of the samples upon which mites were placed became infested with the mites. Finally, simply mowing mite-infested bindweed along roadsides, medians, lawns, etc. is an efficient way to spread infestations great distances in a short period of time. [162]

HOW EFFECTIVE IS BIOLOGICAL CONTROL, WHAT ARE ITS LIMITATIONS, AND HOW CAN WE DO A BETTER JOB? Lincoln Smith, USDA-ARS, Western Regional Research Center, Albany, CA.

The first release of an introduced insect for classical biological control of invasive plants in the western U.S. occurred almost 50 years ago. Since then about 40 species have been targeted for biological control. Nine of these projects are mature enough to give us insights about why they succeeded and what limits effectiveness of the agents. Although these projects substantially reduced the target weed population over large areas, they did not achieve satisfactory control in all habitats. In some cases existence of resistant plant genotypes limited effectiveness of biological control agents. However, environmental conditions that either limited reproduction and/or survival of the agents or that favored growth of the target weed appear to be a common challenge. We can improve success by selecting agents that attack all known genotypes of the target weed, that are adapted to the various target habitats, and that are well defended against existing predators and parasites. Knowledge of the life history and environmental requirements of the biological control agents should help optimize integrated management strategies. [163]

BEYOND QUARANTINE AND HOST-RANGE SCREENING: RISK ASSESSMENT FOR WEED BIOCONTROL AGENTS. Mark Andersen, New Mexico State University, Las Cruces, NM.

Risk assessments for weed biocontrol agents are typically focused on predicting the species' host range in the region of the planned introduction, and on estimating the potential geographic range of the species following its introduction. This approach has historically worked rather well, with only one good example of adverse non-target impacts of a biocontrol agent. However, more scientifically ambitious risk assessment may be needed in the future, particularly for regulatory decisions that may be disputed or challenged. I briefly describe a general risk assessment paradigm that is applicable for such comprehensive risk assessments, and argue that existing approaches to risk assessment for weed biocontrol agents are incomplete according to the standards of this well-established paradigm. I present examples of potential applications to evaluation of biocontrol agents, and assessment of the severity of potential non-target impacts. Integrated application of risk assessment in weed biocontrol programs can help connect science to policy and management decisions, can identify and alleviate values-based controversies, and can integrate public participation and stakeholder involvement into science-based decision-making. [164]

LEAFY SPURGE AND MUSK THISTLE BIOCONTROL IN NEW MEXICO, Kevin T. Gardner and David C. Thompson, Department of Entomology, Plant Pathology and Weed Science, New Mexico State University, Las Cruces, NM.

Most leafy spurge populations in New Mexico have been controlled with either *Aphthona lacertosa/czwalinae* or *A. nigriscutis*. In each case where large (>20 hectares) populations occurred in the1990's on upland areas, biocontrol has successfully suppressed stem density and area of infestation. Stem density was reduced from 80 to 96% within one year after 160 beetles per m^2 were released. Ten years post release stem density remains very low where other management strategies have not been incorporated. These areas that once served as insectaries for beetle distribution don't have enough leafy spurge to continue producing large number of beetles; although small numbers can still be collected. In riparian areas, stem density was reduced an average of 67% after biological control and have not diminished to control levels seen on upland sites in the ten years since releases were conducted. Along the Ponil Creek drainage annual herbicide treatments have further reduced leafy spurge density, but have failed to eradicate the population. Beetles continue to exist on these scattered plants. Musk thistle has invaded much of New Mexico and *Rhinocyllus conicus* has made its way, or has been illegally released, to populations of musk thistle throughout the state. *R. conicus* has not been permitted for biocontrol in NM due to the known risks to native thistles including the endangered Sacramento Mountains thistle (SMT). However, *R. conicus* was confirmed in the northwest corner of the state in the late 1990's and has progressively moved to the east and south. In 2000 it was found near known SMT populations and in 2006 was confirmed to be attacking at least the Silver Springs SMT population. We surveyed SMT populations throughout its range as well as musk thistle populations near SMT to determine *R. conicus* presence, impacts of *R. conicus* on SMT and to survey for other insects impacting the native thistle populations. Surveys for *R. conicus* were conducted near known musk and Sacramento Mountains thistle populations beginning in May and ending in September of 2007 and 2008. Seed heads of both plants were inspected for all life stages of the weevil and documented. Very few *R. conicus* eggs were detected until early July. Peak oviposition occurred in mid July. *R. conicus* populations were detected in every musk thistle population along U.S. highway 82 between Cloudcroft and Mayhill and north along State highway 244. *R. conicus* eggs were present on 85% of the musk thistle seed heads inspected along these two highways. At Silver Springs, the location of the largest SMT population, 95% of the musk thistle seed heads had *R. conicus* present on them compared to 69% of the SMT seed heads. All known SMT populations, except the Silver Springs population, occurs south of highway 82. No *R. conicus* were detected south of highway 82 in 2008. Numerous other insects feed within the seed heads of Sacramento Mountains Thistle, but don't occur in each SMT population or in musk thistle. Seed production in SMT populations is reduced by both *R. conicus* and, more drastically, by native insects. Musk thistle and SMT seed production undoubtedly is reduced by *R. conicus*, but the native weevil, *Lixus pervestitus*, and the Tephritid, *Paracantha gentilis* reduce seed production in SMT populations to a greater degree where they are present. *L. pervestitius* is only found at Silver Springs and severely impacts that population. *P. gentilis* is very common in all SMT populations surveyed. This fly's larvae or pupa was found in 74% of the seed heads surveyed in the Rio Penasco populations and 100% of the heads surveyed at Silver Springs. It is very common for more than one fly in each head.

Many heads surveyed hosted more than 10 larvae. In these cases seed mortality was 100%. Neither of these insects was ever detected in musk thistle. [165]

BIOCONTROL OF SALVINIA ON THE LOWER COLORADO RIVER. Glen Ball, Plant Health Safeguarding Specialist, USDA-APHIS, Yuma, AZ.

In 2003, the role of USDA-APHIS on the Giant Salvinia Taskforce was to provide biological control methodology to an IPM approach for controlling the outbreak of *Salvinia molesta* (giant salvinia) which had first appeared on the Lower Colorado River in August 1999. Releases of *Cyrtobagous salviniae* (salvinia weevil) were made in August of 2003. Insects were released from 2003 to 2006 when the rearing facility was no longer funded. APHIS has continued to monitor distribution and releases to the present time. Distribution of the salvinia weevil occurs from Blythe, California to Morelos Dam south of Yuma, Arizona. [166]

BIOLOGICAL CONTROL OF TAMARISK IN TEXAS. Allen Knutson, Professor and Extension Entomologist, Mark Muegge and C. Jack DeLoach, Texas AgriLife Extension Service, Dallas, TX.

The leaf feeding beetle, *Diorhabda elongata* (Crete ecotype),collected on the Island of Crete, Greece was first released in Texas in 2004 by USDA-ARS. A population established in 2005 at one location on Beals Creek near Big Spring, TX. Since then, the area of trees defoliated at this site has increased annually. In October, 2008, beetles defoliated all of the saltcedar trees in an area of 150 acres along 6 miles of Beals Creek. After four years of repeated defoliation, canopy cover and biomass of saltcedar had been reduced by 85-95% and about 20% of the trees are now dead. Despite the success of the leaf beetle at Big Spring, TX, efforts to establish beetles at other sites in Texas has, until recently, been unsuccessful. Recent studies have shown that predation by native ants can significantly reduce beetle survival, and treatment of release sites with ant baits has aided establishment of new populations. Flooding of sites and a lack of beetles for release at new sites have also delayed the re-distribution program. As part of the Saltcedar Biological Control Implementation Program, the Texas AgriLife Extension Service released beetles at 23 sites in the western watersheds of the Red River, Brazos River, and Colorado River and along the Pecos and Rio Grande Rivers during 2006-2008. Beetles released at a site on the Pecos River in 2006 rapidly increased and in 2008 defoliated all of the saltcedar trees across 90 acres and along 1.75 miles of the Pecos River. While the Crete ecotype appears well adapted to the Colorado and Pecos River watershed, ecotypes (species) of saltcedar beetles from Uzbekistan and Tunisia may be better adapted to northwest Texas and Rio Grande River areas of Texas, respectively. Results to date show biological control of saltcedar with *Diorhabda* leaf beetles holds promise for long-term suppression of saltcedar in Texas. [167]

DALMATIAN TOADFLAX. Andrew Norton, Colorado State University, Fort Collins, CO

No abstract submitted. [168]

THE ROLE OF STATE INSECTARIES IN BIOCONTROL OF WEEDS. Dan Bean, Colorado Department of Agriculture, Palisade, CO.

The Biological Pest Control Program is part of the Conservation Services Division of the Colorado Department of Agriculture (CDA). The Program is centered at the Palisade Insectary, a 14,000 square foot insect rearing and storage facility located in western Colorado. The Program mission is to provide biological control agents and expertise to the citizens of Colorado in order to assist in achieving their land and resource management objectives. To accomplish this goal the CDA rears, collects and redistributes weed biocontrol agents and provides expertise on their use in the context of weed management programs. The CDA also provides educational materials, demonstrations and presentations to better inform the public on available biocontrol options. For a new weed biocontrol agent there are two phases; establishment and widespread distribution. During the establishment phase agents are released throughout the state at strategic locations, field collection sites are developed and there are no charges for biocontrol agents. The distribution phase is when agents become widely available to the public and there is a charge for agents to cover shipping and handling costs. For every agent released select release sites are monitored for establishment and for weed control efficacy. The CDA also works with other states, Federal agencies and Tribes to facilitate weed biocontrol throughout the west. These large-scale projects, such as tamarisk biocontrol and yellow starthistle biocontrol will be described. [169]

BIOLOGICAL CONTROL POSSIBILITIES FOR THE SOUTHWEST. David Thompson, New Mexico State University, Las Cruces, NM.

The Southwest offers some unique challenges in biological control due to the extremely variable often times harsh environmental conditions common throughout the region. Both exotic and native weeds are commonly invasive. Some examples of hopeful future targets include African rue (*Peganum harmala*), Russian knapweed (*Acroptilon repens*), Russian thistle (*Salsola* spp.) and Russian olive (*Elaeagnus angustifolia*). Biological control of weeds is dependent on numerous uncertain factors, including management goals for individual properties, economics, and politics. Most of these are very dynamic and will play important roles in future weed management decisions. Recognizing this fact, the future of weed management, especially using biological control agents, is as unpredictable as the factors that govern it. The future of biological control will continue to emphasize the introduction of the natural enemies of weeds from their country of origin, a process that is well documented, peer-reviewed and heavily regulated to insure environmental safety. Research programs emphasizing augmentation and conservation of natural enemies already in place will be more common than in the past. Biological control has experienced many successes that completely eliminated the need for other weed management strategies; however, the majority of weed biological control programs have resulted in establishment of insects and pathogens that negatively influence the fitness and thus the competitive abilities of target plants without completely controlling the weed. These many successes are often overlooked although the agents have played and continue to play a very important role in the integrated management of invasive weeds. [170]

ERADICATION OF SALTCEDAR (*T. RAMOSISSIMA*) AND GIANT CANE (*ARUNDO DONAX*) ALONG THE BIG BEND REACH OF THE RIO GRANDE: LESSONS LEARNED AND BROADER IMPLICATIONS FOR SALTCEDAR REMOVAL IN THE SOUTHWEST. Mark Briggs. Chihuahuan Desert Program, World Wildlife Fund.

Along the Big Bend reach of the Rio Grande/Rio Bravo, the World Wildlife Fund (WWF), Big Bend National Park (BIBE), Comisión Nacional de Areas Naturales Protegidas (CONANP), Big Bend Ranch State Park (BBRSP), and over twenty other agencies, institutions, and organizations from both sides of the US-Mexico border have been conducting a variety of activities to bring back this important international river reach. Amongst the various activities being employed, the eradication of *Tamarix* spp. and *Arundo donax* has become a key component to realizing long-term rehabilitation objectives. Over the last eight years, over 70 miles of the Rio Grande/Rio Bravo have been treated, providing a strong foundation for gauging the effectiveness of eradiation efforts and how well these efforts are contributing to the long-term goal of improving ecological conditions along the river for native flora and fauna and the well-being of riverside citizens. The main lessons learned thus far from these efforts provide a strong foundation for planning and prioritizing future rehabilitation along the Big Bend reach itself, as well as have application for similar efforts being employed along rivers throughout the western US and northern Mexico. Main lessons underscore the importance of: i) binational collaboration and the participation of divergent disciplines, ii) involving riverside human communities, iii) preproject planning that clearly elucidates how non-native plant eradication fits into long-term rehabilitation goals, iv) developing a detailed tactical plan that is not only based on a sound understanding of ecological conditions, but also prioritizes river reaches where control activities will lead to the best chance of realizing project objectives; and v) monitoring to evaluate how well project objectives are being achieved, providing information that can be used as part of an adaptive management approach. [171]

UTILIZATION OF TAMARISK BY SOUTHWESTERN WILLOW FLYCATCHERS AND OTHER BIRD SPECIES; AND POTENTIAL IMPACTS OF BIOLOGICAL CONTROL RELEASES IN THE SOUTHWEST. Mark K. Sogge, U.S. Geological Survey, Flagstaff, AZ, Susan J. Sferra, U.S. Fish and Wildlife Service, Phoenix, AZ, Eben H. Paxton, U.S. Geological Survey, Flagstaff, AZ.

Despite a widespread perception that tamarisk (*Tamarix ramosissima, T. chinensis*, or hybrid) is not widely used by birds, many riparian-dependent species breed within tamarisk in the Southwest. There is growing evidence that tamarisk is more widely used and provides more positive habitat value than has generally been believed. Because tamarisk can serve as suitable bird habitat, sudden or widespread loss of tamarisk via biocontrol can have unintended negative consequences to some – and perhaps many - species. As a result, the nature and degree of negative impact to riparian bird communities will depend on: (a) the extent to which a species uses tamarisk, (b) the timing and extent of foliar cover loss during the nesting season, and (c) the degree and rate at which high-quality native habitat replaces the tamarisk that is lost due to beetle herbivory. There are several possible patterns of riparian habitat recovery following biocontrol, and although the most positive outcomes are frequently assumed, in the absence of active restoration they may be the least likely to occur in

many riparian systems. This is especially true given the altered hydrological regimes in many southwestern riparian systems, and potential future changes due to climate change. We contend that tamarisk control and restoration projects that do not replace tamarisk with higher quality native riparian habitat can actually result in a net habitat loss for riparian obligate birds. [172]

HABITAT RECOVERY AFTER SIMULATED SALT CEDAR LEAF BEETLE IMPACTS.
Tom Dudley[1], Meghan Taylor[1], Ken Lair[2]. [1]Marine Science Institute, Univ. of California, Santa Barbara, CA.

The introduction of *Diorhabda elongata* (Chrysomelidae) for the biological control of *Tamarix* spp. has generated great interest throughout the western U.S., both for its anticipated benefits (improved riparian habitat, enhanced water resources, reduced fire hazards, etc.) and its presumed risks (rapid target mortality without subsequent recovery of native plants, loss of nest sites for SW willow flycatcher, *Empidonax traillii extimus*). To address this contradiction, we proposed in 2007 to simulate the defoliation effects of *D. elongata* along the Virgin River of S. Nevada and NW Arizona, a river known to support willow flycatcher nesting, using low-dose herbicide treatments. The objective was to test the response of vegetation, associated wildlife and ecosystem properties to tamarisk biocontrol prior to regional establishment of the beetle, which had just been introduced by non-federal managers into the upper Virgin River in SW Utah.

Federal regulatory oversight delayed implementation of this research until October 2008, so initial responses to treatments will not be available until the coming field season although we can report preliminary data on a fire behavior where prescribed burning was used in concert with simulated biocontrol. Instead, we will outline the simulated defoliation program and the experimental restoration procedures that we are installing to determine whether native riparian re-vegetation can be jump-started at sites where biocontrol may change suitability of tamarisk for willow flycatcher nesting. In addition, we will describe our on-going monitoring of the *D. elongata* population in the Virgin watershed, and the studies being established to document the real effects of biocontrol now that the beetle is well-established in the Utah portion of the river and has dispersed toward our study areas during 2008. [173]

EDUCATION AND REGULATORY SECTION: DIGITAL PHOTOGRAPHY

PHOTOGRAPHY EQUIPMENT AND FUNDAMENTALS. Clyde L. Elmore, Wildlife and Landscape Photography, Davis, California.

What do you expect from your photography?

- ☐ What do you want to do with your images?
- ☐ Do you want snapshots?
- ☐ Do you want to send images on the internet?
- ☐ Do you want to make prints 8 x 10 inches or larger? How large?
- ☐ Do you need record shots? Should they be in focus? Should they have proper color?

How far do you want to go in photography?

- ☐ Time and final product? Do you want to manipulate the image or do you want to take the compact flash or SB card to Kmart to get a CD or 4 x 6 prints?
- ☐ Photographing using raw files will require significant computer time, but fine prints can be developed.

Photography Fundamentals

- ☐ Light
- ☐ Light
- ☐ Light
- ☐ Light
- ☐ Whatever it takes to get light to a sensor!

Light –it's character

- ☐ Intensity – how bright or low- most of the best images are made in low light (bright overcast days, early morning or late afternoon light, **not bright noon sun**)
- ☐ Direction – *frontlight* can be good for color but can be harsh and wash out texture. – *backlight* –give a flare and can fool the camera meter=difficult, and *sidelight* – can give texture and adds shadows and is very pleasant.

PHOTOGRAPHY AXIOMS

- ☐ "When starting, buy the middle grade"
- ☐ "Don't buy the lens, until you can afford the one you need."
- ☐ "The equipment is often better than the eye behind it"
- ☐ "Expose to the highlights, print to the shadows"
- ☐ "Never hand hold a camera and lens, and shoot slower than the focal length of the lens."
- ☐ "Match lens quality to camera"

Fundamentals - settings

There are three controls to use to control the amount of light in your image!

1) ISO (ASA for film) – speed or sensitivity
2) Shutter speed – opening and closing
3) Aperture – how big of opening to gather light

Fundamentals

- ☐ Exposure
  - ■ ISO 100-1600 = "film sensitivity-slow to fast)
  - ■ Shutter speed – seconds, 1 sec,1/2, 1/4,1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000 to 1/4000 sec. A change in one setting halves or doubles the amount of light to pass to the sensor.

- Aperture f 2.8(large opening), f/4, f5/6, f/8, f11, f16 to f22(small opening). By opening up one stop (f8 to f5.6) you double the opening size and double the amount of light.

Exposure Modes

- Aperture priority- you set aperture, camera sets shutter speed
- Shutter priority- you set shutter speed, camera sets aperture
- Program – camera sets exposure, but allows you to shift shutter and aperture
- *Manual- you set speed and aperture
- Full automatic- camera sets-stay away

Advantages and disadvantages (DIS) of two types of file formats!

- JPEG – (AD) small files, almost all cameras will shoot in this format, can look at quickly on the computer, (DIS) little leeway on exposure, manipulations reduces quality of image, lossy
- Raw – (AD) lots of information collected, manipulation does not destroy image, gives you control over image (DIS) larger files, need reader to view, more space used on compact flash card and computer

Fundamentals - Histogram

- What is a histogram? It is a bar graph of light capture. It is the 21st century light meter to determine if you have the proper exposure.
- A histogram is one of the best and most important aspects of digital photography.
- Commonly photographed objects such as grass, trees and people will make the highest point in the middle of the histogram (midtones). Highlights are to the right and dark to the left.

Fundamentals - Depth of Field

- Depth of field refers to the distance of the image in focus (closest to greatest distance). To increase depth, close aperture to f16 to f22 and decrease shutter speed to get the correct exposure. May need to raise the ISO setting in low light conditions.

Fundamentals

To manipulate the depth of field one can use an aperture of f5.6 with the shutter speed of 1/250 or change the f stop to f22 (4 stops) and the speed to 1/15 (slow 4 times) and get the same amount of light. However, the depth of field would be increased, but you would need to put the camera on a tripod to hold it steady.

Composition

- Simplify – chose a subject, then try and get rid of almost everything else
- Check your background – get rid of undesirables, move position if necessary
- Move in closer – do you miss anything? (fill the frame with the subject)
- Don't put the skyline or horizon in the middle of the frame.

MAJOR CAMERA TYPES

Point and Shoot (P&S)

Digital Single Lens Reflex (DSLR)

Basic Photography Needs-

Point and Shoot Camera

- Non changeable lens – can add glass to the lens for close ups
- More automated – many settings are determined for you
- 8-10 megapixels, 3-4X optical zoom (digital zoom is poor quality)
- Can get image stabilization (IS)
- High end P&S camera allow for interchangeable lenses, transition to DSLR
- Reasonably priced($150-500) –often first camera used, small, compact, primarily small CCD chips

- JPEG images mostly, few with raw
- Easy to use!
- Example;
- Nikon S610
- 10 mp with 4X wide angle optical zoom lens
- 3 inch LCD, Vibration Reduction (VR)
- ISO from 100 to 3200
- Approximate price: $320

Digital Single Len Reflex (DSLR)

- Interchangable lenses
- Larger sensors-more light and data collected; CCD and CMOS chip to full size. Full size = size of slides
- 10 to 21.1 mp = higher resolution
- Fast speeds, 5 to 9 frames per second with short start time and little lag time
- More expensive ($500-6,550)
- Primary uses- any use of a P and S plus larger prints to poster size
- Special effects and close up to telephoto using different lenses
- Greater control over creativity
- At this stage you have invested into a system—camera, lenses and accessories

DSLR - examples

- Canon Rebel XSI
    - 12.2 mp, CMOS chip with a 3 inch live-view LCD screen
    - ISO from 100 to 1600 at 3.5 frames per second. Shoots both JPEG and RAW files.
    - Chip cleaning system in-body
    - Wide range of lens accepted from fisheye to 800 mm (1.6 crop factor)
    - Approx. price. $1000

Lens Selection

- Fixed focal length – sharpest, best quality but makes you move for image composition. Exp. 50 mm (what your eye sees), 105 (portrait), 300 (telephoto)
- Zoom lens – excellent lens that allows you to “carry two or three lenses in one”, good for composition. Exp. Wide angle 17-35 mm, normal 35 – 70, telephoto 70-200 or 100-400 mm)
- Dependant upon need!!
- Plot work: normal range
- Focal length: 24 – 70 mm, 18 - 200 mm, 17 - 55mm, 24 – 70 mm
- Speed: f4 fixed or 4 to 5.6 zoom– a f2.8 is not needed in normal field work and is more expensive. If you also want to shoot sports or animals get a f2.8.
- What does it all mean?
- AF-S Nikkor ED 70-200 mm, 1:2.8 G VR
    - AF-S Auto focus-silent wave motor
    - Nikkor - Brand name
    - ED Extra low dispersion glass
    - 70-200 mm, zoom focal length from 70 to 200 mm
    - 1:2.8G large opening fast lens that is compact, light-weight (smaller image circle)
    - VR vibration reduction = image stabilization

Flash Photography – In-camera, on-camera or off-camera flash

- In-camera is good for objects at 10 feet or less.
- On-camera is good for greater distance depending upon unit, plus fill flash

- ☐ Off-camera is good for all of the above and to isolate light direction-no red eye.

Tripod – the standard

- ☐ Used to reduce camera shake due to: 1) the photographer, 2) wind, or 3) trying to rush through a photograph
- ☐ A tripod tends to slow you down and make you be more careful, reduces out-of-focus images and increases quality of the image.
- ☐ It allows you to compose the image easily to get just the right objects.
- ☐ It also allows you to set a camera so the depth of field can be greater or narrower and still get a sharp image.

What do you need to save, look at, manipulate or print?

- ☐ A computer with plenty of memory (4G or more) and storage space (250GB to 1 T) plus DVD burner as backup. Every new program or upgrade means more space needed.
- ☐ Flash cards 1,2,4,8 or 16 GB or SB cards for P&S cameras
- ☐ External hard drive for backup
- ☐ Adobe Photoshop CS3 or 4 or
- ☐ Adobe Elements 7 and or
- ☐ Adobe Lightroom 2 or
- ☐ Apple Aperture

References:

1. Burian, Peter K. and Robert Caputo. 1999. National Geographic Photography Field Guide. 352 p
2. Gerlach, John, and Barbara Gerlach. 2007. Digital Nature Photography: The Art and Science. Focal Press. 182 pp.
3. B & H Photo and Video, 420 Ninth Ave. New York, NY 10001
4. Miotke, Jim. 2007. The Better Photo Guide to Digital Nature Photography. Amphoto Books, Watson-Guotill Publications, New York. 224 pp.
5. YOUR CAMERA MANUAL! [154]

CLOSE-UP PHOTOGRAPHY: EQUIPMENT AND TECHNIQUES. Jack Schlesselman, Range of Light Photography, 726 E. Kip Patrick Drive, Reedley, CA 93654

Close-up photography can be a useful educational tool in weed science. A close-up image of a seedling, flower, or seed head is valuable in weed identification and can be compared to other photographs for accurate recognition. Other important reasons for close-up photography in weed science include identifying postemergence herbicide activity on weeds, crop response showing injury resulting from various herbicides, and symptoms on crops unrelated to herbicide injury such as disease, nutritional deficiencies, or frost damage. Optimum magnification for close-up photography requires subject magnification up to one half to full life size (1:1). Obtaining this amount of magnification using a normal 50mm lens requires close-up filters or extension tubes. A dedicated "macro" lens usually has the capability to magnify up to life size and generally has a focal length of 60mm to 105mm. When subjects are magnified, there is a loss of light which must be compensated for by increasing shutter speed, aperture (lens opening), and/or sensitivity (ISO speed). Depth-of-field is the distance range within a photograph that will be in sharp focus. Critical depth-of-field is adversely affected by magnification when larger apertures are used. Here is an important point to remember: *The smaller the aperture, the greater the depth-of-field!* To compensate for the lack of sufficient natural light and reduced image sharpness in close-up photography, a twin flash setup is generally recommended for improved depth-of-field, contrast, and color saturation. Effective close-up techniques include filling up most of the viewing area with the subject, keeping the subject

perpendicular to the lens for optimum depth-of-field, and watching for background “clutter” that can detract from a well-defined subject. [155]

SIMPLE TECHNIQUES FOR IMPROVING DIGITAL PHOTOGRAPHS. Joseph M. DiTomaso*, University of California, Davis.

In most cases, weed scientists and land managers do not need sophisticated photographic equipment to obtain photos required for educational materials or reports. Simple digital photographic equipment is sufficient. However, attention to three aspects of photography can significantly improve the quality of photos. These include framing photos properly, adjusting the lighting, and understanding how to use depth of field. When framing a photo it is important to look at the entire field of view and not just the object of interest within the field. Common errors in photographs include centering the photo on the horizon, including distracting shadows in the frame, omitting a reference point to give the photo depth, and not considering wires, trash, and other distracting objects in the photo. To be able to use light and depth of field properly, it is necessary to use the manual setting on a camera. This can give the photographer much more flexibility with front or back lighting, as well as flash and flash fill. Depth of field can be important in creating a photo where the desired object stands out against a similar or distracting background or the subject can remain in focus even under windy conditions. There are a number of tricks to improving depth of field, including pressing plants so all parts are lined up on a single photo plane, or staging plant parts, leaves, flowers, and fruit so that they are in the same frame and in the same focal plane. When plants are wilted and cannot stand erect it is possible to photograph them upside down and flip the photo so they appear to stand erect. These and other simple helpful tips can make an amateur photographer take much better photographys of research and landscape scenes, as well as plants. [156]

FORENSIC PHOTOGRAPHY. William T. Cobb*, Cobb Consulting Services, Kennewick, WA.

Forensic is defined as:"Pertaining to, connected with or belonging to courts of law". Digital photos taken for forensic purposes are subject to more scrutiny and require more documentation than identical photos taken to visually preserve research or photographically memorialize other information. Digital images can serve an important role in the forensic arena; however, they can be used incorrectly to replace other methods of documentation. Whether images are derived digitally or had their genesis as a photographic film image, care must be taken to preserve the information about how, when and where the image was created. Evidentiary rules about digital images used forensically continue to evolve. [157]

PROJECTS 1 AND 5: WEED OF RANGE AND FOREST/WETLANDS AND WILDLANDS

Chairperson: Jim Harbour

Discussion revolved around how to better present our research to the public. Suggestions included showcasing our successes in managing invasive species in Forest as well as Rangelands. Furthermore, others suggested showcasing the failures in invasive species management and what we learned from those failures.

Lively, and positive, discussion ensued regarding the combination of both Range and Forest and Wetlands and Wildlands Projects. Many names were proposed within the audience, but no one could agree on a single name. Therefore, the proposed Project names were collected and later sent to the participants in the audience for a vote. Voting took place twice as there was essentially a tie for two of the proposed names. The final votes were tallied and the name for the combined Projects 1&5 is **Range and Natural Areas.**

Jim Harbour and Cody Gray will co-Chair the Session in 2010. James Leary is the chair-elect and will become the Chair for 2011.

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PROJECT 2: WEEDS OF HORTICULTURAL CROPS DISCUSSION SECTION

Topic: *Is there a risk for Genetically Modified Crop contamination in seed production systems*

The session was led by Chair Joel Felix. Maria Zapiola, Oregon State University, began the session by giving a presentation on the ways in which genetic contamination of crops and seed crops can occur. This was followed by Rich Affeldt sharing his experiences in the working with Oregon seed producers and situations where contamination is of concern. The majority of the discussion focused on means which could be used to limit contamination and their effectiveness, current testing measures and levels, and cases where genetic contamination has occurred. The discussion also covered the rights of growers to farm the crop of their choice and how seed producers concerns over genetic contamination could limit the ability of others to grow genetically modified crops. Ultimately, it was determined that genetic contamination of seed crops from gene flow or other sources was impossible to prevent. Thus in order to ensure that contamination did not result in market or trade losses it would be necessary for producers and buyers to establish a tolerance level.
The session concluded by electing Brad Hanson, USDA-ARS, as the 2011 Section Chair.

PROJECT 3: WEEDS IN AGRONOMIC CROPS REPORT

Chairperson: Ian Burke

Topic: *Mechanical Weed Management in 21st Century Cereal Systems*

The Weeds of Agronomic discussion session was held on Wednesday, March 11. Approximately 15-20 people were in attendance over the course of the session.

To start the discussion, Ian Burke provided background information to the attendees on the crop production systems employed to produce wheat in the Pullman area of Washington. The crux of the problem revolves around the attitudes of some farmers and the NRCS in controlling weeds such as prickly lettuce, rattail fescue, downy brome with mechanical cultivation. Either due to herbicide resistance development as is the case with prickly lettuce or the close growth habits of downy brome to wheat, these weeds have proven to be very difficult to control in wheat production in a monoculture no-till system. Mechanical cultivation is seen by many to be to harmful to the environment due to soil loss from wind and water erosion, reduction in organic matter, and increase in evapotranspiration. However, when dealing with a weed or weeds that are overtaking the system and pushing the system out of balance, what do you do?

After Ian's introduction, a general discussion session was held. Some attendees recommended a hybrid tillage system where no-till was used, but the soil was inverted with a deep plow every 6 to 8 years in those fields where weed control was problematic. Others encouraged finding alternative crops to fit into the rotation. One suggestion was for the WSWS to make a general statement or develop a white paper about the benefits of tillage to minimize a weed's competitiveness. This statement or white paper would need research documenting what affect inverting the soil every 6 to 8 years has on soil health. Also, research is needed showing the economic loss for a specific weed in a no-till monoculture wheat system. Discussion also delved into possible in-season mechanical cultivation of a wheat crop. Although, this idea was soon pointed out to be too reliant on environmental conditions to be a reliable weed control method. Another idea came about on how the NRCS determines the health of the field. Maybe the NRCS should come-up with a method that will take into account not only residue management but also pest management. Therefore, this would allow farmers to aggressively control a pest when it is dominating the production system. Finally, a discussion on working with innovative farmers who are making modifications to their farm machinery to either enhance the crops ability to compete or finding ways to minimize a weeds competitiveness. To conclude, Ian asked the group to list weeds in cereal production that have the potential or already are very problematic in no-till systems. For the Pacific-Northwest, rush skeleton, rattail fescue, feral rye, Persian darnel, and downy brome were listed. For the High Plains, tumble windmillgrass and prairie cupgrass were sited.

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PROJECT 4: TEACHING AND TECHNOLOGY TRANSFER SECTION

Topic: *Use of Electronic Tools for Weed Identification and IPM Planning*

Attendance: The session was attended by 19 people including session chair Anil Shrestha and chair-elect Andrew Kniss.

The session had presentations/demonstration by Cheryl Wilen, University of California Statewide IPM Program and Joe Ditomaso, University of California Davis.

Cheryl Wilen demonstrated the use of a touch-screen IPM kiosk. The kiosk was developed by the University of California Statewide IPM Program. The objective of the kiosk is to help consumers solve pest problems, protect the environment, and prevent runoff from residential landscapes. The IPM Kiosk contains information on about 60 common home and garden pests (including common weeds) including identification and management, alternatives to pesticides and least toxic pest control, as well as safe use and disposal of pesticides. The kiosk also includes tips related to proper watering, fertilizing, and avoiding problems associated with garden chemicals. Kiosk users can look up a pest by category and name or diagnose a problem on plants. Users can watch videos, print and take home information, as well as locate resources for finding additional pest management help in their county. Considerable interest was expressed by participants in this tool and how it could be developed in other states.

Joe Ditomaso demonstrated the new Online interactive weed identification program. The program is hosted by the University of Wisconsin, Madison (http://weedid.wisc.edu) but can also be accessed through the Weed Research Information Center website of the University of California, Davis (http://wric.ucdavis.edu). The program was created by Mark Rentz of the University of Wisconsin and Joe Ditomaso. The database contains 280 of the most common weeds/invasive plants found in agricultural, urban, and natural settings in Wisconsin and California. The database is organized to ask questions about the unknown plant and based on the user's input, the website produces a list of plants (scientific and common names) along with thumbnail images that match the information entered. The website is interactive and once the user enters information on a weed it leads the user to a separate screen that will ask specific questions of each group. Questions ask where it was found as well as specific questions about the growth, leaf, stem, and floral characteristics. The user has several answers available to select from a dropdown menu to the right of each question. The user is not required to answer any of these questions, but is recommended to begin their search by answering just a few questions. If selections result in too many plants, the authors suggest continuing to answer additional questions to narrow the number of results. The authors state that it is rare that the selection will result in one plant, but often a list of several result. The user can quickly scroll down the page looking at the images and click on pictures to verify the identification of the unknown plant. Further suggestions include avoiding answering too many questions as one incorrect answer can eliminate the desired plant from the results. It is better to answer fewer questions that are unique to the plant (such as plants have spines, thorns, or prickles). The user can change answers and re-search the database to narrow or broaden the search. Leaving all questions unanswered will return all species of the chosen weed type contained in the database. Present limitations of the tool include having to enter all species in the database. Adding all plants would limit the usefulness of this tool. The goal of this database is to help identify weeds and/or invasive plants, not all plants of Wisconsin or California at the moment.

During the discussion session, participants from several states expressed their interest in having a similar program specific to their own states. To which, Joe Ditomaso responded that this was possible if they gave him information on the species to include. However, each state would have to host their own site even though would link to one central program. A pay for service question was raised. The response was it was up to the states to decide whether to charge for this service or not but no charges would have to be paid at the moment for the use of the database developed by Rentz and Ditomaso.

Jamshid Ashigh, Asst. Professor, New Mexico State University was elected as the chair for 2011

PROJECT 6: BASIC SCIENCES

Chairperson: Randall Currie

Topic: *The impact of weeds and cover crops on transportation biofuels*

Randall Currie gave a short presentation about energy cost to growers. He cover the cost of energy including transportation fuels, nitrogen and other nutrients, and fuel to pump water and how that cost can be reduced by planting proper cover crop that fit the local environmental and soil conditions. Dr. Currie showed data how cover crops can conserve moisture, prevent soil erosion, and add nitrogen to soil. In addition, he presented data about cost saving when cover crops are incorporated in cropping systems. However, the group discussed the issues related with cover crops residue and how to manage residue under different cropping system. The group also discussed in length how cover crops can fit in no-till cropping system. Dr. Currie showed data and discuss examples of the benefit of cover crops under no-till system. In the end, the group concluded that cover crops will be beneficial to conserve moisture, reduced synthetic nitrogen used, provide plant residue to prevent moisture loss, and prevent soil erosion. In addition, the group also agrees that deployment and utilization of cover crops needs to consider the growing conditions and cropping system.

The other subject discussed during the session the impact of farming on water use, available, and water right. Clyde Elmore, retired professor with UC-Davis and Brad Hanson with USDA/ARS, Parlier outlined the challenges that California farmers experience with lack of water for irrigation and how drought affected California agriculture. The group discussed practices to conserve moisture. There were also discussion on the relationship between irrigation practices and weed management.

The third topic that the Basic Science project discussed was changing the name and direction of the project. The attendees discussed in length that the project need to be more inclusive and reflect the current science. Therefore, there were unanimous vote to change the name of the project to Weed Biology and Ecology. The group asked Kassim Al-Khatib to write a proposal to the WSWS board of directors requesting changing the name of the project starting in 2010.

Attendance: 18
Chairperson 2010: Kassim Al-Khatib
Agronomy Department, Kansas State University
Manhattan, KS 66506

Chairperson-elect: Kevin Kelly
AGRASERV
2565 Freedom Lane
American Falls, ID 83211

WSWS Summer Board of Directors Meeting
July 25-26, 2008
Embassy Suites Hotel
Albuquerque, New Mexico

Friday July 25, 2008.
Call to Order – Dan Ball

Present at the meeting: Dan Ball, Ian Burke, Phil Banks, Jesse Richardson, Bill Cobb, Carol Mallory-Smith, Vanelle Peterson, Phil Stahlman, Kai Umeda, Pat Clay, Phil Munger, Kirk Howatt, Melissa Bridges, Ryan Edwards, Keith Duncan, and April Fletcher.

Motion: Motion to approve agenda made by Vanelle Peterson. Seconded by Jesse Richardson. **Motion Passed** unanimously.

Motion: Motion to approve March 13, 2008 Minutes made by Vanelle Peterson. Seconded by Jesse Richardson. **Motion Passed** unanimously.

President's report – Dan Ball:
Dan Ball submitted a list of potential candidates for the three open WSWS officer positions.
Motion: Phil Stahlman moves to accept the candidates. Kirk Howatt seconds. **Motion Passed**, Vanelle Peterson and Carol Mallory-Smith abstaining.

Submitted Report:
Date of Preparation: July 24, 2008
Activities during the Year: I took office as President on March 13, 2008 at the WSWS annual meeting in Anaheim, CA. Several committee appointments have been made and are reflected in the list of committees on the WSWS website.
Several communications with the Board of Directors (BOD) have taken place via email. Communications via email to approve minutes from the March 10, 2008 Board of Directors led to a motion and subsequent approval of these minutes on June 16, 2008. Email communications were initiated to discuss reprinting Weeds of the West and led to a motion to approve reprinting after nomenclature updates. This motion passed by Board vote via email on July 10, 2008. Thanks to Ian Burke (WSU) and Melody Rudenko (OSU) for helping me review all weed species in the current book edition for compliance with the 2007 WSSA Composite List of Weeds. Thanks to Tom Whitson for his continued leadership on this publication.

On behalf of the WSWS and then President, Ron Crockett, I signed, as President-Elect, a contract with DoubleTree Hotel Spokane City Center on January 4, 2008 for the 2011 WSWS Annual meeting to be held in Spokane, WA. As President, I signed a contract with the Embassy Suites Hotel Albuquerque for the 2008 WSWS Summer meeting and reviewed a contract with the Waikoloa Beach Marriott Resort for the 2010 Annual meeting.

I have prepared a preliminary operating guide for a new standing committee, the Symposium Committee. To date, I have received no comments or suggestions from those I have solicited input.

Recommendations for Board Action: I would request that the Board of Directors review and adopt an operating guide to facilitate functioning of a Symposium Committee. Committee members need to be appointed for the currently developing symposium. The committee would consist of those individuals interested in organizing a specific symposium on a specific topic. It would be preferable if symposia were proposed two years ahead of the annual meeting to facilitate planning and budgeting. The chair of the committee would serve as a member on the next symposium committee to provide guidance and continuity.

I suggest having a BOD discussion about future revisions to Weeds of the West.

Immediate Past-President's Report – Ron Crockett
No submitted report.

Business Manager's Report - Phil Banks
Expenses on Weeds of the West were lower for the past fiscal year. Next year, expenses will increase (two installments of nearly $58,000 each, total of $116,000) due to reprinting costs. The new printing will be delivered in October. Phil Banks reports we receive $14 per copy from all books sold by the University of Wyoming and $20 to 26.50 per book for all books sold through our website. The Society is still incorporated in California. There are no plans to change incorporation to New Mexico.

The 2008 Annual Meeting in Anaheim lost $10,000 mainly due to activities related to the annual meeting. Costs are recovered through interest and from profits generated by Weeds of the West and profits of other pubs. Annual meeting is estimated to gross $65,000, if registration remains the same. We would lose $14,000, estimated.

Dan Ball asked if the costs in the report include all costs. Phil Banks replied that they do include all costs including travel.

April Fletcher asked about the expenses associated with the 2008 Arundo symposium. Phil Banks replied that expenses are primarily associated with travel, audio-visual equipment rental, breaks, and the reception.

Vanelle Peterson opened a discussion on the 2010 meeting in Hawaii by asking about plans for a symposium in Hawaii. Meeting Registration was discussed, in particular the registration rate. We may have to raise rates for the Hawaii meeting. The Albuquerque meeting attendance is expected to be stable. The meeting rate continues to go up, but the membership still sees us putting money in the bank due to revenue from Weeds of the West. The Annual Meetings should support themselves, but travel costs continue to increase and the result will likely be fewer students. Carol Mallory-Smith pointed out that we can't continue to subsidize unless we make it policy. Phil Banks noted that the Society still subsidizes room rates on request. He also noted that expenses in Hawaii will be more than Albuquerque, but the same as Anaheim.

Motion: Kirk Howatt moved to set the Albuquerque registration at $195 and use the same fee structure as used at Anaheim. Seconded by Carol Mallory-Smith. **Motion passed,** Carol Mallory-Smith opposed.

Submitted Report:
Date of Preparation: 7/8/2008

Activities during the Year: All bills have been paid, tax forms have been filed, and the current financial status of WSWS is attached. As of July 8, 2008 we have $376,856.33 in capital with an additional asset of $103,259.00 in unsold Weeds of the West inventory. We have unpaid liabilities (Director of Science Policy and the Service Contract of the Business Manager) of $ 24,750.00 Also attached is an estimated and final budget for the 2007-2008 operating year and an estimated budget for 2008-2009. All Newsletters were printed and mailed on time.

We continue to sell books through our website and in cooperation with the University of Wyoming. With Board approval, we will be reprinting "Weeds of the West" for the tenth time. Estimated cost is $ 11.62 per book. WSWS receives $ 14.00 per book from sales through University of Wyoming and $ 26.50 per book through our website (discounts are allowed for orders of 10 or more, depending on the size of the order. Most sales are for $ 20.00 per book plus the cost of shipping and handling). We will be posting additional books for sale on the website soon.

I continue to work with the Site Selection Committee and will send out requests for proposals for the 2012 meeting when requested. Future meeting sites are Hawaii (Big Island) for 2010 and Spokane for 2011.

Recommendations for Board Action:

1. Maintain the current $ 195.00 registration fee for the Albuquerque meeting. Discuss possible increase for Hawaii.
2. If a symposium is set for Albuquerque, the registration fee should be set as early as possible and publicity sent out.
3. Consider if a symposium for Hawaii will be cost effective.

Budget Needs: The Board had earlier approved $ 2000.00 to assist with the scanning and posting of old Proceedings on the website. The process is ongoing and anticipate completion by early fall.

Western Society of Weed Science: Budget for 2007-2008 (April 1, 2006-March 31l)					
Estimate			**Estimate**		
2006-07	**Actual**		**2007-08**		**Current**
Income (annual meeting)					
Registrations and dues	$52,000.00	$ 65552.45*	$ 65000.00*		$54,363.29
Proceedings					$4,500.00
Research Progress Rep					$3,400.00
$59,900.00	**$ 65552.45***		**$ 65000.00***		$54,363.29
Expenses					
Postage	$2,000.00	$2,156.86		$1,600.00	$883.81
Website	$270.00	$270.00		$300.00	$360.00
Accountant	$363.00	$363.00		$380.00	$374.94
Insurance	$530.00	$530.00		$550.00	$500.00
CAST dues	$600.00	$629.00		$629.00	$643.00
WSSA Dir. Sci. Policy	$15,000.00	$15,000.00		$15,000.00	$15,000.00
Allen Marketing site selec.	$1,500.00	$0.00		$0.00	$0.00
Printing (all)	$7,172.00	$7,011.19		$7,000.00	$4,795.69
Student awards	$1,000.00	$875.00		$1,000.00	$0.00
Travel	$2,750.00	$4,586.67		$9,500.00	$1,644.54
Annual meeting	$15,000.00	$27,253.71		$25,000.00	$2,656.65
Business manager	$19,500.00	$19,500.00		$19,500.00	$19,500.00
$65,685.00	**$78,175.43**			**$80,459.00**	$46,358.63
($5,785.00)	($12,622.98)				($15,459.00)
* Includes RPR & Proceedings Income.					
Budget does not include Weeds of the West, Noxious Weed Shortcourse, Bio Control of Invasive					
Weeds book, or non-reoccuring items.					

WSWS Financial Report for Summer 2008 Board Meeting: Albuquerque, NM					
ASSETS					
Cash and Bank Accounts					
Certificate of Deposit from Money Market	52,145.56				
Checking	15,209.94				
Money Market	95,743.16				

TOTAL Cash and Bank Accounts	163,098.66				
Other Assets					
Asset	103,259.00	Approx. 4900 WOW			

TOTAL Other Assets	103,259.00				
Investments					
RBC Dain Rauscher Acnt 1101-5709-9272	0				
RBC Dain Rauscher Acnt 1101-5709-9275	221,793.11				

TOTAL Investments	221,793.11				

TOTAL ASSETS	480,115.33				
LIABILITIES					
Other Liabilities					
Liability	24,750.00	WSSA Director of Sci Policy and Business Mgr			

TOTAL Other Liabilities	24,750.00				

TOTAL LIABILITIES	24,750.00				

OVERALL TOTAL	463,400.77				

Secretary Report – Ian Burke

Vanelle Peterson suggested a 'blog' approach to board discussion and voting, maintained on the WSWS website.

No submitted report.

Program Committee Report – Jesse Richardson

Ideas for General Session speakers were discussed.
Poster section for the Jointed Goatgrass symposium will be located near the main poster displays. Divide the main ballroom? Section up the main poster room? Posters submitted to the Jointed Goatgrass symposium should be identified when submitted.
$5000 dollars has been given to WSWS by the JGG National Research Program and allocated for symposium expenses.

Submitted Report:
Date of Preparation: July 16, 2008
Activities during the Year: March to July, 2008
The 2007 meeting had 380 registered, 90 oral presentations and 60 posters
The 2008 meeting had 328 registered, 126 oral presentations and 56 posters

The committee is in the process of developing the 2009 program for the WSWS annual meeting in Albuquerque, NM. When the call for presentations goes out, we'll see how it goes with oral and poster contributions. So far, the program is shaping up as follows:
General Session:
Introductions & Announcements – J. Richardson
Welcome to Albuquerque – TBA (Mayor? City Council? Office of Tourism?)
Presidential Address – D. Ball
Science Policy Update – L. Van Wychen
Topic of National Interest in Weed Science – TBA
Topic of Local Interest Relating to Weed Science – TBA (Matt Schmader, Lowell Catlett)

Two symposia are being considered:

- Jointed Goatgrass Symposium (~3 hrs) Wednesday afternoon, + evening poster session with 25-35 posters – Alex Ogg
- Weed Biocontrol Symposium, Thursday all day – April Fletcher & Dave Thompson

Recommendations for Board Action: Need to approve the two symposia for the 2009 meeting.
Budget Needs: None presently. May need to arrange for general session speaker travel/honoraria.

Research Section Report – Kirk Howatt

We are changing the way the PowerPoint presentations are sent to the project chairs – instead of being sent to the research section chair, they'll be sent directly to the section chairs.

Submitted Report:
Date of Preparation: July 11, 2008
Activities during the Year: Outgoing chair, Rick Boydston, collected reports from project chairs for discussion sessions and forwarded for inclusion in the proceedings. Project chairs have been charged with identifying discussion topics during the annual meeting. Discussion topic ideas have

not been received for board input. The chairs continue to develop ideas, and we will provide support and aid as requested and available.

Project chairs for the 2009 annual meeting follow:
Weeds of Range and Forest: Michael Moechnig, michael.moechnig@sdstate.edu
Weeds of Horticultural Crops: Joel Felix, joel.felix@oregonstate.edu
Weeds of Agronomic Crops: Ian Burke, icburke@wsu.edu
Teaching and Technology Transfer: Anil Shrestha, anil@uckac.edu
Weeds of Wetlands and Wildlands: Jim Harbour, james.d.harbour@usa.dupont.com
Basic Sciences: Randal Currie, rscurrie@ksu.edu

Education and Regulatory Section Report – Bill Cobb
Steve Dewey might be a potential speaker in this section if he is not utilized in the General Session.

No submitted report.

Member-at-Large (Public Sector) - Carol Mallory-Smith
Submitted Report:
Date of Preparation: July 2008
Activities during the Year: Consulted with President Ball on Symposia Operating Procedures. Contacted Committee Chairs for reports.
Recommendations for Board Action: Accept request from Education Committee to become a standing committee.

Member-at-Large (Private Sector) – Phil Munger
Submitted Report:
Date of Preparation: July 11, 2008
Activities during the Year:
- Received Committee Report and Poster from Herbicide Resistant Plants Committee. The report and poster were also submitted to Tony White.
- Requested information from Director of Science Policy and Invasive Weed Awareness Committees and will present any new information at the Summer Meeting.

Student Liaison – Melissa Bridges / Ryan Edwards
Tuesday is the only available day for a Student Luncheon. Carol Mallory-Smith noted that we could combine lunch with industry personnel and then a business meeting. Organize a room to carry breakfasts to. Students do like the breakfasts, so eliminating them might not be best. Dan Ball suggests a Tuesday evening mixer and then a Wednesday morning business meeting. Vanelle Peterson: make sure we fulfill the meeting food and beverage requirement. Carol Mallory-Smith schedule graduate student business meeting on Thursday afternoon after the Business Meeting. Bill Cobb suggests that we reach out to non agricultural schools nearby the meeting place (U. New Mexico).
Scholarships were suggested as a way to decrease the cost of attendance for students. Carol Mallory-Smith suggests having some rules: one trip only, must be presenting, one per institution, how to award? Dan Ball suggests solidifying procedures and protocols to bring to the Board in March.

Ryan notes that some had bad experiences, and there was a decrease in participation, in the Graduate Student Night Out. There needs to be more attention brought to the program. Carol Mallory-Smith

notes there are too few nights. MB notes that industry usually takes large groups, Vanelle Peterson notes that large groups are not the best for interpersonal interaction. April Fletcher suggests that these dinners are 1 on 1, not group meetings. Also suggests that the mentors put their disciplines of research as a way to potentially match people.

Submitted Report:
Date of Preparation: 7/11/2008
Activities during the Year:
2008 WSWS Meeting Student-Specific Activities

- Student breakfasts sponsored by private industry
- Student night out with a member of the academia or private industry

Recommendations for Board Action:
Problem (per discussion at the WSWS 2008 Board Meeting in Anaheim): Lack of student participation in student-specific activities sponsored by the Board and private industry

It is the hypothesis of the current student liaisons that a lack of communication properly informing students of activities during the meeting contributed to a decrease in student participation as compared to prior years. To help confirm this hypothesis, a questionnaire was sent to current WSWS student members (see attached). Results of this questionnaire will be discussed during the Summer WSWS Board Meeting. Furthermore, building camaraderie among students could be the key for increasing student participation in meeting activities.

Suggestions for the Future:
Solution: The themes for the 2009 WSWS meetings in Albuquerque will be building student fellowship and increasing awareness of student-specific networking opportunities.
The Student Liaison Committee proposes the following two tasks that we feel will increase student involvement during the 2009 WSWS meetings:
1. Initiate outreach to the current student membership via use of the newly formed student listserv
a. Introduce the current student liaisons, advertise the activities at the 2009 WSWS meetings, and allow students a forum for discussion of various research and student-related topics
2. Work with Tony White, WSWS Webmaster, to develop a student webpage on the WSWS website
a. Allows opportunity to advertise activities at the 2009 WSWS meetings and events of general interest, post web links to university labs of the western region, promote service to the WSWS, etc

Budget Needs:
Discussion: Because the WSWS Student Liaison Committee is a newly formed committee of this Board, we would like to take a few minutes during this summer board meeting to discuss creating a budget for student-related activities that can be organized and hosted by the Student Liaison Committee in future years.
Examples of activities that could require WSWS funds:
1. A student reception preceding the WSWS Members Welcome and Retirees Reception on Monday evening
2. Luncheon to discuss student business (e.g., nomination of Liaison Committee members, identify student-related issues warranting the WSWS Board's attention, etc)
3. Student Quiz Bowl
4. Student Travel Scholarship to attend and present at the WSWS meetings

Suggested Changes for 2009 WSWS Meetings in Albuquerque:
1. Because the 2009 meetings will be held at the Embassy Suites (where a complimentary hot breakfast is provided), we feel that a Student Lunch sponsored by our private industry partners/members may be more appropriate/successful.
2. We also suggest that the name of Graduate Student Breakfast (or Lunch) be changed to *Student Breakfast* (or *Lunch*) to include the undergraduate students attending and presenting at the WSWS meetings.
Suggested Changes in Operating Guide: Suggestions for changes to the operating guide include the following:

- Establishment of the student liaisons responsibilities into the charter
- Potential changes to the activities to involve students
- Establishment of a student budget

WSSA Representative Report - Vanelle Peterson
Hotel facilities for the WSSA appear to be very nice.

If joint meeting, would the registration price be the WSSA price or the SWSS price? April Fletcher points out it is harder to take in a joint meeting as there is more demand for time. Phil Banks notes that there won't be much of a change in the program. Vanelle Peterson points out that the awards banquet for the SWSS will be separate. Carol Mallory-Smith states that we should request the same amount from the WSSA as the SWSS. Phil Banks adds that we have met with the WSSA twice. Dan Ball wonders whether we will dilute out the meeting feeling by having a joint meeting April Fletcher agrees.

Phil Stahlman points out that we should pay close attention to what happens in the two planned joint meetings.

Carol Mallory-Smith points out that there are a lot of people who do not work in invasive species, and the emphasis currently being placed on invasive weeds might alienate those scientists involved in other more traditional topics.

Submitted Report:
Date of Preparation: July 24, 2008
Special dates:
1. Joint WSSA/SWSS meeting February 9-12, 2009 in Orlando, FL at the Hilton Disney Resort (David Shaw, Program chair)
2. Joint WSSA/Society of Range Management meeting in February 7-12,2010 in Denver (John Jachetta, co-program chair, WSSA/SRM committee)
Activities during the Year:
1. Represented WSWS with the WSSA board at meetings in February and July 2008 meetings
Notes for Board consideration:
1. WSSA revenues are in good standing but investments are suffering with the market conditions. Regular membership decreased during the last year from 807 to 713.
2. New journal *(Invasive Plant Science and Management)* first issue launched at the WSSA annual meeting in February. Joe DiTomaso, editor, reports that as of the end of June 2008, there have been two issues of IPSM produced and the third issue is about ready to go to press. A new section has been added called Invasion Alerts, which is designed to allow publication of new reports of invasive species or major range expansions. In addition, a paragraph has been added to the Contributions for Authors that clarifies the

expectations of when nonreplicated experiments are acceptable for publication in IPSM. As of June, there have been 90 papers submitted for publication. A decision has been made on 74, with a 72% acceptance rate.
3. Strategic plans for WSSA include excellent projects that will benefit WSWS members:
a. Continuing support for the "subject matter expert" Weed Scientist to work as a liaison at EPA. Steve Dewey will be stepping down in January 2009; a replacement is needed.
b. Continuing to produce more popular press articles on the importance of weed science, and for this committee to become a WSSA standing committee. The Public Awareness committee is looking for volunteers to draft press releases of interest to the public about Weed Science.
c. Professional Development committee looking to add web pages to the WSSA web site for mentors to help early career scientists.
4. WSSA continues to support NIWAW. NIWAW 2008 was very successful. The organization for NIWAW 2009 is being discussed.
5. The USDA-ARS position, National Program Leader (Weed Science) Interdisciplinary (GS-15), has been advertised. Go to http:/www.usajobs.gov and type "73922246" in the "Search Jobs" box. All of the efforts of Weed Scientists (WSSA and the regional societies) helped to get Weed Science in the job title. Thanks to Dan Ball for writing a letter in support of having this position be announced as a Weed Scientist
6. Registration for the 2009 meeting will increase by $20 except that student and spouse registrations will remain the same ($75 and $80 respectively). The International Biocontrol Group (IBG) will be meeting at the same time and location as the combined WSSA/SWSS meeting and those talks are also open to WSSA members.
7. Dues will also be increased in 2009 by $25 for regular members and $10 for students.

Budget Needs: Funds to cover some charges at the Orlando summer WSSA Board meeting.
Suggestions for the Future: Question for the WSWS Board - Are we interested in the potential of meeting with WSSA in a joint meeting such as the SWSS is doing in 2009?

Welcome to Tim Miller as the in-coming WSWS representative to WSSA. Tim and I will split the WSSA Board meetings in February 2009. He will be fully in place by the end of the WSSA meeting in February and reporting to this Board at the WSWS annual meeting in March 2009.

CAST Representative Report - Phil Stahlman
Membership appears to have stabilized, however, individual membership continues to decline. CAST at this point may be serving as a publication for hire entity, which could be potentially problematic. Other publications come through the normal channels. The special publications, though, are a potential problem.

Submitted Report:
Date of Preparation: July 19, 2008
The Spring Board meeting was held in Washington D.C. on March 11-14, 2008, the same time as the 2008 WSWS annual meeting in Anaheim. Overlapping CAST and WSWS meeting dates is a reoccurring problem. I have informed CAST staff of future WSWS meeting dates with a request not to schedule CAST Board Meetings on those dates. The Fall Board Meeting will be in Raleigh, NC the last week of October.

Two new publications have been rolled-out since the WSWS annual meeting in Anaheim.
- ***Vaccine Development Using Recombinant DNA Technology*** is the seventh in a nine-part CAST series entitled *Animal Agriculture's Future through Biotechnology*. Infectious animal diseases

continue to rank foremost among the significant factors limiting efficient production in animal agriculture. This new Issue Paper provides details about specific diseases and vaccines. The authors offer an historical overview of vaccine development, evaluate the development of vaccines for many animals, describe commercially available vaccines, outline recent advances in recombinant vaccines, and discuss the future of vaccines for animal diseases.

- ***Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes***, a new CAST Special Publication, is the result of a workshop at which scientists, researchers, environmentalists, and water specialists joined together to discuss the issues facing the turfgrass and water industries. This publication addresses the science of turfgrass and other landscape materials, water use, and the related environmental concerns, while realizing that the ultimate goal is to provide quality urban areas for activities and recreation while conserving and protecting our water supply.

Selected forthcoming and proposed publications with particular relevance to WSWS include:

- ***Convergence of Agriculture and Energy: III. Considerations in Biodiesel Production.*** (CAST Commentary)
- ***Convergence of Agriculture and Energy: IV. Infrastructure Requirements for Biomass Harvest, Transportation, and Storage.*** (CAST Commentary)
- ***Gene Flow in Alfalfa: Biology, Mitigation, and Potential for Impact on Production.*** (Special Publication)
- ***Resistance Management in Genetically-Engineered Pest Resistant Crops: Implications for Future Policy.*** (Proposed Issue Paper)
- ***Endangered Species Act and Agriculture.*** (Proposed CAST Commentary)

Recommendations for Board Action: None
Budget Needs: Reasonable travel costs to Board Meetings upon request and receipt.
Suggestions for the Future: Continue membership in CAST

Constitution and By-Laws Representative Report - Kai Umeda

The Business Manager position has been updated. Public Relations revisions are in progress. LC needs to be revised. Student Liaison descriptions need to be revised. Dan Ball did send thanks to the South Dakota contact and originator. Dan Ball has been working on an operating guide for the symposium committee.

COMMITTEE REPORTS (BOARD CONTACT)

Nominations – Jill Schroeder (Ron Crockett)

Jill Schroeder suggested that we not put the nominations report on the Web.
Melissa Bridges suggests we put voting for student liaisons with voting for board members.

Submitted Report:
Date of Preparation: July 3, 2008
Activities during the Year: The committee met during the 2008 annual meeting to discuss potential nominees for the offices President-elect (public sector), Research Section Chair-elect, and Education and Regulatory Chair-elect. We discussed whether the balloting for officers should go to an electronic format with Dan Ball, Tony White, and Phil Banks. Ron Crocket conducted a straw poll at the annual business meeting and members were in favor of moving to an electronic ballot. A solicitation for nominees by the membership was placed in the spring newsletter to broaden the list of nominees; however, no one responded to the request.
The following members were contacted by the chair and agreed to serve if elected:

President-elect: Joe DiTomaso, Carol Mallory-Smith
Research Section Chair-elect: Brad Hanson, Vanelle Peterson
Education and Regulatory Section Chair-elect: Marvin Butler, Cheryl Wilen

Schroeder contacted Tony White to inquire what assistance he needed to proceed with web based elections for 2009. Tony requested information from the committee so the web site could be set up, which we provided.

Recommendations for Board Action: The committee recommends approval of the slate of candidates for the 2009 election. The committee also recommends that the society proceed with electronic web-based elections in 2009. The committee recommends that paper ballots be made available on request and to members without computer access.

Suggestions for the Future: Suggested Changes in Operating Guide: The operating guide will need to be amended if the board approves web-based balloting.

Finance – John Fenderson (Carol Mallory-Smith)
Asset reallocation should wait for market rally. Finance committee can make a change in asset allocation without board approval, *and* asset allocation is in our RBC representative's hands.

Submitted Report:
Date of Preparation: 7/8/2008
Activities during the Year: The finance committee met and reviewed the financial reports during the March meeting in Anaheim. Report of finances indicates the society is still in solid financial condition and the books are in good order. It is the finance committee's opinion that the Treasurer and the financial advisor are acting according to the society's investment guidelines.

The committee discussed fund allocations to more conservative investments vs. our current allocations. Our current investment balances at RBC Dain Raushcer have declined since January 1 by $13,319 or 5.98%. This compares with 11.9% decline for the S&P 500 in the same time frame. Current asset allocations are 69% stocks and 31% cash and bonds.

Currently our asset balances are: Money Market - $95,743.16, RBC Funds – $209,182, Certificate of Deposit – $52,145.56.

The business manager recommended we maintain annual meeting registration at $195 for the upcoming year and the committee agreed with his recommendation.

Next meeting March 09, Albuquerque, N.M.
Recommendations for Board Action:
Consider asset reallocation. Decide if this should be done immediately to stop erosion or wait for a market rally? The society financial advisor has recommended that reallocation occur after a market rally and has recommended 30-40% stocks and 60-70 % cash and bonds.

Site Selection – Bill Kral (Dan Ball)
Phil Banks notes that we have a lot of flexibility and we should probably wait and find the best deal. Phil Stahlman suggested Colorado Springs.

Submitted Report:
Date of Preparation: 11-July-2008
Activities during the Year: Three cities were submitted to Phil Banks for consideration in 2012. The proposed locations would include Sacramento, CA, Salt Lake City, UT and Denver, CO. The proposed sites were discussed amongst the committee members and Phil Banks. These three locations were proposed based on past histories and "drivability" to the locations.

Phil Banks did mention that in previous discussions with hotels in the Salt Lake City area, they were not price competitive but we decided to inquire again due to its central location.

Recommendations for Board Action: Approval of the 3 proposed locations, if necessary. Phil Banks was to follow-up with hotel information and competitive bids.

Awards – Rob Wilson (Dan Ball)
Submitted Report:
Date of Preparation: June 2008
Activities during the Year:

- We have prepared a Call for Nominations (attached).
- We would like the call to be included in the Society newsletter in September.
- We plan to review nominees for the Distinguished Achievement Awards in January. The due date for nominations is December 1. Electronic or hardcopies of documents are acceptable. We have some carry-over nominations from last year for several of the awards. We will consider those carry-over nominations this year.
- We plan to select a deserving recipient for the Outstanding Weed Scientist Award from both of the public and private sectors, Outstanding Weed Scientist – Early Career Award from both of the public and private sectors, Weed Manager Award, and Professional Staff Award.
- When do the Board of Directors and Treasurer need recipients' names before the conference?
- Rob Wilson will announce the Distinguished Achievement Awards recipients to the membership at the Society luncheon.

Local Arrangements – Keith Duncan (Jesse Richardson)
No Mexican food currently available on the menu – will sit down and work with us to develop entrees if we would like. Last year there were two choices, with an optional vegetarian dish. A buffet lunch may take more time and be more noisy.
Phil Banks estimates attendance at 65% of registration. Phil Stahlman suggests that we have one dish – if more options are desired, then do a buffet.

Submitted Report:
Date of Preparation: July, 9, 2008
Activities during the Year: Several visits to the Embassy Suites have been made to visit with hotel personnel concerning the summer BOD meeting and the March 2009 annual meeting. Hotel personnel have been very accommodating and flexible. I expect this attitude to continue. Everything appears ready for the summer BOD meeting. Post summer BOD meeting, specific conversations concerning room assignments for annual meeting, menus, etc will occur over the next few months. Tracy will arrange for backup computers and projectors from NMSU. April will gather information on other activities in the area.

Publications – Jesse Richardson

Proceedings - Joan Campbell

The proceedings were 100 pages shorter because the officer reports were not included online. Vanelle Peterson suggests that we need to include the officer reports in proceedings. When a report is not submitted, make a note of it in the minutes. In the future, reports should be included as an addendum to the secretary's minutes and included in the proceedings. Secretary should shorten the reports in the interests of efficiency.

Board members, in particular the secretary, should be proactive and move the minutes to the board for approval as quickly as possible.

Submitted Report:
Date of Preparation: July 22, 2008
Committee Activities during the Year: The 2008 Proceedings has 190 pages and 225 copies were printed by Omnipress. The size was smaller than 2007 by almost 100 pages. The cost is $3130 (includes shipping to Las Cruces) or $13.91 each. The books will be shipped to the business office in Las Cruces the end of July. This is late for the Proceedings to be published.
Recommendations for Board Action: Approve budget
Budget Needs: Budget request: $3,100 for printing + travel cost (airfare $500 + 2 nights lodging) = $3,800
Suggestions for the Future: Attempt to have all business finished up by mid-April so we can print the Proceedings earlier.

Research Progress Reports - Traci Rauch

Kirk Howatt wants to know if that is a line item budget.
Carol Mallory-Smith wants to know if we could also get the research progress report electronically.

Submitted Report:
Date of Preparation: July 14, 2008
Committee Activities during the Year: Currently, the 2009 Call for Research Progress Reports is being updated. Changes will be made to clarify directions that may have caused problems. Reports were submitted electronically for the first time last year. Electronic submission by e-mail helped the editors decrease the amount of time spent contacting authors to make minor typographical changes. The Call will be included in September Newsletter and be posted online. To continue encouraging submissions to the Research Progress Report, we will also include a note in the September newsletter and on the website.
Recommendations for Board Action: None
Budget Needs: Budget request: 2,100 for printing + travel cost (airfare $500 + 3 nights lodging) = $2,800

WSWS Newsletter - Cheryl Fiore

Vanelle Peterson suggests that we add all the board members to the side strip in the newsletter – the student liaisons were not included. April Fletcher suggests we add a list of activities in the area around the meeting site to the November or January Newsletter. Logistic information will be included in the November newsletter.

Submitted Report:
2008 WSWS Newsletters have been distributed by e-mail, US Postal Service and published on the WSWS Web page in January and April 2008. The August Newsletter deadline is August 10th.

Weeds of the West - Tom Whitson
Submitted Report:
On July 6, 2007 we had an inventory of 8,144 WEEDS OF THE WEST at the University of Wyoming. In July of 2008 the inventory was 2,120 - for a total yearly sales of about 6,024 - with an average of 500 per month. WSWS makes $3.26 per copy for a profit of $19,638.24 from the University of Wyoming.

The Board approved reprinting 10,000 copies with 71 plant name changes that coincide with the Weed Science Society of America approved list to update the publication. The new books will be available in October, 2008.

Since the publication came out in 1991, over 150,000 copies have been sold with a profit to the WSWS of well over $300,000.00.

Biological Control of Invasive Plants in the U.S. – TBA
Dan Ball wants to make sure we have the correct contact for this publication (Janet Clark).

Website - Tony White
Dan Ball described the process for online voting. Phil Banks wants to have all who have electronic logins have to vote electronically. Those without a login or email address will automatically be sent a paper ballot.

Kirk Howatt asked if, once the voting page is entered, will anyone who is attempting to vote and decides not to finish be able to return. There is a submit button, and that would be what would lock out anyone.

Recommendations for Board Action:
1. (See Report Below)
Motion: Kirk Howatt moves to approve the budget request from Tony White. Seconded by Carol Mallory-Smith. Vanelle Peterson wants to know how long it will take to recover costs. Phil Banks notes that we will save $10 per month over the current system, and the new system will charge approximately 1% less on payments received compared to PayPal. **Motion passed** unanimously.

2. (See Report Below)
Phil Banks notes that we are in the process of converting all the abstracts to an electronic format. Carol Mallory-Smith encourages continued use of a hardcopy, no matter what we decide to do electronically. Vanelle Peterson wants to make sure we are consistent in our access policy to the abstracts. Jesse Richardson notes that the search function is useful. Phil Banks notes that scanned proceedings will only be searchable by author over the short term. Phil Banks notes that access is limited to members.

Motion: Carol Mallory-Smith moves to keep the electronic abstracts online once they are put online. Jesse Richardson seconds. **Motion Passed** unanimously.

Submitted Report:
Date of Preparation: July 2008
Committee Activities during the Year:

Online Stats Integrated. After the annual meeting in March, I implemented an online analytics application through Google to help track website statistics. These stats can help us better understand where people are coming from, what they are looking for, and other information about website users. This is the essential feedback we can use to continuously improve the WSWS website. A few key stats from April 1 until July 10, 2008 include:

- 1,788 visitors came to the website from 58 countries
- Website traffic sources come from direct traffic, referral sites, or search engines (nearly 1/3 equal from each).
- The Online Store is the top content page during this time (11%), with the meeting pages second (8%).

I have a considerable amount of online stats data to share and would be happy to provide this if anyone would like to see it.

Online Officer Voting Launched. The online voting site has been developed and is ready to present to the board at the summer meeting. This site is open for testing at this time. To do so, please contact Tony White or Dan Ball for information on how to access the test location. Once the site is ready to go live for voting, the database will be cleared and posted with actual candidates and biographical information.

The voting site requires current members to login to their account, complete a very simple voting ballot, and confirm their selections. Members are allowed to vote only once. For those who need the information, a voting management page with login access only (different than member login) has been developed to allow viewing of voting counts. This management page is set up to automatically tally votes for all categories and each candidate within each. For close elections, the entire database can be pulled if manual counts need to be done.

Website Activity In Progress.
The credit card payment system through Pay Pal is currently functioning as planned. To further utilize this new online payment tool, additional books, and other items related to the WSWS are being added when available.

Although PayPal works for us now, more efficient, user friendly, and economical options of accepting credit card transactions were evaluated over the past year. In order to better meet the needs of website users who purchase online store items or complete meeting payment transactions, I am seeking to implement our own merchant account and shopping cart to streamline the process of making a payment and managing it on our end. More about this is listed in Board Action and Budget request sections below.

For the 2008 annual meeting, online abstract viewing and search capabilities were added. This system was allowed members registered for the annual meeting to login and view abstracts by program number or through a search of author and/or title information. After the annual meeting, the site was opened up to all current WSWS members as an added membership benefit. The same thing is planned for the 2009 meeting. Board action on maintaining this abstract viewing on the website for old publications (in addition to the proceedings) is requested below.

In December 2007, the WSWS online and the NDSU Weed Science group joined together to allow online registration and payment of the NDSU Wild World of Weeds Workshop through the WSWS

website. Registration fees covered all online charges through Pay Pal and other administrative costs, thus not costing the WSWS anything. This may be conducted again in 2008, but has not been confirmed by the staff at NDSU.

Recommendations for Board Action:
1. Consider budget request for upgrading the current PayPal credit card system to our own merchant account and shopping cart. This upgrade would allow the payment process for members to become more streamlined and integrated into the functionality of the existing WSWS website instead of transferring from the WSWS site to PayPal to complete payment processes.

The site will be very secure and we will not store any member credit card information due to excessive liability. Budget funds requested below will be used to establish the merchant accounts, set up the online shopping cart, and integrate all payment aspects of the WSWS website into the new system. Some of these funds will be used to contract with Casey Designs, our current web hosting company, to help develop the web code to make this integration necessary as I am not proficient with some of this new technology. I will continue to keep the board informed as we progress forward with development of this new system.

2. Do we want to maintain the online viewing of abstracts from all previous meetings, starting with the launch of this system for the 2008 meeting, or should this tool be only for the current meeting? I ask because abstracts are printed in the proceedings and available that way for an official reference. Seems redundant, but if we go all electronic in the future, I say we keep them posted online as they are.

Budget Needs: I wish to request $2,000 to cover contract programming and initial set up fees to establish a merchant account and get the new payment system operational before the opening of meeting registration on October, 1, 2008.

<u>Poster Committee – Charlie Hicks (Jesse Richardson)</u>
Phil Banks notes that the committee has arranged for the poster boards and easels to Albuquerque. They will be stored in Las Cruces after the meeting. Carl Libby was appointed to the committee. Kirk Howatt asks if we have enough.

Submitted Report:
Date of Preparation: July 23, 2008
Activities during the Year: Assisted with set up and take down of poster boards and easels at the 2008 meeting in Anaheim, CA. A total of 100 new poster boards plus the 50 easels were sent for storage with David Belles at the conclusion of the 2008 meeting. The boards and easels are being stored with Bill McCloskey at the University of Arizona Maricopa AG Center. David Belles is planning on delivering these to the 2009 meeting in Albuquerque, NM.
Recommendations for Board Action: The board should discuss plans for poster and easel arrangements for the 2010 meeting in HI. This will effect storage arrangements following the 2009 meeting. Possible scenarios would include: shipping easels and buying or renting boards in HI, renting boards and easels in HI (if possible) or shipping boards and easels. I believe at the last meeting in Kauai, we shipped the easels and someone local purchased boards, which was cheaper than shipping.
Budget Needs: Assuming David Belles will transport to the 2009 meeting, no money for shipment will be needed. Some money should be budgeted to rent extra easels if more than 50 posters are to be presented.

Student Paper Judging – Paul Figueroa (Jesse Richardson)
Ryan Edwards asks how many members are there to judge papers and posters. Ryan Edwards would like to see more comments.

Vanelle Peterson notes there is far too much information on posters. Dan Ball suggests that perhaps she should author a 'how to make a poster' for publication in the news letter prior to the annual meeting.

Submitted Report: No submitted report.

Sustaining Membership – Pete Forster (Ron Crockett)

Submitted Report: No submitted report.

Fellows and Honorary Members – Phil Stahlman (Ron Crockett)
A proposal was discussed to make Tom Brokaw an honorary member.
Vanelle Peterson suggests we send a signed hardcopy book to Tom Brokaw.
Motion: Vanelle Peterson makes a motion direct the committee to name Tom Brokaw an honorary member in 2009. Carol Mallory-Smith seconds. **Motion Passed** unanimously.

Submitted Report: No submitted report.

Necrology – Laurel Baldwin (Ian Burke)

Submitted Report: No submitted report.

Public Relations - Brad Hanson (Bill Cobb)
Bill Cobb suggests we contact local universities who would be interested in the meeting contact be notified. The PR committee would be responsible for such contacts.

Submitted Report:
Date of Preparation: July 9, 2008
Activities during the Year:

- A post-meeting (2008) press release dated May 1, 2008 (see attachment) was distributed via email to:

AgOnline (Successful Farming)
Agronomy Society of America
AgWeb.com (Farm Journal)
American Society of Horticultural Science
American Vegetable Grower
Associated Press
California Farm Bureau Federation
Capital Press
Progressive Farmer
Farm Progress Publishing (California Farmer; Western Farmer – Stockman)
Metrofarm radio
Southwest Trees and Turf
Turf Magazine
Weed Science Society of America
Western Farm Press
Western Farm, Ranch, and Dairy Magazine
Wildland Weeds
Yuma Daily Sun

- Continuing education credits to meet state licensing requirements were obtained for the 2008 meeting from: Oregon, Montana, Washington, California, Kansas, Oklahoma, Nebraska, Arizona,

and New Mexico. Credits for the Certified Crop Advisor (CCA) and Society for Range Management certification programs were also obtained.

- Although usually available, no credits were obtained from Utah, Idaho, and Nevada in 2008 due to an oversight
- In late April and early May, an individual email memo and the post meeting press release was sent to various Department Heads, Unit Secretaries, University newspapers, and several industry supervisors detailing the award(s) presented to students, scientists, faculty, and staff from the various organizations. Each individual was recognized for their achievement and specific presentation titles or details from the award presentation were included in the letter.
- Milt McGiffen left the committee and Deb Shatley joined the committee following the 2008 meeting.

Suggestions for the Future: After the 2008 meeting, the WSWS Board offered several suggestions for the Public Relations Committee:

- Need for additional information on awardees etc. to be included in future press releases – this has been adopted
- Send awardee info to local universities and newspapers – this has been adopted
- Send Board electee information to local universities etc – this will be adopted following the next election
- Form a link to the WSSA Public Awareness Committee – has been initiated and will be continued and strengthened
- The PR Committee should take responsibility for the pre-meeting brochure that was done for the first time in 2008 – we will adopt and address this project
- Consider "white paper" topics for publication as a way to keep the public aware of weed issues; similar to the work of WSSA – in discussion but no action taken at this point

Herbicide Resistant Plants – Steve King (Phil Munger)

Submitted Report:

Date of Preparation: 06/26/2008

Activities during the Year: The committee constructed a poster titled "Herbicide Resistance in the Western United States" that was presented at the WSWS annual meeting. A copy of the poster is attached to this report.

Legislative – Dana Coggon (Vanelle Peterson)

There needs to be an improvement in communication between the committee and Lee Van Wychen.

Submitted Report: No submitted report.

Education Ad Hoc - Tracy Sterling (Bill Cobb)

The committee recommends to the board to make the distance education sub-committee a permanent component of the education committee. Carol Mallory-Smith points out that we should, as an organization, have an education committee.

Motion: Make a recommendation to the membership that the education committee become a standing committee. Seconded by Kirk Howatt. **Motion Passed** unanimously.

Dan Ball states that the education committee now requires an operating guide.

Motion: Kirk Howatt moves that the Education Committee would include the Distance Education Committee and the Noxious Weed Short Course. Bill Cobb seconded. **Motion Passed** unanimously.

Submitted Report:
Date of Preparation: July 1, 2008
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 and we thank Tony White for keeping the links up to date (see WSWS web site - http://www.wsweedscience.org/Lessons/lessons.asp). Many of these lessons have been published in the peer-reviewed, on-line journal, *Journal of Natural Resources and Life Science Education* (JNRLSE). Additional lessons are being prepared for consideration of publication. The funding provided by WSWS was used to set up the WSWS website as a sibling site to the http://plantandsoil.unl.edu website and showcase those lessons specific to Weed Science. We continue to work with Deana Namuth to upgrade the lessons and correct any problems.

Using these materials, Bill Dyer, Scott Nissen, and Tracy Sterling have offered a shared, graduate-level Herbicide Physiology course (PSPP 546 Herbicide Physiology) via Distance Education from Montana State University in Fall 2006 and 2007 (http://btc.montana.edu/courses/aspx/descrip3.aspx?TheID=104). In Fall 2006 and 2007, nine and eight students from across the U.S. (AZ, CA, CO, IA, MO, MT, OR, VA) and Canada (SK) enrolled with one dropping in 2006 and two dropping in 2007 because of time constraints. Students came from multiple backgrounds – those seeking M.Sc. and Ph.D. degrees as well as several from industry and consulting businesses, and one professor; this diversity really added to the quality of the discussions and insights shared. Student reviews were very favorable, emphasizing knowledge gained, clarity of expectations, and in-depth coverage of topics. This 14-week course will be offered every Fall semester. The course will be advertised in WSSA and WSWS newsletters for the 2008 offering.
Recommendations for Board Action: To make the Distance Education sub-committee a permanent component of the Education Committee.
Suggestions for the Future: Suggested Changes in Operating Guide: To make the Distance Education sub-committee a permanent component of the Education Committee.

Membership Ad Hoc - Phil Stahlman (Kirk Howatt)
Phil Stahlman suggests we discuss and consider authorizing a membership survey to assess the current value, importance, and format of the WSWS Research Progress Reports and Proceedings. The Research Progress Reports currently serve as a place to put research that may not ever be published, like efficacy work. They also serve as an outlet for county faculty, new faculty, or others that might not be interested in publishing such information in a peer-reviewed journal. Vanelle Peterson suggests rephrasing the question to make sure that people understand the Proceedings and the Research Progress reports are publications.

Vanelle Peterson suggests that we poll those in the business meeting about the utility of the publications and other things of value in the Society.

Phil Stahlman suggests that we give some thought to revisit the survey and make sure we are addressing points raised by the 2000 survey. Carol Mallory-Smith requested Phil Stahlman to send the results of 2000 Survey to the Board.

Dan Ball suggests that Phil Stahlman remind Dan Ball and also organize questions for the informal Business Meeting survey.

Submitted Report:
Date of Preparation: July 19, 2008
Activities during the Year: Members of the WSWS were last surveyed in 2004. That survey focused on how well WSWS was meeting the career needs of members, asked for ways to increase the value of WSWS membership, and sought member input on the major challenges, opportunities, and trends in Western Weed Management in the next 5 to 10 years. Approximately 75% of survey respondents indicated WSWS was doing a good job (4 or 5 on a scale of 1-5) in meeting their needs. In response to the question "What does WSWS offer that is most valuable or useful to you?", few (5 out of 249 responses) mentioned WSWS publications. Considering changes in technology and the ways people access information today, there is need to examine and assess the value and relevance of WSWS publications.
Recommendations for Board Action: Discuss and consider authorizing a membership survey to assess the current value, importance, and format of the WSWS Research Progress Reports and Proceedings.
Budget Needs: $50 for paper and copying if paper-based survey is conducted.
Suggestions for the Future: Assess WSWS response to the challenges, opportunities, and critical issues identified in the 2004 survey.

Noxious Weed Short Course - Celestine Duncan (Carol Mallory-Smith)
Carol Mallory-Smith notes that Celestine Duncan will raise the price of the Short Course $50.

Submitted Report:
Date of Preparation: 7/08
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 21st through 24th, 2008, and is scheduled for April 27th through 30th, 2009. There were 40 people that attended in 2008 including employees of the USFS, BLM, National Park Service, Fish and Wildlife Service, Dept. of Transportation, private conservation groups, and County Weed Coordinators. The course continues to be highly recommended to weed managers within agencies.

Instructors include: Dr. Rod Lym, Dr. Scott Nissen, Dr. Steve Dewey, Dr. Jim Jacobs, and Celestine Duncan representing the Western Society of Weed Science. Ken Cantrell (USFS), Dr. Rachel Frost (MSU), Gary Adams, USDA APHIS, Mary Mayer USDA, ARS, Melissa Brown, consultant, also assisted with the course.

Registration fees were $500/person for the 2008 course with $50 non-refundable. The course will increase fees to $550 for 2009.

Recommendations for Board Action: continue course
Budget Needs: None- funded by registration. There will be an increase in registration fees for the 2008 course to cover cost of PayPal and increase in food/meeting room costs.

Invasive Weeds Awareness Week - Nelroy Jackson (Phil Munger)

Submitted Report:

Registration and Sleeping Room Pickup: Paid registrations were 137 compared to 162 in 2007 and 175 in 2006. The downward trend is partially due to tightening state, county, and NGO budgets. Also, more attendees shared rooms than in prior years.

Program innovations: There was a change in format for the Departmental Briefings - Roundtables were held at the hotel instead of `Talking Heads' presentations at the two Departments. These were successful and more fruitful. Interestingly, a few `Talking Heads' requested to address the group. There was a `Mixer' and Poster Session on Sunday evening instead of the Orientation Session, and a Contractors' Roundtable was held. An EPA briefing, involving Don Stubbs, Dan Kenny, Steve Dewey and Kurt Getsinger was also held.

Program Highlight: A presentation by Troy and Lori Zaumseil from CNIPM, Alaska showed how citizen activists can have a tremendous effect. They educated themselves on invasive weeds and got the municipalities around Anchorage, their senators and congressman, as well as the Governor to pay attention to the issue and take action.

Legislative Progress: Support of S 1949 - the 100' Meridian Bill was the main position of NIWAW9. Support of SCROCDA (the saltcedar act), better support for the COE aquatic program and Q37 Rules and Regulations were also explained. A large number of congressional visits were made.

The week provided opportunities for Jeff Derr and David Shaw to meet with
David Lodge and Dick Mack of the ESA (Ecological Society of America) to discuss possible avenues for WSSA and ESA to continue cooperation. David and Dick were brought into Washington DC to make congressional and departmental visits specifically during NIWAW.

Planning for NIWAW 10, which will be held February 22/27 in Washington DC, is underway. All members of WSWS are encouraged to attend.

Director of Science Policy - Lee Van Wychen (Phil Munger)

Submitted Report:

DSP Priorities- WSSA Board of Directors Survey Results.

1. Continue to work on public relations and weed science press releases
2. Continue to push awareness of biofuels and invasive weed issues
3. Make sure NEW farm bill research money for organics, specialty crops, and biofuels finds weed science.
4. Work to increase funding for USDA NRI and resolve "pre-proposal" issues.
5. Conduct National Invasive Weed Awareness Week
6. Conduct meetings and garner support for maintaining USDA-ARS position for a NPL for weed science.
7. Continue to build partnerships with wildlife and public lands groups
8. Herbicide resistance / glyphosate stewardship issues
9. Create WSSA membership brochure / marketing display
10. Increase aquatic weed control/ Army Corp of Engineer funding
11. Hire/select/find an intern to assist in weed science policy
12. Apply for EPA Conference Grant ($25K - $75K) with Steve Dewey on invasive weed issue

13. Work to create and pass legislation for an invasive species management fund
14. Work to change OMB attitude about acceptable weed management vs. eradication
15. Develop an experts database for weed scientists
16. Create Interagency Personnel Agreements (IPA) with Forest Service, NRCS
17. Advocate for passage and funding of 100th Meridian Invasive Species Bill
18. Finalize WSSA-accepted definitions for invasive plants and weeds
19. Attend International Weed Science Congress and or Weeds Across Borders conference

2008 Farm Bill Implementation

USDA is moving full speed ahead on implementing the 2008 Farm Bill. The Research Title has some considerable changes in the organization and structure of USDA's Research Education and Economics mission area that are designed to enhance and streamline multi-agency collaboration. There is approximately $500 million in new mandatory research funds over the next five years in areas such as specialty crops, organic agriculture, and biofuels. However, current sentiment is that earmarks will continue to be phased out.

NIFA, the National Institute of Food and Agriculture. All of the authorities under the existing CSREES are transferred to NIFA. NIFA will be headed by a Director who is appointed by the President for a 6 year term. NIFA will be responsible for administering the Agriculture and Food Research Initiative (AFRI) grants, which combines the money and authorities from the National Research Initiative (NRI) and Initiative for Future Agricultural and Food Systems (IFAFS) grants. Discretionary funding for AFRI is set at $700 million per year from 2008-2012 with 60% designated for basic research and 40% to applied research. At least 30% of AFRI funds must go to integrated projects that include teaching and extension components as well.

The USDA Under Secretary for Research, Education and Economics will become USDA's chief scientist and retain jurisdiction over the Agricultural Research Service (ARS), the Economic Research Service (ERS) and the National Agricultural Statistics Service (NASS). To ensure greater collaboration among these agencies and NIFA, the Under Secretary will have an expanded staff to be housed within a new Research, Extension and Education Office (REEO) with six divisions: 1) Renewable Energy, Natural Resources and Environment; 2) Food Safety, Nutrition and Health; 3) Plant Health and Production; 4) Animal Health and Production and Animal Products; 5) Agriculture Systems and Technology; and 6) Agriculture Economics and Rural Communities. The Under Secretary will be charged with preparing an annual "road map" to guide all of the USDA science agencies.

FY09 USDA CSREES and ARS Budgets

The Senate Appropriations Committee marked up the FY2009 Agriculture Appropriations bill on July 17. The full House Appropriations Committee has not yet reported its version of the ag appropriations bill so I've used their Subcommittee report numbers. The FY2009 appropriations process remains very fluid and it is unclear how the "end-game" will unfold.

CSREES- The short version is that the House and Senate rejected most of the Administration's proposed cuts except for earmarks. The formula fund programs got increases in both the House and Senate over FY2008 enacted. Smith Lever 3(b) and 3(c) is $15M above last year at approx. $290M. The Hatch Act is proposed to get a $10 to $18 million increase over the $195 million from last year. The Agriculture and Food Reseprch Initiative (formerly the NRI) is set to get $200 million, a$10 million increase FY2008 enacted.

The Senate made significant reductions in the CSREES accounts generally considered "earmarks." These reductions totaled $66 million compared to the total "earmarks" of $151 million in FY 2008.

The 2008 Farm Bill included **mandatory** funding for three **new** CSREES programs: (1) Organic Agriculture Research & Extension Initiative ($18M); (2) Specialty Crop Research Initiative ($50M); and (3) Beginning Farmer and Rancher Development Program ($19M). The House Ag Appropriations Subcommittee did not impose any "limitations" on these mandatory funds. However, the Senate Appropriations Committee reduces mandatory funding for these three new programs by a total of $19 million. Specifically, the Senate cut $2M from Organic, $14M from Specialty crops, and $3M from Beginning Farmer.

ARS- The short version is that the House and Senate rejected almost all the Administration's proposed cuts to existing research programs. The Senate version provided $1.13 billion for ARS, a $13 million increase over FY2008. The Senate Appropriations committee rejected nearly every proposal to terminate ongoing research and directs USDA NOT to close any laboratories. '

$28.4 Million in Funding for Specialty Crop Research-Announced This Week

CSREES is now requesting applications for the Specialty Crop Research Initiative (SCRI), which is new research money in the 2008 Farm Bill. Specialty crops are defined as fruits and vegetables, tree nuts, dried fruits and nursery crops including floriculture. The SCRI has five focus areas: 1) plant breeding, genetics and genomics research to improve crop characteristics; 2) **efforts to identify and address threats from pests and diseases;** 3) innovations and technology, including improved mechanization and technologies that delay or inhibit ripening; 4) efforts to improve production efficiency, productivity and profitability; and 5) methods to prevent, detect, monitor, control and respond to potential food safety hazards in the production and processing of specialty crops.

NIWAW/IWAC/NCIPA/NIPM

WSSA President Jeff Derr and I have edited a proposed charter for the Invasive Weed Awareness Coalition (IWAC), currently a 15 member coalition of public and private stakeholders. The goal of IWAC is to facilitate and foster collaboration, education, and action to raise the awareness of the invasive plant issues across the United States and world-wide. The coalition will not engage in lobbying. The main part of IWAC's responsibility is to organize NIWAW. As WSSA Director of Science Policy, I will serve as the IWAC Chair. Since our National Fish and Wildlife Foundation grant of $15,000 was not accepted for a 4~' year, IWAC will be soliciting proposals for the NIWAW Coordinator position. IWAC will be meeting July 30 to vote on the NIWAW coordinator and approve the charter.

Separate from this is a new lobbying coalition that has a couple of proposed names: the National Coalition for Invasive Plant Advocacy (NCIPA) or the National Invasive Plant Management (NIPM) Coalition. This Coalition would be a nonprofit, nonpartisan, consensus-based coalition that brings invasive plant stakeholders together, serving as a forum and a unified voice in support of sustaining and increasing public investment at the national level in invasive plant prevention, education, management, and research. This Coalition needs to start moving forward as soon as we have IWAC formalized as the lobbying faction. NCIPA/NIPM will meet during NIWAW as well.

WSSA Public Awareness Committee - 2008 Activities to 7/17/08

Press Releases

1. Tropical Soda Apple Overshadows Some Agricultural Industries in the Sunshine State (Jan 8)

(over 2100 accesses)
2. The 48th Annual Meeting of the Weed Science Society of America Hosts International Experts on Weed Management (Jan 24) (over 180p accesses)
3. Weed Science Society of America announces Scientific Award Winners (Feb 7) (distributed to each of the 19 winners' university or hometown publications)
4. The 9th Annual National Invasive Weed Awareness Week (NIWAW) Reminds Us to Spread the Word, not the Weeds (Feb 20) (over 2200 accesses)
5. Climate Change Fueling a New Generation of More Aggressive Weeds (March 25) (over 1800 full page reads and over 100,000 headline impressions)
6. Weed Science Society of America: Algae-Harboring Hydra7la Causing Bald Eagle Deaths in the Southeast (March 31)
7. Beetles Help Take a Bite Out of One of the World's Most Aggressive Weeds (Loosestrife) (Apr 21) (over 1500 full page reads and over 109,000 headline impressions)
8. Giant Cousin of the Carrot Plagues Backyard Gardeners with Blisters and Burns (Hogweed) (May 5) 9. Weed Science Society of America Warns Glyphosate Resistance Increasing (May 19)
10. 5th International Weed Science Congress Highlights the Impact of Weeds on Agricultural Systems, the Environment and the Global Economy (June 16)

Other Completed Work
1. Janis NIWAW Presentation
2. Updated Strategic Plan; Measures of Success
3. Built Master Media Lists using Cision and MediaAtlas and segmented by coverage area, including gardening & horticulture, agribusiness, farming, environment, lawn care, etc.; and complemented our current distribution (PR Web and 80 daily newspapers in key markets) to include trade publications, smaller daily and weekly newspapers, broadcast news outlets and online publications.
4. Created handout on WSSA/How to Become a Member and Importance of/Careers in Weed Science; distributed at Weeds Across Borders

Work In-Progress:
1. First WSSA "Newslines" (Reporters' Notebook) and Reporters' Pressroom
2. Press release: Weed Control can Improve the Quality of Life for Women in Africa
3. Press release: "Underground Gardening" by Earthworms is Spreading One of the Nation's Most Irritating Weeds.
4. Press release: The Potential of Molecular Biology in Weed Science
5. Early Planning - WSSA Golf Event

Symposium Committee Ad Hoc - April Fletcher
April Fletcher recommends that we use option 3 in her Symposium Committee report. Phil Banks has concerns that there might not be an available room for breakfast and lunch for Symposium participants. Carol Mallory-Smith suggests that we invite Symposium participants to the Business breakfast. The hotel might reduce the price if we ask them to remove that charge from a package price. Phil Stahlman points out that 9 AM is late for breakfast, and we could expect participants to have breakfast before arrival. Consensus seems to be to use Option 2.

Dan Ball recommends that April Fletcher coordinate with the Program Committee to avoid overlap with the Business Meeting and Breakfast.

Carol Mallory-Smith asks that we remove the slush fund. April Fletcher asks for at least $1000 for potential travel.

Phil Banks suggests that $100 may be an appropriate price, and we might not want to increase $125.

Motion: Kirk Howatt moves to accept the proposed agenda and plan except that the slush fund is removed, replace it with a $1000 travel budget, and to keep the registration at $100, $70 for members. Vanelle Peterson seconds. **Motion Passed** unanimously.

Submitted Report:
Date of Preparation: July 24, 2008
Activities to Date: The committee has drafted an agenda for the Symposium on Biological Control, to be held all day on March 12, 2009. We have been contacting potential speakers, and have confirmed a number of them. Emphasis has been on locating speakers who would already be attending WSWS or who could pay their own expenses. A copy of the Draft Agenda is attached: Speakers we are still trying to reach or confirm are followed by question marks. Those without question marks have agreed to present or for their alternates to present.

There are several alternatives concerning expenses for participants (meals, breaks). Since a number of the participants may be driving in early that morning, we want to offer at least a simple continental breakfast. Also, because of the tight time frame, we want to offer a buffet lunch, so we can limit the lunch time to one hour. There are three alternatives listed on the attached Projected Expenses/Income sheet, of which we would prefer to offer Alternative 3.

Of the speakers whom we have confirmed, none have expressed a need for our covering expenses. Since there are several gaps in the agenda still, there may be others who need travel covered. We are proposing a $5,000 "slush" fund for travel, which may or may not be needed.

We are also proposing consideration of raising the Symposium fee to $125.00 from $100.00, to make sure we can cover the cost of the continental breakfast and buffet lunch for registrants and added expenses for speakers' lunch and their travel IF needed. The estimated income from both fee levels is on the attached Project Expenses/Income sheet. This is based on a modest 75 registrants - probably a significant underestimate of registration for the Symposium.

I am requesting a hotel room for the night of March 11, just before the Symposium, to permit me to be on-site first thing morning of March 12: I live an hour out of town, and my commute is *with* rush-hour traffic. If a "comp" room is available for that night, there would be no added expense; otherwise it would be hotel for one night.

Recommendations for Board Action: Discussion and recommendation/decision regarding raising the Symposium fee to $125.00 if it's needed..
Budget Needs: Approval of up to $5,000 for a speakers travel "slush" fund to be used only if needed.

OLD BUSINESS

Symposium Committee Operating Guide
April Fletcher notes that the 2 year time frame would mean that there would not be a Symposium in Hawaii. Dan Ball points out that given justification, a 1 year time frame is provided for in the

operating guide. Carol Mallory-Smith points out that there would necessarily be a group for each symposium, and that maybe an ad hoc committee for each symposium, with board representation on each ad hoc committee would be sufficient. Vanelle Peterson supports making a standing committee to ensure that the recent experiences are captured for future Society leadership. Carol Mallory-Smith suggests that in addition to the Past President, an At Large Member serve on the symposium committee. Dan Ball requests that we move forward with a standing committee. Dan Ball will continue to refine the operating guide to incorporate the several subcommittees necessary to facilitate multiple year planning. Phil Stahlman requests that we refine the wording on accepting symposiums with one year of planning. Kai Umeda suggests putting a call for symposium ideas for Hawaii if planners are energetic enough to serve on the symposium committee and organize the symposium. Bill Cobb reiterated that the person organizing a symposium on short notice be proactive and plan the symposium. Dan Ball will continue to work on the operating guide and present it to the board soon.

IWSC Donation
Carol Mallory-Smith reported that we supported the coffee break, and we were the only region to do so. The WSWS was suitably recognized.

NEW BUSINESS

Selection of a local arrangements chair for Hawaii in 2010
Jeremy Gooding is currently our local Hawaii contact. Dan Ball mentioned that Jeremy is on Maui, and he could possibly use help from someone on the big island, too.

Website voting for WSWS Elections A beta version of the on-line voting site is available for testing by the WSWS Board of Directors. Our webmaster, Tony White, has been working on developing this on-line capability. It is planned to be operational for the next, upcoming elections. WSWS members without an email address will be mailed paper ballots.

Voting status for Board of Director members
Dan Ball summarized past business, noting that there was some discussion of making a student liaison a voting member. Phil Stahlman asked what the justification was. Dan Ball notes that the students are spending the time attending and preparing for the board meetings.
Phil Stahlman notes that a majority of the voting members of the board are elected. Carol Mallory-Smith and Vanelle Peterson think that the Members-at-large should be elected. Phil Stahlman notes that the issue should be studied.

Collages
April Fletcher has offered collages for silent auction, proceeds to offset student travel to Hawaii. April Fletcher asks that the proceeds be divided among several students. Kirk Howatt wanted to know if there needed to be a contact on the board for the student liaisons. Dan Ball suggests the Public Sector Member-at-Large serve and also that WSWS consider supporting. Jesse Richardson suggests that industry might want to be invited – Phil Stahlman suggests we ask the host site hotel be asked to contribute.

Phil Banks recommends that we place the silent auction online prior to the meeting, with pictures. Dan Ball supports the idea. April Fletcher suggests we use matching WSWS funds. Carol Mallory-Smith suggested that we set a limit, perhaps that WSWS would contribute $5000, to encourage a commensurate bid.

Motion: Kirk Howatt moves to have WSWS contribute up to $2500 in matching funds to whatever funds the silent auction brings. Jesse Richardson seconds. **Motion Passed** unanimously.

Student Scholarship to Attend Annual Meeting
The board requests a proposal to consider at the next board meeting.

Symposium at the Hawaii Meeting
Vanelle Peterson suggests that we consider carefully a well planned symposium centered on topics concerning Hawaii. Phil Stahlman suggests that we provide the venue and allow those interested in Hawaii to plan and conduct such a symposium.

Books to the Governors
Motion: Carol Mallory-Smith moves that we send a copy of Weeds of the West to each governor of western states that were represented at the western governors conference, with a cover letter copied to the head of department of agriculture of each respective state. Vanelle Peterson seconds. **Motion Passed** unanimously.

Weeds of the West Revision
Dan Ball notes that the Weeds of the West has not been revised since 2000. Vanelle Peterson strongly encourages a revision. The revision would add new invasive species and correct and replace many pictures. Dan Ball notes that 2009 would be the 10 year mark and a good time to put together a group to revise. April Fletcher suggests adding invasive trees. Phil Stahlman notes that we are at the limit of the thickness. Carol Mallory-Smith asks if we publish now, how long it would take to revise the book. Phil Banks states that it would take about 2 years before the next reprinting will be needed.

Phil Banks reports that we only have a memorandum of agreement with Tom Whitson to continue to work on the Weeds of the West. There is some question on what would happen if Tom chose not to be involved.

Motion: Vanelle Peterson makes a motion to adjourn, Jesse Richardson seconds. **Motion Passed** unanimously.

Respectfully submitted – Ian C. Burke WSWS Executive Board Secretary – July 28, 2008.

WSWS Board of Directors Meeting
Monday, March 9, 2009
Embassy Suites Hotel, Albuquerque, NM

Call to Order – Dan Ball

Present at the meeting: Dan Ball, Jesse Richardson, Ian Burke, Carol Mallory-Smith, Tim Miller, Kirk Howatt, Bill Cobb, Phil Banks, Ed Peachy, Kai Umeda, Phil Stahlman, Melissa Bridges, Ryan Edwards, Philip Munger, Pat Clay, John Fenderson (Chair of the Finance Committee), Keith Duncan.

Motion: Approval of Agenda: Add discussion of institution of travel scholarships for students. Kirk Howatt moves to approve the agenda, Carol Mallory-Smith seconds. **The motion passed unanimously.**

Motion: Jesse Richardson makes a motion to approve the addendum to the March 9 2009. Carol Mallory-Smith seconds the motion. **The motion passed unanimously.**

President's Report – Dan Ball

Activities during the Year: I took office as President on March 13, 2008 at the WSWS annual meeting in Anaheim, CA. This report reflects activity since my previous report given at the July 25, 2008 Summer Board meeting in Albuquerque.

I asked Tim Miller of WSU-Mt. Vernon to replace Vanelle Peterson as WSSA Representative, a 3-year assignment. Tim accepted, and attended the 2009 Orlando WSSA meeting in that capacity. At the Board meeting of March 10, 2008 in Anaheim, a motion was approved to change the symposium committee from an ad-hoc to a standing committee. I have prepared an operating guide with the assistance of several others. This guide needs to be discussed and approved by the Board.

In a keynote address to a Western Governors Association conference, Tom Brokaw of NBC News commented on the WSWS book, Weeds of the West, indicating that it was a favorite of his. In response to this positive endorsement, a Board motion was made and approved on July 25, 2008 to offer Tom Brokaw an Honorary Membership in WSWS, and to send a copy of Weeds of the West to all western Governors. Dan Ball notes that many governors sent thank you letters.

Mr. Brokaw has accepted our invitation and will accept the award at the Wednesday, March 11th awards luncheon via a telephone link. Copies of Weeds of the West were sent to a list of western governors. I have assembled a notebook of thank you notes that I received in reply. This will be available for viewing at the registration desk
during the 2009 meeting.

Letters were sent to all 2009 successful and unsuccessful candidates for WSWS elected offices, and to all 2009 WSWS Award winners, and fellows. Articles were submitted for WSWS Newsletters in April, Sept., and Nov. 2008, and January 2009. Communicated with WSSA to add WSWS endorsement of a WSSA letter of rebuttal for a NRDC petition to cancel all registered uses for 2,4-D.

Several communications with the Board of Directors (BOD) took place via email to approve minutes from the July 25-26, 2008 BOD Summer meeting. This led to a motion and subsequent approval of the summer board meeting minutes on September 19, 2008. Upon Board approval, I offered the Presidential Award of Merit to Mike Edwards. Mike will accept this award at the Wednesday awards luncheon.

Recommendations for Board Action: I would request that the Board of Directors adopt an operating guide as drafted to facilitate functioning of a Symposium Committee.

Suggestions for the Future: I suggest having a BOD discussion about future revisions to Weeds of the West.

The CAST representative position held by Phil Stahlman will need to be appointed after the fall 2009 CAST meeting.

Suggested Operating Guide Changes: Need approval of an operating guide for the Symposium Committee.

Treasurer-Business Manager Report – Phil Banks

Activities during the Year:

All bills have been paid, tax forms have been filed, and the current financial status of WSWS is attached. As of February 27, 2009 we have $301,132.64 in capital with an additional asset of $191,259.00 in unsold Weeds of the West inventory. We reprinted Weeds of the West (10,000 copies) during the year at a cost of $116,280.00. We have no unpaid liabilities for the year with the exception of expenses related to the Albuquerque meeting which will be paid prior to the end of our fiscal year (March 31, 2009). Also attached is an estimated and final budget for the 2007-2008 operating year and an estimated and current budget for 2008-2009. All Newsletters were printed and mailed on time.

In cooperation with the Website Editor, we have added additional books for sale through our website. Several books published by Wiley publishing can be purchased with WSWS receiving a percentage of each sale. This was started only recently and so far we have not determined how much income will be realized. We will also arrange to offer the new Southern Weed Science Society Weed I.D. book.

I have worked with the Site Selection Committee for the 2012 meeting. We sent our RFP to hotels and Convention and Visitor Bureau's in Salt Lake City, Denver, Sacramento, and Reno. Several proposals have been received and we will summarize them for the Site Selection Committee to review during the Albuquerque meeting.

The Business Manager will again present a New Member Orientation and a New Officer Orientation presentation during the annual meeting.

We have electronically scanned existing WSWS Proceedings into pdf files from 1938 through 1981 to preserve these documents and Web Editor Tony White has posted them for WSWS Members to view and use. In 2008, the Board approved the use of $ 2000 to complete this work. These funds have not been used but will be put to use in 2009 to hire an NMSU student to hopefully complete the task by mid-year.

Dan Ball asks if the $2000 is sufficient to cover labor. Phil Banks thought it was.

We switched master accounts for credit card services, and this caused some difficulties in attributing registrants to University bookkeepers.

Western Society of Weed Science: Budget for 2008-2009 (April 1, 2008-March 31, 2009)						
	Estimate	Actual		Estimate		
	2008-09	through 3/2/09		2009-10		
Annual Meeting Income*	$65,000.00	$63,892.45		$65,000.00		
Expenses						
Annual Meeting**	$42,200.00	$13,287.95		$45,000.00		
Website	$500.00	$1,810.00		$500.00		
Accountant	$390.00	$385.65		$385.00		
Insurance	$500.00	$500.00		$500.00		
CAST dues	$650.00	$679.00		$690.00		
WSSA Dir. Sci. Policy	$15,000.00	$15,000.00		$15,000.00		
Student Awards	$1,000.00	$1,000.00		$1,000.00		
Business Manager	$19,500.00	$19,500.00		$19,500.00		
	$79,740.00			$82,575.00		
	($14,740.00)			($17,575.00)		
*Includes registration fees, individual and sustaining membership dues, RPR and Proceedings income.						
**Includes hotel charges, travel, printing costs (newsletters, programs Proceedings, RPR), postage, etc.						

Western Society of Weed Science Financial Report
April 1, 2008 through March 31, 2009
Annual Meeting Report

CAPITAL

2007-2008 Balance Forward	$380,722.79
Current Income (loss) for 2008-2009	(108,420.28)
	$272,302.51

DISTRIBUTION OF CAPITAL

RBC Dain Rauscher Funds	$165,278.12
Money Market (Bank of the West)	21,892.25
Checking (Bank of the West)	41,775.63
Certificate of Deposit (Bank of the West)	43356.51
	$272,302.51

WSWS Financial Report – April 1, 2008 through March 31, 2009

INCOME

Registration & Membership Dues (includes Proceeding and Research Progress Report income)	$ 63,985.95
Noxious Weed Control Short Course	26,167.65
Weeds of the West	70,918.45
Bio Control of Invasive Weeds book	895.79
California Weeds Books	1,311.82
Bank interest & Investment income	1,583.17
2009 Sustaining Membership Dues	6,600.00
Invasive Plants Book	98.97
Student Travel Account	300.00
	$ 171,861.80

EXPENSES

Annual Meeting Expenses (includes cost of Proceedings, Research Progress Report, & programs printing and mailing)	41,015.75
Website (Host fees & service)	1,810.00
Tax Accountant	385.65
Liability Insurance	500.00
CAST Membership Dues (2008)	679.00
CAST Representative Travel	0.00
WSSA Director of Science Policy	15,000.00
Service Contract for business management	19,500.00
Noxious Weed Control Short Course	22,047.48
IWSC Meeting Support- Vancouver ‘08	4,000.00
Newsletters (printing and postage)	759.56
Invasive Plants Books	10.50
Travel to Board meeting	2,500.37
Website transaction fee (Web Editor)	1,020.00
Book handling charges	437.50
Merchant credit card fee (PowerPay)	2607.31
Monthly credit card fee (AuthorizNet)	634.43
Virtual Terminal (PayPal)	210.00
Weeds of the West	117,285.98
California Weeds Book fee	1,369.00
Misc. Expenses	30.00
	$ 231,802.53

Recommendations for Board Consideration:

1. The Hawaii meeting will be considerably more expensive and possibly pose an economic hardship on members and result in reduced income for WSWS. The cost for the entire Board to meet in Hawaii for the summer Board meeting may be prohibitive. I will present cost alternatives for other meeting sites for consideration.

We are going to continue to lose money on the meeting when the Business Manager’s and Science Policy’s costs are included.

Carol Mallory-Smith notes they are not part of the annual meeting expenses. Phil Banks notes that the Business Manager's costs are closely associated with the costs of the meeting.

Carol Mallory-Smith asks about future costs. Phil Banks notes the attendance next year is unknown due to the economic situation. We need to be prepared to pay a penalty if we do not meet our room block. Phil Banks notes that we can cut rooms from the block if need be.

Kirk Howatt asks how many room nights we had reserved. Phil Banks notes that 1725 room nights are allocated, and extra days count toward the room block. Carol Mallory-Smith notes we should advertise widely.

Phil Banks suggests that the summer board meeting be scheduled at Portland due to a preponderance of the board located near Portland.

Carol Mallory-Smith suggests we move to the Finance Committee report.

Finance Committee Report – John Fenderson

Officer or Chairperson Name and Committee Members: John Fenderson, Phil Munger, Leo Charvat

Activities during the Year: The Finance committee met at the annual meeting of the society. Financial reports and investments were reviewed with Business Manager Phil Banks. All financial records and investments were found to be in good order and the society is operating within its financial operating guidelines.

Financial advisor Stan Cooper met with the board at last year's meeting and recommended a new strategy for our investment portfolio. The board instructed the Finance committee to implement the new strategy according to the financial advisor's recommendations.

The finance committee met via telephone and communicated via email in July and August 2008 with regard to our investment account. After communication with the society financial advisor, it was deemed appropriate to reallocate our assets since market opportunities to recoup lost principal appeared unlikely. The financial advisor was instructed to convert our current assets to the more conservative approach adopted by the board and committee when he deemed most appropriate.

Changes in the investment portfolio were implemented in August. Investment allocations are as follows: 17% Equities, 26% Hedge fund, 56% Bonds, and 1% Cash. This represents a decrease of 44% in Equities and an increase in Bonds of 19% compared to the previous year reflecting our new investment direction. (Note, Hedge fund investments are considered alternative investments with relatively low risk and low correlation to the market as a whole – this year it was correlated to the market). Short term, the financial advisor would advise vacating the stock market all together should significant rallies permit recapture of lost principal.

As of February 27, 2009 overall value of the RBC Wealth Management account was $161,129 vs. $214,748, a decrease of $53,619 from 1 year earlier. 2008 overall return was -22.51% vs. the S&P 500 which was down 36.99%.

Recommendations for Board Action: The financial advisor has suggested that we change our financial arrangement with RBC to a fixed percent of the plan value. The fee would be 1.25% of the

total value. This structure is recommended so we can be more fluid with our investments, not requiring transaction fees each time a move was made. He believes this to be appropriate considering the volatility in the market and the need to make frequent adjustments in our investment selections. The Finance Committee would recommend that this be adopted by the board.

The opinion of Stan at RBC Dain is that there will be a rebound and the stock market may move back in the mid 9000s. At that point, he recommends that we move all principle out of the market and into safe investments, especially bonds, as he foresees a further reduction in stock market value. It is also his opinion that we could see a doubling of unemployment with deflation. The bottom line is his advice is that we protect principle.

Budget Needs: Grad Student travel to 2010 meeting in Hawaii?
Name of Person Preparing This Report: John M. Fenderson

> *Dan Ball notes that our objective of our society is to preserve principle. He recommends that we express that attitude to our advisor. Kirk Howatt questions the necessary to move money back into the market. John Fenderson notes that we should probably express that to the manager. Carol Mallory-Smith M. recommends that follow our manager's advice based on his record predicting the current economic environment. John Fenderson also suggests that we switch to a flat maintenance fee (1.25%) based on his advice to make rapid moves, which would incur higher transaction fees. Phil Munger asks if we need to have a statement of monetary purpose much like we had in place up until the 2008 spring board meeting. Dan Ball thinks we might be able to accommodate such a statement, if the finance committee thinks it would be useful. Phil Banks notes that we should probably emphasize conservative management.*

Motion: John Fenderson suggests we adopt the flat maintenance fee. Jesse Richardson agrees. Kirk Howatt moves that we accept the proposed flat fee structure (1.25%) and follow our investment accountant's recommendations on the management of the account. Carol Mallory-Smith seconds. **The motion passed unanimously.**

Program Committee / President-Elect Report – Jesse Richardson
The Anaheim meeting was the highest number of titles for some time, and the Albuquerque meeting was very close.

Program Committee Chair for 2008-2009 WSWS annual meeting in Albuquerque, NM. Special thanks to Keith Duncan, local arrangements chair, and Phil Banks, business manager.

Submitted the call for papers on September 4, 2008.

Submitted an annual meeting preview for the January newsletter.

Recommended to the chair of the Education and Regulatory Section to adopt the topic of digital photography, utilizing selected speakers from the 1997 Education and Regulatory Section on a related topic. Attended a meeting of three of the speakers on January 13, 2009 in Sacramento.

Served as chair of the Publications Committee 2008-2009.

Suggestions for the Future: Should we consider combining Weeds of Range and Forest and Wetlands and Wildlands projects into one project? A review of the titles in the 2009 program

suggests that the line between the two appears to be blurry at best. Should we consider a new name of Range, Forest and Wetlands, or perhaps Range, Forest and Wildlands? For the 2009 meeting, Range and Forest encompasses a sizeable group of oral papers and posters, while Wetlands and Wildlands is small (four oral papers, four posters). For the past two years at least, these two sections have combined for their discussion session, suggesting that they are already closely aligned. Virtually 100% of the Wetlands and Wildlands oral papers and posters that were submitted for the 2009 program listed Weeds of Range and Forest as their second choice, and vice versa. I have asked the chairs of both projects to discuss this topic in their discussion session on March 11. Making such a change would be significant, and should only be made after thoughtful consideration.

Dan Ball notes that as you put the program together, it would simplify the process to arrange the program. Phil Stahlman notes that when he was program chair, he scheduled the two sessions concurrently and received negative feedback on the arrangement. He also notes that the number of papers in the two sessions fluctuates considerably year to year.

Melissa Bridges suggests that the nature of the presentations in these two sections tends to be more basic in nature. She suggests that we combine the Wetland and Wildlands and Range and Forest Projects, and open a new project more focused on Ecology and Biology. Phil Banks suggests that we follow the recommendations of the two projects, and Jesse Richardson agrees.

Program Committee Report – Jesse Richardson

Officer or Chairperson Name and Committee Members: Jesse Richardson, Chair, Kirk Howatt, Bill Cobb.

Activities during the Year: The program committee has compiled the program for the 2009 WSWS Annual meeting to be held March 9-12, 2009 at the Embassy Suites in Albuquerque, NM. There were 67 posters submitted, 80 volunteered oral papers, 25 symposium invited papers, and 4 general session talks for a total oral paper count of 109. The break-down of oral papers is as follows: Agronomic Crops – 36, Range and Forest – 20, Basic Sciences – 5, Horticultural Crops – 11, Teaching and Tech Transfer – 0, Wetlands and Wildlands – 4, Jointed Goatgrass Symposium – 8, Biological Control of Invasive Plants Symposium – 17, and Education and Regulatory session – 4.

Budget Needs: A small number of speakers were provided travel and lodging reimbursement. The amounts fell within the budgets previously approved. Exact cost figures are not available. Section and symposium organizers did an excellent job staying within budget this year.

Education and Regulatory Section – Bill Cobb

Activities during the Year:
Organized the speakers and schedule for the 2009 Education and Regulatory Section (Jesse Richardson's ***help*** in all of this is hereby gratefully acknowledged). Thursday, March 12th, 2009

Title: Digital Photography

9:30 Equipment and Fundamentals
Clyde Elmore, University of California, Davis, CA.

10:00 Close-up Photography, Range of Light Photography

Jack Schlesselman, Reedly, CA.

10:30 Simple Techniques for Improving Digital Photographs
Joe M. DiTomaso, University of California, Davis, CA.

11:00 Forensic Photography
William T. Cobb, Cobb Consulting Services, Kennewick, WA.

Name of Person Preparing This Report: Bill Cobb

Member-at-Large (Public Sector) – Carol Mallory-Smith

Carol Mallory-Smith notes that she received a question about what is the appropriate use of the WSWS listserv is.

Phil Banks notes that any member can currently send a message over the list serve. He suggests that we limit the use by allowing Tony White to approve list serve messages. Dan Ball notes it was a energetic session chair, and that as long as it is WSWS business, that use is acceptable. Phil Banks notes that any member can remove their name from the list serve if they do not want to receive the messages.

Member at Large (Private Sector) – Phil Munger

Activities during the Year:
- Reviewed during the 2008 Summer Board Meeting, the report from the Herbicide Resistant Plants Committee.
- At the 2008 Summer Board Meeting, reviewed reports from the Director of Science Policy and the Invasive Weed Awareness Committee.
- For reports to be presented at the Annual Meeting, contacted the Director of Science Policy and Chairpersons serving on the following committees: Herbicide Resistant Plants, Fellows and Honorary Members, Sustaining Members, and Invasive Weed Awareness.

Name of Person Preparing This Report: Phil Munger

Research Section – Kirk Howatt

Officer or Chairperson Name and Committee Members:
Kirk Howatt, chair
Ed Peachey, chair-elect

Activities during the Year:
Helped revise the call for papers before distribution. We decided that presentations would be sent directly to project chairs; a reminder for submission was distributed. Discussion topics were solicited from the project chairs. Projects 1 and 5 decided to combine discussion sessions.

Weeds of Range and Forest/Wetlands and Wildlands
Costs and benefits of weed management among aquatic and terrestrial environments.

Weeds of Horticultural Crops

Is there a risk for genetically modified crop contamination in seed production systems?

Weeds of Agronomic Crops
Mechanical weed management in 21st century cereal systems.

Teaching and Technology Transfer
Use of electronic tools for weed identification and IPM planning.

Basic Sciences
The impacts of weeds and cover crops on transportation biofuels.

A total of 105 papers and 67 posters will be presented at the meeting in Albuquerque accumulated from Research Projects 1 through 6, two symposia, and one special program. Of these, 18 papers and 19 posters are entered in the student contest.

Venue	Papers (student)	Posters (student)	
Project 1	20 (7)	13 (4)	
Project 2	11 (-)	7 (2)	
Project 3	36 (6)	22 (9)	
Project 4	-	2 (-)	
Project 5	4 (1)	4 (1)	
Project 6	5 (4)	4 (3)	subtotal 76 (18) 52 (19)
Sym.: AEGCY 8	15		
Sym.: Biocont.Inv.	17 in five topics		
Sp. Pr.: Digital Photo	4		

Suggestions for the Future: Reconsider published date of presentation submission and/or handling of late submissions

Name of Person Preparing This Report: Kirk Howatt

Only one paper was submitted into the teaching and technology transfer project. Dan Ball notes that we should probably follow up on Melissa Bridges's suggestion to reorganize the projects.

Ian Burke notes that many of the participants failed to send their papers by the deadline.

Melissa Bridges suggests that the students in the contest papers in particular may need to have more leniency. Phil Munger suggests that a submission site could be set up to submit papers. Dan Ball supports the development of such a system. Phil Munger says it has to be a very hard deadline. Ian Burke suggests that a similar process be adopted for paper submission – powerpoint files could be submitted to the WSWS website with very specific file names. The program chair could build powerpoint files around each project content, and it would be a simple matter for the section chairs to load the content on Monday. Ian Burke will meet with Tony White and discuss any ideas in the Thursday meeting.

WSSA Representative Report – Tim Miller

Activities During the Year: The 2009 WSSA annual was a joint meeting with the SWSS, held February 9-13 in Orlando, FL. There were a total of 699 regular and 149 student registrations, of

which 115 and 20, respectively, were from WSWS. This reflects a slight increase from 98 regular and 14 student registrations, respectively, from the WSWS at the 2008 annual meeting in Chicago. There was no plan by the WSSA Board of Directors to immediately pursue additional joint meetings with regional societies, although the BOD was generally pleased with how the meeting worked. The poster sessions, however, had a mixed review. Some liked the breakout poster sessions with short oral presentations followed by discussion, others thought they were awkward and preferred the old format. Student travel grants were newly available this year and so the timing of that information was made available later than desired. Next year student travel grant opportunities will be made available to the membership at an earlier date prior to the meeting. The 2010 WSSA annual meeting will be held jointly with the Society of Range Management February 7-11 in Denver. SRM is a large meeting (some 2500 registrants) so Program Chair John Jachetta is working hard to ensure that WSSA will maintain its identity while marketing itself to prospective new members.

James Anderson (Director of Publications) reported that the Journals are bringing in about $80,000 in royalties annually, mostly from *Weed Science* and *Weed Technology*. *Invasive Plant Science and Management* enjoyed a successful launch during 2008, primarily through the work of Joe DiTomaso, Janet Clark, and Vanelle Peterson as well as Karen Ridgway of Allen Press. It is hoped that both institutional and personal subscriptions will continue to increase for this journal and that it will be profitable after three years. Additional marketing of *IPSM* is planned for 2009.

In other publications business, "open access" for non-subscribers has been requested by some contributors to our journals. This means that non-members can access the full article on the website rather than just the abstract. The BOD decided to allow open access for those authors, up to 25% of the articles in any particular issue. Cost for open access will be paid by the authors, $2000 per manuscript for members and $2500 for non-members. Also, in effort to increase international readership, abstracts of articles submitted to *Weed Technology* will be printed in English and Spanish beginning in 2010. Cost to the authors will be $17 for the translation, and usual page charges will apply. Depending on results of this trial project, *Weed Science* and *IPSM* may move in this direction in the future.

Jill Schroeder has assumed her position as Weed Science Subject Matter Expert at EPA, following the completion of Steve Dewey's term. Jill asked for WSSA members to contact her with their individual interests and expertise in various aspects of weed science.

An ad hoc committee chaired by John Madsen was formed to consider the future format of continuation of NIWAW.

The International Weed Science Society wants to strengthen its relationship with WSSA, particularly as it relates to short courses or other educational opportunities with other international societies. WSSA is investigating the possibility of giving the IWSS a seat on the BOD, which will be discussed further at the summer board meeting in Denver.
A membership directory in pdf format will be placed on the web site behind the member firewall.

Finally, the BOD is hiring website director (David Kruger) to develop a WSSA on-line abstract submission for use at the 2011 WSSA annual meeting in Portland. A committee chaired by Jeff Derr has been formed to oversee the project.

Phil Banks notes that as a non-profit we may need to have a code of ethics. If you have any board member that may have a conflict must declare it and recues themselves from voting on that motion.

Jesse Richardson wants to know if we have a policy on whether or not we would participate with the WSSA in a joint meeting. Tim noted that the two presidents of the WSSA and SWSS were from the same institution. Phil Banks thought it was a positive event. Jesse Richardson concludes that the consensus is that we might be open to it. Carol Mallory-Smith did not enjoy the meeting primarily because the content was primarily southern. Phil Banks notes that we have a minority of presenters, while the SWSS typically has more presentations than attendants.

CAST Representative Report – Phil Stahlman

The CAST brand is widely recognized as a respectable source of scientific information and CAST's credibility remains high within targeted audiences, particularly in Washington D.C. CAST staff continues to explore ways to expand audience and influence. The hiring of a new Membership and Marketing Director has brought new energy, enthusiasm, and ideas to the position that will help sell the brand. The CAST website received more than 25,000 hits from around the world in 2008.
CAST produced a record number of publications in 2008 (8), all dealing with "hot topics" in the news, and a similar number of new publications are in the pipeline. Past publications can be viewed at the CAST website at www.cast-science.org. Examples of some forthcoming publications include:

- Convergence of Agriculture and Energy: IV. Infrastructure Requirements for Biomass Harvest, Transportation, and Storage (CAST Commentary).
- Endangered Species Act and Its Impact on Agricultural Practices (CAST Commentary)
  This commentary paper might be unfriendly to agriculture. It will be followed up with a series of issue papers that will address the issues in more detail
- Energy Flow in Agricultural Systems: Corn and Soybean Production (Issue Paper)
- Food, Fuel, and Plant Nutrient Use in the Future (Issue Paper)
- Sustainability in U.S. Soybean Production: Comparative Environmental Impacts of Various Production Systems (Special Publication)
- Water, People, and the Future: Supply and Demand (Issue Paper)

CAST faces major funding challenges because of declining congressional funds and lost corporate sponsorship as a result of mergers and retirements of champions within corporate sponsors. Increasingly, corporate donations are being shifted to lobbying and Political Action Committees. Individual membership also is declining, which eventually erodes Societies support because the members are not aware of the mission and benefits of CAST. Half of CAST Societies pay the minimum membership of $640 per year and nearly half the Board members request travel reimbursement from CAST, rather than the Society they represent, to attend Board meetings. This essentially wipes out the amount more than half the Societies pay in dues to CAST. Despite these challenges, CAST finished 2008 within 2% of budgetary goals thanks to timely grants and contracts and completion of contracted publications.

CAST's focus is mainly on agricultural and environment issues but there is increasing need to address food-focused topics in response to growing consumer awareness and concern about food quality and nutrition. Currently, Societies and corporate sponsors are agricultural related. Can or should CAST try to do both or continue the current focus? At the 2008 Fall Board meeting in Durham, NC last October, Board members spent considerable time discussing the above issues and will continue those discussion at the Spring Board meeting in Washington D.C. next week, March 18-20, 2009.

Recommendations for Board Consideration: My 3-year term will end following the Board meeting this coming October. I recommend the Board compile a list of potential candidates to consider as the next CAST representative with further discussion at the Summer Board meeting.

Budget Needs: WSWS pays reasonable travel costs to attend CAST Board meetings twice a year upon request with proper receipt. Because I have gained personal benefit from serving as WSWS representative to CAST, I have elected not to request reimbursement from CAST or WSWS. The Spring Board meeting will be held in Washington D. C. March 18-20, 2009.

Dan Ball notes that the society appreciates Phil Stahlman's service.

Constitution and Operating Procedures Report – Kai Umeda

- Revised and completed committee operating guides for Nominating, Fellows and Honorary Member.
- Revision in progress Finance. Publications, Sustaining Member, Legislative, Education, Symposium committees.
- Finalized Treasurer-Business Manager operating guide.
- Reviewed initial draft of operating guide for new Symposium Committee.
- Notified membership via Newsletter in January of Constitution and by-laws revision for a new standing Education Committee to be voted upon at General meeting.
- Present Constitution and by-laws revision for new standing Education Committee for Board approval.

Recommendations for Board Action:

- Approve Constitution and by-laws revision for new standing Education Committee for presenting to General membership in March 2009.
- Draft Constitution revision to include Symposium Committee for General membership vote in 2010.

Suggestions for the Future:

- Prepare to designate a new Constitution and Operating Guide representative to assume duties after the 2010 meeting.

Proposed Changes:

CONSTITUTION

ARTICLE VII - STANDING COMMITTEES

Section 1. There shall be sixteen Standing Committees: Program, Finance, Publications, Local Arrangements, Nominating, Public Relations, Nominations of Fellows and Honorary Members, Site Selection, Awards, Poster, Student Paper Judging, Necrology, Sustaining Membership, Legislative, Herbicide Resistant Plants, and Education appointed by the President with the advice and consent of the Board of Directors.

Section 17. The Education Committee shall consist of a Chairperson and five additional members. Terms of office of this committee shall be: Chairperson appointed to a

three-year term and five other members appointed to three-year terms, established to expire alternately so that at least four members continue over each year.

WSWS BY-LAWS

ARTICLE VII - DUTIES OF STANDING COMMITTEES

Section 16. The Education Committee shall be responsible for advising and guiding in the development and implementation of innovative dissemination of formal and informal weed science instruction.

Dan Ball asked if we need to vote on the changes. Kai suggests we do so.

Motion: Carol Mallory-Smith moved to accept wording change to Article VII – Standing Committee and Article VII – Duties of the Standing Committee in the constitution and bylaws. Jesse Richardson seconded. **The motion has passed unanimously.**

Kai notes that his term is ending and his replacement should be identified soon.

Committee Reports:

Local Arrangements – Keith Duncan

Officer or Chairperson Name and Committee Members: Keith W. Duncan (chair), Tracy Sterling, April Fletcher, Nelroy Jackson (2009), Jeremy Gooding (2011)
Date of Preparation (include year): 2/26/09

Activities during the Year: Arrangements with the Embassy Suites have gone well. The Hotel and the Committee are apparently on the same page and everything appears ready to go for the meeting. Arrangements have been made for three committee meetings and two symposia during the meeting. Extra projectors and laptops will be available. Extra easels and poster boards are available as needed. Menus have been arranged for all events.

We have three functions: WERA77, Jointed Goatgrass, and PNW Weed Control Handbook committees will meet during the meeting.

Projectors are available for those that need them.

The decision was made to not have a head table.

Director of Science Policy – Lee Van Wychen

APHIS/EPA Grant for Herbicide Resistance White Paper
The WSSA received a grant of approximately $46,000 from APHIS Biotech Regulatory Service and EPA to write a "state of the science" review paper on the development of herbicide-resistant weeds and weed shifts are linked to the introduction of GE herbicide-tolerant corn, soybeans, wheat, rice, cotton, alfalfa and switchgrass. The report will be published in "open access" format in *Weed*

Science and be the length of a review article with an extensive set of references that reflect fully where weed scientists and others are on the subject.

Bill Vencill, chair of the WSSA Herbicide Resistance Plants Committee has agreed to lead this effort and has assembled a group of WSSA members who have begun writing the individual sections. Team members include Carol Mallory-Smith, Bill Johnson, Nilda Burgos, Ted Webster, and Bob Nichols (+ 1 person from HRAC). Final drafts will be reviewed at the WSSA summer board meeting in July 2009 with the goal of final publication by October 2009.

Doubling Campaign for USDA-AFRI grants

The 2008 Farm Bill established the Agriculture and Food Research Initiative (AFRI) grants program authorized at $700 million annually within USDA's National Institute of Food and Agriculture. AFRI is the successor of the National Research Initiative (NRI) and the Initiative for Future Agriculture and Food Systems (IFAFS). While a full appropriation of $700 million is unlikely, Congress can certainly improve on the $193 million appropriated for NRI in FY2008. Our ag research coalition group is pushing Congress for $250 million in FY 2010 (exclusive of any Section 406 Program funding), with a goal of $500 million in total funding by FY 2015. NOTE: $4.6 million in Biology of Weedy and Invasive Species will become all "integrated" grants. Pre-application due April 20, 2009. Due date is June 19, 2009.

New Grants from the 2008 Farm Bill

$47 Million for FY2009 **Specialty Crop Research Initiative** (SCRI) Proposals. Letter of intent due: March 21, 2009, Final grant applications due: April 15, 2009. $17.3 Million for **Organic Agriculture Research and Extension Initiative** (OREI). Due Date: March 9, 2009

USDA-ARS NPL for Weed Science

Three candidates interviewed in January 2009. Bill Chism, John Lydon, Jerry Sims. Expect announcement very soon. Administrator Knipling said a "couple of weeks" at 2009 WSSA meeting.

388 Comments Submitted on 2,4-D Petition- During the 2,4-D comment period, over 388 comments were submitted; overwhelmingly supporting EPA's 2005 re-registration decision. Some 14 comments were negative, but provided no new or compelling evidence for EPA to cancel the product. Thank you!

IPM Funding- House and Senate Ag are not willing to change the Smith Lever 3(d) amendment

10th National Invasive Weeds Awareness Week (NIWAW 10)

We had 104 people attend. Awarded Sen. Dan Inouye Invasive Species Awareness Award. Kickoff of the Healthy Habitats Coalition was successful. Year-round invasive species advocacy work led by Tim Richardson- Wildlife Forever with help from Janet Clark, CIPM. Main message was going after "Green Jobs" in the Economic Stimulus bill. A $1 billion commitment will generate 20,000 invasive species management jobs and help restore 1 million acres of invasive species infested public lands.

EPA- Jill Schroeder has hit the ground running. Met with EPA OPP and Office of Water on court decision on NPDES permits (field trip in the works) and spray drift reduction technology symposium. -**Need examples of herbicide control of invasive's to protect/restore endangered species habitat**

Nominations – Jill Schroeder (Phil Munger)
Committee Members: Jill Schroeder (Chair), Vint Hicks, Don Morishita, Ron Crocket

Activities during the Year: The committee met during the 2008 annual meeting to discuss potential nominees for the offices President-elect (public sector), Research Section Chair-elect, and Education and Regulatory Chair-elect. We discussed whether the balloting for officers should go to an electronic format with Dan Ball, Tony White, and Phil Banks. Ron Crocket conducted a straw poll at the annual business meeting and members were in favor of moving to an electronic ballot. A solicitation for nominees by the membership was placed in the spring newsletter to broaden the list of nominees; however, no one responded to the request.
The following members were contacted by the chair and agreed to serve if elected:

President-elect:
Joe DiTomaso
Carol Mallory-Smith

Research Section Chair-elect:
Brad Hanson
Vanelle Peterson

Education and Regulatory Section Chair-elect:
Marvin Butler
Cheryl Wilen

Schroeder contacted Tony White to inquire what assistance he needed to proceed with web based elections for 2009. Tony requested information from the committee so the web site could be set up, which we provided.

Recommendations for Board Action: The committee recommends approval of the slate of candidates for the 2009 election. The committee also recommends that the society proceed with electronic web-based elections in 2009. The committee recommends that paper ballots be made available on request and to members without computer access.

Suggestions for the Future: Suggested Changes in Operating Guide: The operating guide will need to be amended if the board approves web-based balloting.

Name of Person Preparing This Report: Jill Schroeder

> *Kirk Howatt points out that if the Board is allowed a vote on a tie, the Board would have two votes. A coin toss represents a chance of equal candidates serving. Phil Banks agrees.*

Fellows and Honorary Members – Phil Stahlman

Activities During the Year: Call for Nominations was included in each issue of the WSWS newsletter and posted on the WSWS website. The committee received one new nomination and one updated nomination for Fellow from the Public Sector. No nominations were received and there were no holdover nominations from the Private Sector.

The committee recommended to the Executive Board that Kassim Al-Khatib, Kansas State University, and Scott Nissen, Colorado State University, be honored as Fellows from the Public Sector at the 2009 WSWS meeting. The Executive Board approved the committee recommendation.

No nominations were received for Honorary Member. However, at the 2008 Summer Board Meeting, the Board was made aware of comments made by NBC News journalist Tom Brokaw during the keynote address at the 2008 Western Governors' Association Annual Conference. In his address, he commented on the detrimental impacts that weeds can have on the environment, and to ranching and agricultural operations in the western U.S., and said that *Weeds of the West* was one of his favorite books.
The Board voted to send a complimentary copy of *Weeds of the West* to members of the Western Governors Association and to extend to Mr. Brokaw the offer of Honorary Membership in the WSWS. He agreed and will receive the award of Honorary Membership via telephone link during the WSWS Luncheon on Wednesday. President Dan Ball will present the award.

Budget Needs: None other than for plaques, which the Executive Secretary orders.

Suggestions for the Future: Need to encourage more members to nominate candidates. The committee should compile a list of deserving nominees and recruit nominators.

Suggested Changes in Operating Guide: None. Recently, the Operating Guide was revised to include the Immediate Past-President as a member of the Fellows and Honorary Committee and to serve as the Board contact with the committee.

Committee Members: Bill Cobb, Rod Lym, Phil Stahlman (Chair), and Ron Crockett (Immediate Past-President)

Phil Stahlman notes that there are no hold-over candidates, and notes that Dan Ball has to find suitable candidates.

Awards – Robert Wilson (Dan Ball Ball)

Committee Members: Rob Wilson (Chair), Roland Schirman, and Frank Young

Date of Preparation (include year):
Activities during the Year: Received and ranked nominations for awards

Recommendations for Board Action:

Present following awards
Professional Staff Award
Gary Willoughby
Research Specialist North Dakota State University

Outstanding Weed Manager
April Fletcher
Invasive Species Program Coordinator, Technical Advisor on Pesticide Use, and Pesticide Use Proposal Reviewer, US Fish and Wildlife Service New Mexico

Outstanding Weed Scientist Early Career Public Sector
Alan Helm
Extension Weed Specialist, Colorado State University Cooperative Extension Service- Golden Plains Area

Outstanding Weed Scientist Private Sector
Pete Forster
R&D Scientist III, Syngenta Crop Protection

Outstanding Weed Scientist Public Sector
Dr. Carol Mallory-Smith, Oregon State University
Professor/Associate Department Head - Weed Science Oregon State University

Poster Committee – Charlie Hicks (Jesse Richardson)
Officer or Chairperson Name and Committee Members: Charlie Hicks – Chair 2009, David Belles - Past Chair, Carl Libbey – (Chair 2010), Robert Finley – (Chair 2011?).

Activities during the Year: Posters were stored at University of Arizona Maricopa AG Center and transported to Las Cruces, NM by Bill McCloskey. Amber Groves and Garrett Moser then transported supplies to Albuquerque, NM. There are a total of 100 new poster boards plus the 50 easels. We will set up a total of 52 boards and easels in the Sandia VI-VIII rooms for the two poster sessions. Additional boards and rental easels will be set up in the Ocotillo Room I for the Jointed Goatgrass Symposium on Wednesday afternoon following lunch. Following the meeting, boards and easels will be transported back to Las Cruces, NM for storage.

Recommendations for Board Action: The board should discuss plans for poster and easel arrangements at the 2010 meeting in HI. The local arrangements committee for HI should check into the cost and availability of renting easels and boards -Vs- shipping. I believe at the last meeting in Kauai, we shipped the easels and someone local purchased boards, which was cheaper than shipping.

Budget Needs: Need to plan for shipping and/or rental cost for the 2010 meeting.

Student Paper Contest – Paul Figueroa (Jim Harbour presented by Jesse Richardson)

Committee Members: Paul Figueroa (Chair), Andy Hulting, Chair-Elect, Jim Harbour (Past Chair).

Activities during the Year: Four contests will be held at the 2009 Annual Conference in Albuquerque: the Graduate Student Poster Contest with students; the Undergraduate Student Poster Contest with four students; and two separate Graduate Student Paper Contests. One Paper contest consists of Weeds of Agronomic Crops and Basic Sciences (eight students participating), and the other Paper contest consists of Weeds of Range and Forest and Weeds of Wildlands and Wetlands (nine students participating).

Volunteers to judge the Student Contests were requested on January 15, 2008 via email from Jim Harbour. Members who have not volunteered before were encouraged to serve as a Contest judge. The response was very good. We have five judges for each Contest Section.

Recommendations for Board Action: Consider using a count-down timer instead of the current Green-Yellow-Red light system for all participants. This was first suggested at the 2007 NCWSS wrap-up board meeting. One reason for the request is some participants are red-green color blind and cannot distinguish the lights on the light-bar.

Otherwise, no recommendations are presented.

Budget Needs:

Graduate Student Poster Contest: $100, $75, $50
Undergraduate Student Poster Contest: $100
2 Graduate Student Paper Contests: $100, $75; $100, $75, $50
Total: $725

Name of Person Preparing This Report: Jim Harbour, Past-Chair

Sustaining Members – Pete Forster (Phil Munger for Ron Crocket)
Committee Members: Pete Forster (Chair), Jeff Koscelny, Jeff Tichota.

Activities during the Year:
March to October – develop list and contact persons for past and new potential Sustaining Members
October – Sent first email to Sustaining Membership list
December – Sent second email to Sustaining Membership who have not responded to first email
February – Sent final email to Sustaining Membership who have not yet contributed

Seventeen companies contributed to Sustaining Membership in 2009. This includes two new Sustaining Members.

The Sustaining Membership Committee acknowledges the generous contributions of our 2009 Sustaining Members. Our committee is also grateful for the frequent updates and email contact from Phil Banks.

Recommendations for Board Action: Continue the policy that only Sustaining Members may participate in the "What's New in Industry" session.

Jesse Richardson asks when to mention the Sustaining Members, and Dan Ball notes he will thank them in the General Session.

Necrology – Laurel Baldwin (Ian Burke)
Officer or Chairperson Name and Committee Members: Laurel Baldwin (Chair), Corey Ransom, Brad Hanson, Tom Whitson

Activities during the Year: The Necrology committee has been notified of the deaths of three WSWS members and friends since the 2008 Annual meeting. Our sympathies are extended to the families of Dr. George Kapusta, Larry Burrill, Paul Ogg, and Ellery Knake.

Dr. George Kapusta, 75, passed away March 31, 2008, in Memorial Hospital of Carbondale.

Dr. Kapusta was born Nov. 20, 1932, in Max, N.D., to Philip and Tena Kapusta, both of whom were immigrants from Ukraine. He married Karen Susan Green of Minneapolis on Sept. 13, 1958. She survives, as well as their four children, Daniel Kapusta (Rubia) of New Orleans; Deborah Kapusta of Carbondale; Lynnette Wright (Jeff) of Tucson, Ariz.; and Brenda Csatlos (Rich) of Houston; and six grandchildren. His parents, two sisters and two brothers preceded his death.

Dr. Kapusta served in the U.S. Army artillery in the U.S. and Japan from 1954 to 1956. He spent six years as a crops researcher with North Dakota State University and later spent 34 years with Southern Illinois University Carbondale as a professor of plant and soil sciences. During his tenure at SIUC, he initiated the Belleville Research Center, trained numerous undergraduate and 53 graduate (M.S. and Ph.D.) students and conducted crop production and weed control research. He was honored by numerous state, national and international societies for his esteemed accomplishments in plant and soil science and weed control research.

Larry C. Burrill died at his home in Coos Bay, Oregon, on August 2, 2008, following a long struggle with multiple systems atrophy and chronic leukemia. He was 72. He was born in Los Olives, CA on January 10, 1936, and was raised in western Oregon. He received the BS degree from Oregon State in 1959 and the MS in 1973.

Larry joined Oregon State University in 1963 and soon became a Faculty Research Assistant on the weed project. In 1969, the weed project divided into the international and domestic divisions and Larry chose to be involved with the International Plant Protection Institute with Dr. Bill Furtick. Over the years, he became widely known and respected as an international weed scientist. He was an early founder of the International Weed Science Society, served for several years as Secretary-Treasurer, and taught short-courses in many countries. In 1992, he was awarded IWSS's highest honor, the Outstanding International Achievement Award.

In about 1975, he joined Arnold Appleby in teaching the large weed control course. He was a demanding instructor, but the students enjoyed his dry wit and respected his knowledge gained from his travels around the world. They voted him Teacher of the Year in the Crop Science Department.

In the early 1970s, he became interested in photography, was only average in the beginning, but persisted until he became expert. He won several photo awards at WSSA meetings and was once named Photographer of the Year. His wall-mounted photographs and his beautiful greeting cards became widely admired.

He served as President of WSWS in 1980 and was elected Fellow in 1984. He was named Fellow of WSSA in 1986. In 1994, he received the Outstanding Weed Scientist Award from WSWS.

In the mid-1980s, he became the Weed Control Extension Specialist in Crop Science, and he immediately became popular with the extension agents and growers. In 1993, he was named the Outstanding Extension Weed Scientist by WSSA. He retired as Full Professor at the end of 1994.

Larry Burrill strove toward and achieved excellence in everything he did—international work, teaching, photography, extension work, etc. He was well-liked and admired by colleagues, students, and friends. A great many people from around the globe can attest to the fact that the world is a better place for him having been among us. He will be sorely missed.

Paul Joe Ogg died on Tuesday, November 25, 2008 at Longmont United Hospital following an extended illness.

He was born on August 9, 1945, to George Harper Ogg and Lena (Salzman) Ogg in Worland, Wyoming. Paul and his four brothers grew up working on the family farm, outside of Worland. He graduated from high school, where he was active in the Future Farmers of America, participating in judging contests for both steers and hogs. He was also on the wrestling team, going to the state meet all four years and winning individual titles, both his junior and senior years.

He is survived by his wife, Yvonne Lea Ogg of Longmont, Colorado; a son, Gerald Harper Ogg, Gerald's wife, Cari Ogg, and their daughter, Cailin Ann Ogg of Castle Rock, Colorado; a step-daughter, Debra Schoen, (husband Kim), and their daughters, Alyssa and Chelsee Schoen, and son, Taylor Schoen of Brighton, Colorado; a step-son, Bob McLaughlin (Kristi) of Monterey, California; brothers, Kenneth Ogg (Shirley) of Worland, Wyoming; Reverend Thomas Ogg and Max Ogg (Mary) of Sheridan, Wyoming; and Bill Ogg (Patti) of Great Falls, Montana. Preceding him in death was his first wife, Cynthia Ann Ogg, in 1989.

Paul attended the University of Wyoming, graduating with a BS in 1968 in Agronomy and a Master's in 1970, in Weed Science.

Paul went to work for American Cyanamid immediately following college and worked in the research area for the company for 33 years, continuing as a consultant at the time of his death. He received numerous awards and recognitions in his field, serving on numerous boards for various organization including, Western Society of Weed Science, serving as President and being named outstanding Weed Scientist for the same organization. He was a Fellow for Western Society and North Central Weed Science Society and served on the Board of National Society of Weed Science.

Paul loved to travel and see the country. Paul and Yvonne recently drove to the east coast to see the fall colors, completing a dream of visiting all 50 states by traveling the last six on that trip. In addition, he also traveled to over a dozen countries overseas.

Ellery L. Knake, 81, of Pittsfield, formerly of Champaign, died Sunday, March 1, 2009, at 11 a.m. at the Eastside Healthcare and Rehab Center, Pittsfield, Illinois. He was born Aug. 26, 1927, in Gibson City to Louis Franz and Wilhelmina (Minnie) Dorthea Behrens Knake. He married Colleen "Connie" Mary Wilken on June 23, 1951, in Gilman, and she preceded him in death in 2005.

Ellery was a professor of Agronomy at the University of Illinois for 30-plus years. He served his country in the Army from 1945 to 1946. Ellery received numerous honors in his lifetime including the Weed Science Society of America’s Outstanding Extension Worker Award, the Who's Who of America-agronomist, and the Ciba-Geigy Award for Outstanding Contributions to Agriculture. He received degrees from the University of Illinois (Tehr): a B.S. (1949), M.S. (Wright Fellow 1950), and Ph.D (1960). At the University of Illinois (Urbana) he was Assistant Professor in the Dept of Agronomy, Associate Professor and Professor of Weed Science. For the Weed Science Society of America Ellery served as Vice-President, President, Chairman of the Board, and was on the editorial board for the Herbicide Handbook. He was also a contributing editor to professional journals, and feature editor of Weeds Today magazine.

Surviving are two sons, Gary (Jean) Knake, Pleasant Hill, and Kim (Sue Connelly), Longmont, Colo.; one sister, Mrs. Twylla Mae Kemple, Bend, Ore.; two grandchildren, Skylar Knake and

Cimarron Knake; and one great-grandchild, Riley Bryant. He was preceded in death by his wife, Colleen Knake, sister, Adeline, and a granddaughter, Chelsey Knake.

Public Relations – Brad Hanson (Bill Cobb)

Committee Members: Brad Hanson (Chair), Mark Ferrell, Bill Cobb, Erin Taylor, Brian Olson, Deb Shatley

Activities during the Year:

• A post (2008) meeting press release dated May 1, 2008, a pre-meeting (2009) press release dated February 22, 2009, and a pre-2009 meeting brochure (see attachments) were distributed via email to

- → Capital Press
- → AgOnline (Successful Farming)
- → Agronomy Society of America
- → AgWeb.com (Farm Journal)
- → American Society of Horticultural Science
- → American Vegetable Grower
- → Associated Press
- → California Farm Bureau Federation
- → Farm Progress Publishing (California Farmer; Western Farmer – Stockman)
- → Metrofarm radio
- → Southwest Trees and Turf
- → Turf Magazine
- → Weed Science Society of America
- → Western Farm Press
- → Wildland Weeds
- → Yuma Daily Sun

Each media contact was asked to provide feedback on if/when/where the WSWS press releases were distributed.

Dennis Scott left the PR committee in spring 2009. A new committee member will be recruited to replace him.

Continuing education credits to meet state licensing requirements were requested for the 2009 meeting from: Oregon, Montana, Utah, Wyoming, Washington, Idaho, Nevada, California, Kansas, Oklahoma, Arizona, and New Mexico. Credits for the Certified Crop Advisor (CCA) and Society for Range Management (SRM) certification programs were also requested.

Education – Tracy Sterling (Bill Cobb)

Office or Committee Name: Education Committee – Distance Education Sub-Group

Committee Members: Tracy Sterling (Chair), Kassim Al-Khatib, William Dyer, Carol Mallory-Smith, and Scott Nissen

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 and we thank Tony White for keeping the links up to date (see WSWS web site - http://www.wsweedscience.org/Lessons/lessons.asp). Many of these lessons have been published in the peer-reviewed, on-line journal, *Journal of Natural Resources and Life Science*

Education (JNRLSE). Additional lessons are being prepared for consideration of publication. The funding provided by WSWS was used to set up the WSWS website as a sibling site to the http://plantandsoil.unl.edu website and showcase those lessons specific to Weed Science. We continue to work with Deana Namuth to upgrade the lessons and correct any problems.

Using these materials, Bill Dyer, Scott Nissen, and Tracy Sterling have offered a shared, graduate-level Herbicide Physiology course (PSPP 546 Herbicide Physiology) via Distance Education from Montana State University in Fall 2006, 2007, 2008; see course description below. In Fall 2006, 2007, and 2008, nine, eight and 15 students from across the U.S. (AZ, CA, CO, Fl, IA, MO, MT, NE, OR, VA) and Canada (SK) enrolled, with one to two dropping each year because of time constraints. Students came from multiple backgrounds – those seeking M.Sc. and Ph.D. degrees as well as several from industry and consulting businesses, and one professor; this diversity really added to the quality of the discussions and insights shared. Student reviews were very favorable, emphasizing knowledge gained, clarity of expectations, and in-depth coverage of topics. This 14-week course will be offered every Fall semester. The course will be advertised in WSSA and WSWS newsletters for the 2009 offering.

Suggestions for the Future: This Ad-hoc Committee was voted in as a Standing Committee at the 2008 summer board meeting to blend the Noxious Weed Course and the Distance Learning component as well as any other educational outreach initiatives. The committee will work with Kai Umeda to develop its Standard Operating Procedures this spring and clarify its future directions.

Legislative – Dana Coggon (Tim Miller)

The committee has not functioned as Dana Coggon has not been able travel in support of committee work. Tanya Skurski, a graduate student, was suggested by Melissa Bridges as a person who had an interest in legislative processes and might have an interest in serving. Kirk Howatt notes that there is no reason why we can't have three society members and a student.

Herbicide Resistant Plants – Steve King (Phil Munger)

Committee Members: Steve King (Chair), Craig Alford, Ian Burke, Joel Felix, Earl Creech

Activities during the Year: We have not conducted any activities during the past year.

Site Selection – Bill Kral (Dan Ball)

No report submitted.

Membership Development Committee – Phil Stahlman

Office or Committee Name: Membership Ad Hoc
The following is from the WSWS Operating Guide:
Ad-Hoc Committees are appointed by the President when, in the opinion of the President or the Board of Directors, such committees are deemed necessary to provide a specific function for the betterment of the Society. The President will appoint the Board of Directors contact for each ad hoc committee. The Ad Hoc Committees shall:

(1) Function for one year or as long as subsequent Presidents feel the committees are providing a necessary service.
(2) Restrict activities to objectives and charges outlined by the President.

(3) Report findings and activities to the Board of Directors at the annual Society meetings.
(4) Prepare a brief summary to be presented to the membership at the Society Business Meeting and to be included in the Society Proceedings.

At the 2008 Summer board meeting, Phil Stahlman proposed the committee conduct a membership survey to assess the current value, importance, and format of the WSWS Research Progress Reports and Proceedings. Ensuing discussion led to the consensus decision that a (non-binding) poll be taken at the Thursday Business Meeting to assess opinions of the membership regarding "the utility of the publications and other things of value in the Society". A draft set of questions will be presented to the Board for review and approval.
Phil Stahlman also proposed the Board review results of the Membership Survey taken in 2004 to determine WSWS response to the challenges, opportunities, and critical issues identified in the 2004 survey. A summary of the survey results was sent to the Board as requested.

Recommendations for Board Action: (1) Review and approve questions to be asked at the Business Meeting; (2) review summary of the 2004 survey and decide if action is needed; (3) authorize continuation of the committee for a specific function or disband the committee as required by the Operating Guide.

Phil Banks notes that we can mine the membership data and determine who has not attended the meeting since Portland. He notes that 30% of the people who attend the WSWS each year have not attended the meeting in the previous 5 years or more, indicating that the WSWS has a regional impact.

Carol Mallory-Smith asks if the committee is necessary, and Kirk Howatt responds by asking what would be the particular charge in light of the committee's discharge of the duties to other committees. Carol Mallory-Smith suggests that, regardless of the committee standing, a new survey is important. Phil Stahlman points out that the committee needs a charge or a goal. Jesse Richardson notes that the attendance has increased since the inception of the committee, and peaked in Portland. Dan Ball asks if there is need to come up with a set of questions to ask the membership about the future of the research progress reports or the Proceedings. Phil Banks notes that it is all hard copy, and that the number of submittals to the research progress reports continues to decline. Phil Banks notes that the previous survey was complex and time consuming. Dan Ball doesn't feel that without a specific charge there is no need to keep the committee.

Dan Ball entertains discussion on the status of the committee, and the consensus among the board is that it be disbanded. Dan Ball disbands the committee until a specific service or project can be identified and assigned, at which time the President will reform the committee.

<u>Student Liaison – Melissa Bridges and Ryan Edwards</u>

Officer or Chairperson Name and Committee Members: Melissa Bridges, Chair, and Ryan Edwards, Chair-elect

Activities during the Year:

- Student liaison message in the WSWS newsletter
- Establishment of the student WSWS website
- Establishment of the online voting for president elect student liaison

- Reorganization of the student breakfasts into two new activities
    - Student luncheon
    - Student reception
- Proposal for WSWS Student Travel Scholarship

Recommendations for Board Action:
Problem: lack of student participation in the a student specific events-activities sponsored by the board and private industry (*presented at the summer 2008 board meeting*)

1. **Student night out program**
2. **Student breakfasts**
3. **Student participation**

Solutions: our solutions for this year's meeting

1. **Student night out program:** The program will be promoted by the two student liaisons at all of the student functions (e.g. the student luncheon, the student reception, and the student webpage). The student reception will also be used to encourage students who already do not have prior plans to connect with groups who will be going to dinner following the reception. The reception will serve two purposes: 1) an *icebreaker* for student members to meet the liaisons, other students, and members of industry in a casual setting and 2) promote the student night out program.
2. **Student breakfasts:** Industry-sponsored student breakfasts will be replaced with a student lunch and reception on Tuesday of the meeting.
3. **Student participation:** We hope that by changing the breakfast activities to a lunch and reception that overall student participation will be increased at the 2009 meeting.

Proposal: WSWS Student Travel Scholarship (requires Board vote)

Suggestions for the Future: We suggest that the WSWS Student Travel Scholarship be instituted on an annual basis starting with applications for the 2010 meeting in Hawaii.

Tony White asks if voting should take place online, and Melissa Bridges thought the organization was not sufficiently prepared to do so.

Dan Ball suggests that Jesse Richardson mention the student night out program, the shift to a student lunch (also the business meeting, Tuesday at Noon), the fact that it is only for students and supporters, and the student reception (also Tuesday from 5:00 – 6:30) in the general meeting. Carol Mallory-Smith notes that some (perhaps most) students are interested in meeting potential employers.

Director of Science Policy – Lee Van Wychen

APHIS/EPA Grant for Herbicide Resistance White Paper
The WSSA received a grant of approximately $46,000 from APHIS Biotech Regulatory Service and EPA to write a "state of the science" review paper on the development of herbicide-resistant weeds and weed shifts are linked to the introduction of GE herbicide-tolerant corn, soybeans, wheat, rice, cotton, alfalfa and switchgrass. The report will be published in "open access" format in *Weed Science* and be the length of a review article with an extensive set of references that reflect fully where weed scientists and others are on the subject.

Bill Vencill, chair of the WSSA Herbicide Resistance Plants Committee has agreed to lead this effort and has assembled a group of WSSA members who have begun writing the individual sections. Team members include Carol Mallory-Smith, Bill Johnson, Nilda Burgos, Ted Webster, and Bob Nichols (+ 1 person from HRAC). Final drafts will be reviewed at the WSSA summer board meeting in July 2009 with the goal of final publication by October 2009.

Doubling Campaign for USDA-AFRI grants

The 2008 Farm Bill established the Agriculture and Food Research Initiative (AFRI) grants program authorized at $700 million annually within USDA's National Institute of Food and Agriculture. AFRI is the successor of the National Research Initiative (NRI) and the Initiative for Future Agriculture and Food Systems (IFAFS). While a full appropriation of $700 million is unlikely, Congress can certainly improve on the $193 million appropriated for NRI in FY2008. Our ag research coalition group is pushing Congress for $250 million in FY 2010 (exclusive of any Section 406 Program funding), with a goal of $500 million in total funding by FY 2015. NOTE: $4.6 million in Biology of Weedy and Invasive Species will become all "integrated" grants. Pre-application due April 20, 2009. Due date is June 19, 2009.

New Grants from the 2008 Farm Bill

$47 Million for FY2009 **Specialty Crop Research Initiative** (SCRI) Proposals. Letter of intent due: March 21, 2009, Final grant applications due: April 15, 2009. $17.3 Million for **Organic Agriculture Research and Extension Initiative** (OREI). Due Date: March 9, 2009

USDA-ARS NPL for Weed Science

Three candidates interviewed in January 2009. Bill Chism, John Lydon, Jerry Sims. Expect announcement very soon. Administrator Knipling said a "couple of weeks" at 2009 WSSA meeting.

388 Comments Submitted on 2,4-D Petition- During the 2,4-D comment period, over 388 comments were submitted; overwhelmingly supporting EPA's 2005 re-registration decision. Some 14 comments were negative, but provided no new or compelling evidence for EPA to cancel the product. Thank you!

IPM Funding- House and Senate Ag are not willing to change the Smith Lever 3(d) amendment

10th National Invasive Weeds Awareness Week (NIWAW 10)

We had 104 people attend. Awarded Sen. Dan Inouye Invasive Species Awareness Award. Kickoff of the Healthy Habitats Coalition was successful. Year-round invasive species advocacy work led by Tim Richardson- Wildlife Forever with help from Janet Clark, CIPM. Main message was going after "Green Jobs" in the Economic Stimulus bill. A $1 billion commitment will generate 20,000 invasive species management jobs and help restore 1 million acres of invasive species infested public lands.

EPA- Jill Schroeder has hit the ground running. Met with EPA OPP and Office of Water on court decision on NPDES permits (field trip in the works) and spray drift reduction technology symposium. -**Need examples of herbicide control of invasive's to protect/restore endangered species habitat.**

Carol Mallory-Smith notes that Michael Bowers has made basic proposals very difficult to fit into the Biology of Weedy and Invasive Species.

Special Symposium Committee – April Fletcher

April reports that we have 79 registrants for the special symposium, and 6 who may register on site. The agenda is now set, there were two changes in presenters but the overall symposium content was improved by those changes. The discussion will be focused on the biocontrol of tamerisk.

Noxious Weed Short Course – Celestine Duncan (Bill Cobb)

No report submitted

Proceedings Report – Joan Campbell
Co-editors: Joan Campbell and Traci Rauch
Committee Activities during the Year:
225 copies of the 2008 Proceedings were printed by Omnipress at a cost of $3130.00 which included shipping.

Electronic copies of past Proceedings are being provided for upload to the WSWS website. Members required to submit information post-conference for the 2009 Proceedings have been contacted and reminded of the need for a timely printing of the Proceedings. No information has been received to date.

Recommendations for Board Action: The Operating guide for the Publications committee does not match with the Constitution. The constitution states that the President-elect is the chairperson of the committee. The OG states "The chair shall be elected by the committee and will serve one year" and "The President-elect is the Board of Directors contact for the Publications committee." We suggest a constitution change that the President-elect is the board contact and the chairperson is as stated in the OG.

Kai notes that, instead of changing the constitution, we change the operating guide to require one of the editors serve as chair and guide the process. No new reports would need to be generated. Carol Mallory-Smith suggests to change the constitution. Dan Ball decides to plan on changing the constitution to match the OG at the summer board meeting.

Budget Needs: For 2009, about $3200 for printing and shipping.

Suggested Changes in Operating Guide:
1. Change the timelines for the Proceedings. The abstracts and indexing information will not be sent to the editors until the week after the annual meeting which does not align with the timeline in the OG for the Website editor or Proceedings editor. Either the timelines need to be met or they need to be changed.
2. Publications committee will work as a committee to update the Operating Guide.

Research Progress Reports – Traci Rauch

Activities during the Year:
The 2009 Research Progress Report is 172 pages duplexed. Omnipress printed 125 copies and were sent to Phil Banks (Las Cruces, NM). The total cost including shipping was $1,990.00.

Project 1 - 39 reports, Project 2 - 5 reports, Project 3 - 30 reports, Project 4 - 1 report, Project 5 - 5 reports, Project 6 - 2 reports

To continue encouraging submissions to the Research Progress Report, we included a note in the September newsletter and on the website. Reports were submitted as paper copy and electronically by e-mail. Most reports were submitted in Microsoft Word format and some as pdf file type (Acrobat). This allowed the editors to make minor changes (margins, typos, full justification, etc) without needing to contact the authors. The number of reports submitted was 82 in 2009 which is the same as last year and six more than in 2007. Reports were submitted from the following states: Arizona, California, Colorado, Idaho, Nevada (new this year), New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington.

Recommendations for Board Action:
The Operating guide for the Publications committee does not match with the Constitution. The constitution states that the President-elect is the chairperson of the committee. The OG states "The chair shall be elected by the committee and will serve one year" and "The President-elect is the Board of Directors contact for the Publications committee." We suggest a constitution change that the President-elect is the board contact and the chairperson is as stated in the OG.

Budget Needs: $2,100 -printing & shipping

Suggestions for the Future: The price of the Research Progress Report has been $20 since 2002. A $5 increase to cover rising costs is suggested. Also, on the website, add the choice to purchase Research Progress Report when paying membership dues and not attending the meeting.

> *Phil Banks notes that we charge non-member entities $25. Members pay $20. We are probably not covering our costs on research progress reports. Carol Mallory-Smith notes that we should not be subsidizing the production of reports. Discussion revolved around the increase in costs.*

Motion: Jesse Richardson made a motion to increase the costs of the Research Progress reports $5 at each price point. Kirk Howatt seconded.

Discussion: Tony White asks about changing the price of the Proceedings.

Jesse Richardson modified his original motion to include increasing the costs of the proceedings. Kirk Howatt seconded. **The motion passed unanimously.**

Suggested Changes in Operating Guide: Publications committee will work as a committee to update the Operating Guide.

<u>Website Report – Tony White</u>
Committee Activities during the Year:
Online Stats Integrated. In April 2008, an online analytics application through Google was established to help track website statistics. These stats can help us better understand where people are coming from, what they are looking for, and other information about website users. This is the essential feedback we can use to continuously improve the WSWS website. A few key stats from April 1, 2008 until March 2, 2009 include:

9,024 visitors came to the website from 95 countries; 57% were new visits

Website traffic sources come from direct traffic, referral sites, or search engines (nearly 1/3 equal from each).

With 19,150 page views, the meeting pages were at the top of the list with 15% of all views. Personal account pages and the online store were nearly tied for second (4%).

I have a considerable amount of online stats data to share and would be happy to provide this if anyone would like to see it.

New Online Payment System. In late September 2008, the PayPal online payment system was replaced with our own merchant account and shopping cart to streamline the process of making a payment and managing it on our end. The site provides some much needed flexibility in payment and online store options while keeping users on the WSWS website without switching to a third party webpage for processing. While the WSWS site does not authorize actual payments, the process is seamless to the user when it is approved through Authorize.net.

Phil Banks and I have many administrative changes to make to the behind-the-scenes functionality of the payment pages. While some of this may affect users (in a positive way), many of the upgrades will streamline payment management and meeting participant registration. I welcome other upgrade suggestions you may have regarding the payment system.

Phil Banks noted some of the deficiencies of the new system, including payment for multiple people and attributing payment to the right person.

Online Officer Voting Launched. The online voting site was launched and used for officer voting for the 2009 class. In cooperation with Jill Schroeder, the process seemed to go rather well. Jill has some suggested changes or upgrades in her report to ensure the future voting process is fair and complete. Relative to the online system and process, there seems to be no major changes required for use again next year. The student organization is considering using online voting for the Student Liaison elections in 2010.

Student Site Launched. In February 2009, the student site was launched. This site contains a variety of information relevant to the student membership. The site will hopefully be a key place for student members to visit and vote on officer elections. The page will be kept current by the Student Liaisons.

Website Activity In Progress.
Thanks to Phil Banks and his staff, many of the proceedings from 1938 to the present time have been scanned and posted to the WSWS website. Currently, not all available proceedings copies have been scanned. However, we will work over the next year to get them all posted to the site.

Continue to update a variety of pages for general content. The online store and member account pages will be updated soon.

Working to improve navigation on the website to make things easier to find. I am open to suggestions on how to make this better.

Tony White asks that we discuss how to get everyone to submit an electronic title and abstract. Currently, the symposium participants send their abstracts and titles to the symposium. Jesse Richardson noted that rather than burden Tony White, abstracts for symposium papers are sent to Joan Campbell for addition to the proceedings. Dan Ball notes that the operating guide specifies the authors are responsible for their own title and abstract submissions. TonyWhite needs clarification – either they need to be entered into the website system, or they need to be

collected by the symposium chair and sent on to Joan Campbell. TonyWhite notes that the symposium chair can and probably should all the symposium titles. He also notes that he needs to modify the drop down menu to show a 'symposium' option.

Tim asks how an additional Friday program might fit into this system. Jesse Richardson responds that it depends on the session but notes that all presentations submittals should be the same way.

Dan Ball asks how to fast track the operating guide for the symposium committee. The board will get a copy for review of the operating guide. April asks if the operating guide has a timeline. Dan Ball notes it does.

Tony asks that we go to the same submission system for board reports as we use for abstracts.

Recommendations for Board Action:
Currently, I am compensated for time spent on the WSWS website at a rate of $1.00 per transaction coming through the website payment system. While the rate is to cover hours, I also incur costs on my own regarding my own computer equipment, supplies, and facilities to complete the job. Because of these other costs, I would like for the WSWS Board to consider a fee increase for my website development and maintenance compensation to go from $1.00 to $2.00 per transaction. If approved, I would request the increase take effect starting in the first quarter of 2009 (calendar year).

Carol Mallory-Smith asks what the total charge. Phil Banks notes $1000. Carol Mallory-Smith asks if this payment arrangement is acceptable. Tony thinks that is. Phil Banks notes that Tony's service has been instrumental in increasing the functionality and content of the web site. He suggests that, instead of the $2.00 per transaction, we go to a $3.00 per transaction. Jesse Richardson suggests going to a % charge, instead of a per transaction fee. Phil Banks notes that things are simple now, and a percent calculation would make things more complex.

Motion: Kirk Howatt moved that we increase the transaction fee to $3.00 and said increase takes effect the first quarter of 2009 (calendar year). Seconded by Bill Cobb. **The motion passed unanimously.**

Budget Needs: Other than the board request noted above, there are no additional website budget needs at this time.

<u>Newsletter Report – Cheryl Fiore</u>
Activities during the Year:
Requested information for the quarterly WSWS newsletter from members of the Board of Directors, Committee Chairs and membership. Accepted requests for publishing articles of interest from various interested organization.

Submitted word documents of quarterly newsletter to Phil Banks, Treasurer-Business Manager for distribution of paper copies to society members. Tony White, WSWS Webmaster received copies of newsletter as PDF files to post on the WSWS website for members not receiving a paper copy of the newsletter.

Since the March meeting in 2008, newsletters were distributed in April, September, and November 2008 and January 2009.

Suggested Changes in Operating Guide: Make the following changes to the Newsletter Time Schedule

April: as written.

July or August [immediately following summer board mtg]: Prepare a newsletter to include: report on Summer Board Meeting; Call for Papers; Call for Research Progress Reports; Call for Award Nominations - Outstanding Weed Scientist; preliminary annual meeting information; calendar of events; any publications [extra Proceedings, etc] available.

November: Prepare a newsletter to include: preregistration for annual meeting ~~[include that payment cannot include credit cards or billing to a company]~~; local arrangements committee information ~~tour information; hotel registration cards; special airfare offers~~; Program information; notice of any special symposium; hotel registration information; student paper contest info reminder [including points]; calendar of events; reminder for resolutions; elections [include ballot & biographies]; placement committee forms.

January: Prepare a newsletter to include: reminder of preregistration due date; hotel information; program highlights submitted by the Program Chair; ~~Call for Nominations – Fellow & Honorary Members~~; By-Laws changes; announce time & location of Board meeting.

Kai agrees to make the changes in the operating guide.

Old Business

Education committee operating guide – no longer relevant.

Symposium Committee Operating Guide – still a work in progress. Dan Ball will send it out for review and asks that the board members give it their attention. Jesse Richardson will address it at the summer board meeting.

New Business

Combining Range and Forest with Wetlands and Wildands (Projects 1 & 5). Jesse Richardson asks for discussion. Carol Mallory-Smith thinks we need to wait until the Thursday meeting and consider comments from the project chairs. Kirk Howatt notes that because of the similar content of the two projects, they have asked that they are scheduled in such a way that they do not oppose. He also notes the size of the projects would lend themselves to a merger. Jesse Richardson thinks that some guidance from the board would facilitate discussion in the individual projects. Tim asks why the Wetlands and Wildlands were created separately. Tim notes that the idea for creating Project 5 may be no longer valid, but we should determine the original purpose. Jesse Richardson felt it gave him less flexibility to make sure they were run sequentially. If they were included as one project, he would have greater flexibility.

Jesse Richardson thinks we should leave it up to the Project Chairs. Kai suggests conducting a straw pole in the respective members and return a consensus. Dan Ball tables the discussion.

State Chapters of WSWS Concept – Kelly Uhing

What we are interested in is an invasive plant council. We are interested in a regional group with state chapters. The decline of extension workers on a county level has left a void in outreach activities focusing on control of invasive species and revegetation projects. Colorado needs its own IPC, and is trying to determine how best to form such an entity.

The entity formed at the state level would function facilitate research and disseminate research information.

Tim notes that the PNW has an IPC, Dan Ball also notes Washington, Idaho, and Oregon have Weed Societies or Associations.

Dan Ball notes that the membership committee (recently disbanded) might have been an ideal vehicle to facilitate or research the suggestion.

Bill Cobb notes that Colorado does not allow recertification credits, and without those there might not be an incentive for Colorado workers to attend. Kelly notes that there may be ways to work around such a restriction, although Phil Banks expresses doubt.

Carol Mallory-Smith asks how the state chapter would interface with the state chapters. Kelly describes how she would envision a Colorado IPC would function with a national IPC or the Westerns. Kirk Howatt asks what the benefit would be to the national organization by the state organization. Kelly notes having a state chapter would further the mission of the Westerns by facilitating information from regional scientists to the state chapter or below.

Dan Ball notes that the biggest challenge is that the WSWS is a successful, well established meeting. Changing it to fit a concept of a state-oriented research delivery system would require considerable changes to the organization.

Dan Ball suggests perhaps adding a specific section to address the needs of individual state invasive weed managers. He notes that we have a good sense of the needs, but we need to continue the conversation after we have thought more about how to integrate state level IPC groups into the WSWS.

Motion: Bill Cobb moved that we table the discussion and that a Member-at- Large (Phil Munger) continue to develop the idea of integration of an IPC-like entity into the WSWS. Jesse Richardson seconded. **Motion passes unanimously.**

WSWS Logo Trademark Renewal

Phil Banks notes that the trademark (including the name) needs to be renewed.

Motion: Carol Mallory-Smith moved to maintain the WSWS name and logo by renewing the trademark (including the name). Tim Miller seconded. **The motion passes unanimously.**

Ideas for Symposia for Hawaii

Dan Ball notes that we need some ideas. Vanelle Peterson had canvassed for local ideas, but no solid topic had emerged.

Kai also suggests that we begin to think about symposia for the meeting in Spokane. Phil Banks notes that if we do add a large symposia, we need to adjust room numbers.

Dan Ball asks Jesse Richardson to solicit ideas for symposia at the General Business Meeting.

Graduate Student Scholarships

Justification:
A problem that has been documented during previous years of the WSWS Annual Meetings has been the lack of student participation, despite the amount of students that register and present at the meetings. One way to encourage not only increased attendance by undergraduate and graduate students but increased service to the Society is to offer financial assistance to students who intend to present their research and volunteer their time during the Annual Meeting.

Background:
There are several professional societies whose disciplines overlap with those represented in the WSWS that offer scholarships to students. The Mid-South Aquatic Plant Management Society offers a $2000 to an outstanding student. Likewise, the Southern Weed Science Society grants two outstanding graduate student awards worth $400 each. Although there is no cash prize, the Northeastern Weed Science Society does recognize two exceptional graduate students during their annual meetings. Furthermore, the Canadian Weed Science Society furnishes several student scholarships, many of them funded exclusively through private industry; the Agronomy, Crop Science, and Soil Science Tri-Societies of America offer various scholarships for undergraduate and graduate students as does the Ecological Society of America.

Recently, the Weed Science Society of America (WSSA) established a Graduate Student Grant that awards six travel grants to graduate students attending their first WSSA annual meeting. The grants cover the hotel and conference registration costs. We propose that the WSWS institute a travel scholarship program that is based on the grant program offered by the WSSA with a few modifications.

Scholarship Proposal:
The travel scholarship program should be available for the 2010 annual meeting and continue for at least three additional years before the program is evaluated and renewed in 2013. We propose the following structure for eligibility and application, candidate selection, and scholarship award:

We propose at least 2 scholarships for undergraduates and at least 4 scholarships for graduate students that cover the costs of lodging and conference registration.

<u>Student Eligibility:</u>
1. Must be in good academic standing at an accredited institution of the western region
2. Must present either a poster or oral paper pertaining to research primarily conducted by the student at the WSWS meeting for which the travel grant is awarded
3. Must enter the poster or oral paper contest if eligible
4. Must be willing to volunteer a portion of their time to the WSWS during the annual meeting
5. Previous WSWS travel scholarship winners are ineligible for these awards

<u>Application Packet:</u>
1. Applicant information (e.g., name, address, institution, degree, GPA, etc)

2. Description of why the student feels it is important to attend the annual meeting (word limit)
3. Description of research to be presented and why it is important to weed science and/or weed science in the western region (word limit)
4. Student's C.V. or resume
5. Letter of recommendation from a supporting faculty member (word limit)

Award Selection:

1. Applications should be received at least XX weeks prior to the title submission due date
2. Representatives from the Awards and Membership Development Committees (or the formation of a subcommittee) will oversee the program and review applications
3. Applicants selected for one of the scholarships will be contacted by XX days before title submission due date
4. Winners will be recognized at the Awards Luncheon

Scholarship Administration:
The WSWS Business Manager can directly handle the costs of the awards without having to issue checks to those selected applicants.

***Suggestion:** we could consider setting aside one graduate student award that is for a student whose research/oral paper focuses on weed ecology and biology. This is currently not a formal section at the WSWS meetings, but might evolve into one with increased interest. We might promote that interest with a specific scholarship.

Example Budget:
Based on the 2009 meeting costs, a total of $4050.00 would fund 6 student scholarships.

4 nights hotel: $600.00
Conference Registration: $75.00
Cost per scholarship: $675.00

Total for 6 scholarships: $4050.00

Kai Umeda asked about the difference between the presentation award and the travel scholarship. Carol Mallory-Smith suggests that the costs of sending graduate students is becoming prohibitive. Jesse Richardson suggests that instead of a scholarship we give ALL students some return. Phil Banks asks if some sustaining members would be willing to contribute a onetime surcharge to facilitate graduate student travel to Hawaii. Instead, Carol Mallory-Smith suggests putting off the travel scholarship grant until the 2011 meeting. Dan Ball suggests the Awards committee be responsible for selecting the recipients, Carol Mallory-Smith suggests the graduate student contest judging committee. Pat Clay suggests that hardship support similar to the Southern model would be a positive development, and that a graduate student award be implemented, either as a outstanding student award or as travel scholarships. Phil Banks notes that we increased the reimbursement during the last trip to Hawaii.

Motion: Kirk Howatt moved to table the discussion on the graduate student travel scholarship until the summer board meeting. Jesse Richardson seconded. **The motion passed unanimously.**

Nomination Committee. The committee recommends that the end date for electronic voting be changed to December 1, the practice for the last three years.

Motion: Tim Miller moved to accept the changes suggested by the nominating committee to the operating guide. Jesse Richardson seconded. **The motion passed unanimously.**

Publicity Committee

Carol Mallory-Smith notes that the president ask the recipient where award letters are to be sent (suggest Dean or Department Head).

Motion: Carol Mallory-Smith moves to adjourn. Jesse Richardson seconds. **The motion passed unanimously.**

Respectfully submitted – Ian C. Burke WSWS Executive Board Secretary – June 5, 2009.

WSWS Annual Business Meeting
Thursday, March 12, 2009
Embassy Suites Hotel, Albuquerque, NM
Sandia IV & V
6:30 – 9:00 am

Call to Order – President Dan Ball

Treasurer-Business Manager Report – Phil Banks
Phil thanked the hotel management for the good job they've done for us at this meeting and also thanked his employees who helped run the registration desk.

Phil Banks reported that as of February 27, 2009 we have $301,132.64 in capital with an additional asset of $191,259.00 in unsold Weeds of the West inventory. The WSWS reprinted Weeds of the West (10,000 copies) during the year at a cost of $116,280.00. The WSWS has no unpaid liabilities for the year with the exception of expenses related to the Albuquerque meeting which will be paid prior to the end of our fiscal year (March 31, 2009).

In cooperation with the Website Editor, the WSWS has added additional books for sale through our website. Several books published by Wiley publishing can be purchased with WSWS receiving a percentage of each sale. This was started only recently and so far we have not determined how much income will be realized. We will also arrange to offer the new Southern Weed Science Society Weed I.D. book.

Program Committee Report – Jesse Richardson
Jesse thanked the paper and poster presenters and authors and said it was a real help to get the paper .ppt files submitted to the session chairs and also thanked Tony White for getting all Title and Abstract submission done online.

Jesse then summarized the presentations. There were 67 posters submitted, 80 volunteered oral papers, 25 symposium invited papers, and 4 general session talks for a total oral paper count of 109. The break-down of oral papers is as follows: Agronomic Crops – 36, Range and Forest – 20, Basic Sciences – 5, Horticultural Crops – 11, Teaching and Tech Transfer – 0, Wetlands and Wildlands – 4,

Jointed Goatgrass Symposium – 8, Biological Control of Invasive Plants Symposium – 17, and Education and Regulatory session – 4.

Local Arrangements – Keith Duncan
Keith thanked the hotel management staff and thanked the members for attending this meeting.

WSSA Representative Report – Tim Miller
Tim told the members that the 2009 WSSA annual was a joint meeting with the SWSS, held February 9-13 in Orlando, FL. There were a total of 699 regular and 149 student registrations, of which 115 and 20, respectively, were from WSWS. This reflects a slight increase from 98 regular and 14 student registrations, respectively, from the WSWS at the 2008 annual meeting in Chicago. There was no plan by the WSSA Board of Directors to immediately pursue additional joint meetings with regional societies, although the BOD was generally pleased with how the meeting worked. The poster sessions, however, had a mixed review. Some liked the breakout poster sessions with short oral presentations followed by discussion, others thought they were awkward and preferred the old format. Student travel grants were newly available this year and so the timing of that information was made available later than desired. Next year student travel grant opportunities will be made available to the membership at an earlier date prior to the meeting. The 2010 WSSA annual meeting will be held jointly with the Society of Range Management February 7-11 in Denver. SRM is a large meeting (some 2500 registrants) so Program Chair John Jachetta is working hard to ensure that WSSA will maintain its identity while marketing itself to prospective new members.

James Anderson (Director of Publications) reported that the Journals are bringing in about $80,000 in royalties annually, mostly from *Weed Science* and *Weed Technology*. *Invasive Plant Science and Management* enjoyed a successful launch during 2008, primarily through the work of Joe DiTomaso, Janet Clark, and Vanelle Peterson as well as Karen Ridgway of Allen Press. It is hoped that both institutional and personal subscriptions will continue to increase for this journal and that it will be profitable after three years.

In other publications business, "open access" for non-subscribers has been requested by some contributors to our journals. This means that non-members can access the full article on the website rather than just the abstract. The BOD decided to allow open access for those authors, up to 25% of the articles in any particular issue. Cost for open access will be paid by the authors, $2000 per manuscript for members and $2500 for non-members. Also, in effort to increase international readership, abstracts of articles submitted to *Weed Technology* will be printed in English and Spanish beginning in 2010. Cost to the authors will be $17 for the translation, and usual page charges will apply. Depending on results of this trial project, *Weed Science* and *IPSM* may move in this direction in the future.

CAST Representative Report – Phil Stahlman
Phil told the members that the CAST brand continues to be widely recognized as a respectable source of scientific information and CAST's credibility remains high within targeted audiences, particularly in Washington D.C. The hiring of a new Membership and Marketing Director has brought new energy, enthusiasm, and ideas to the position that will help sell the brand. He encouraged the members to support CAST by becoming members.

Constitution and Operating Procedures Report – Kai Umeda
Kai summarized his work over the fall and the spring, including a revised and completed committee operating guides for Nominating, Fellows and Honorary Member committees, and a finalization of the Treasurer-Business Manager operating guide.

Director of Science Policy – Lee Van Wychen

Committee Reports:
Poster Section – Charlie Hicks
David reported that 4 undergraduate and 6 graduate student posters were presented this year.

Finance – John Fenderson
John told the members that the Finance committee had met at the annual meeting of the society. Financial reports and investments were reviewed with Business Manager Phil Banks. All financial records and investments were found to be in good order and the society is operating within its financial operating guidelines.

Financial advisor Stan Cooper met with the board at last year's meeting and recommended a new strategy for our investment portfolio. The board instructed the Finance committee to implement the new strategy according to the financial advisor's recommendations.

The finance committee met via telephone and communicated via email in July and August 2008 with regard to our investment account. After communication with the society financial advisor, it was deemed appropriate to reallocate our assets since market opportunities to recoup lost principal appeared unlikely. The financial advisor was instructed to convert our current assets to the more conservative approach adopted by the board and committee when he deemed most appropriate.

Changes in the investment portfolio were implemented in August. Investment allocations are as follows: 17% Equities, 26% Hedge fund, 56% Bonds, and 1% Cash. This represents a decrease of 44% in Equities and an increase in Bonds of 19% compared to the previous year reflecting our new investment direction. (Note, Hedge fund investments are considered alternative investments with relatively low risk and low correlation to the market as a whole – this year it was correlated to the market). Short term, the financial advisor would advise vacating the stock market all together should significant rallies permit recapture of lost principal.

As of February 27, 2009 overall value of the RBC Wealth Management account was $161,129 vs. $214,748, a decrease of $53,619 from 1 year earlier. 2008 overall return was -22.51% vs. the S&P 500 which was down 36.99%.

Nominations – Jill Schroeder
Jill thanked her committee and said WSWS had an excellent slate of candidates. The new Officers are Joe DiTomaso, President-elect; Vanelle Peterson, Research Section Chair Elect, and Marvin Butler, Education and Regulatory Section Chair-elect.

Fellows and Honorary Members – Phil Stahlman
Phil summarized the awardees and reminded the membership to nominate worthy fellows.

Awards – Rob Wilson
Bob reminded the members that the award winners this year were the following: Outstanding Weed Scientist (Public), Carol Mallory-Smith; Outstanding Weed Scientist (Private), Pete C. Forster; Outstanding Weed Scientist - Early Career Alan L. Helm; Weed Manager, April Fletcher; Professional Staff, Gary P. Willoughby.

Proceedings – Joan Campbell
Joan reports that 225 copies of the 2008 Proceedings were printed by Omnipress at a cost of $3130.00, including shipping. Electronic copies of past Proceedings are being provided for upload to the WSWS website. Joan reminded members required to submit information post-conference for the 2009 Proceedings to do so soon to ensure a timely printing of the Proceedings.

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Web Site and Web Manager – Tony White
Tony thanked everyone for following the online directions for submission and voting. In late September 2008, the PayPal online payment system was replaced with our own merchant account and shopping cart to streamline the process of making a payment and managing it on our end. The site provides some much needed flexibility in payment and online store options while keeping users on the WSWS website without switching to a third party webpage for processing. While the WSWS site does not authorize actual payments, the process is seamless to the user when it is approved through Authorize.net.

Tony also noted that in February 2009, the student site was launched. This site contains a variety of information relevant to the student membership. The site will hopefully be a key place for student members to visit and vote on officer elections. The page will be kept current by the Student Liaisons.

Tony commended Phil Banks and his staff for scanning many of the proceedings from 1938 to the present. They are posted to the WSWS website. Currently, not all available proceedings copies have been scanned. However, we will work over the next year to get them all posted to the site.

Newsletter – Cheryl Fiore
Members were reminded that April 1st is the deadline for next newsletter.

Site Selection – Bill Kral
Bill told the members that the 2010 and 2011 meetings will be held in Hawaii and Spokane, respectively.

Education – (ad Hoc) - Distance Education – Tracy Sterling
Tracy reported that the Education subgroup for Distance Education has met its long-term goal of developing web-based Weed Science educational materials. Many lessons have been developed and we thank Tony White for keeping the links up to date (there is a link to the lessons on the WSWS

website). The funding provided by WSWS was used to set up the WSWS website as a sibling site to the http://plantandsoil.unl.edu website and showcase those lessons specific to Weed Science.

Education – (ad Hoc) - Noxious Weed Short Course – Celestine Duncan
Celestine reminded the members that the Course is financed by the course registration fees. The 2009 course will be held in Chico Hot Springs Resort in Pray, MT, on April 27-30 and is again already full.

Public Relations – Brad Hanson
Brad reported that POST 2008and PRE 2009 press releases for the meetings were sent to print, radio, and electronic media contacts.

Necrology – Brad Hanson
Brad read the obituaries for our lost collegues: George Kapusta, Larry C. Burrill, Paul J. Ogg, and Ellery L. Knake. The obituaries are available in the Committee report at the WSWS web site.

Legislative – Pam Hutchinson
No report

Sustaining Members – Pete Forster
Pete told the members that there are 18 total Sustaining Members this year. He thanked the Sustaining Members for their contributions.

Herbicide Resistant Plants – Steve King
Steve told the members that the HRP committee was in a state of reorganization. The committee had met at this meeting and identified several ideas to develop over the next year.

Student Liaison – Melissa Bridges
Melissa outlined the accomplishments of the liaison committee, including establishment of the student WSWS website, establishment of the online voting for president elect student liaison, reorganization of the student breakfasts into two new activities - the student luncheon and student reception. Both were well attended. Melissa also outlined the proposal for WSWS Student Travel Scholarship.

Poster and Paper Contest – Jim Harbour
Jim told the membership that the student contest participant numbers were as follows: the Graduate Student Poster Contest with 9 students; the Undergraduate Student Poster Contest with 4 students; and two separate Graduate Student Paper Contests. One Paper contest consisted of Weeds of Agronomic Crops and Basic Sciences (8 students participating), and the other Paper contest consisted of Weeds of Range and Forest and Weeds of Wildlands and Wetlands (9 students participating).

Undergraduate Poster – 1st Place, Jared Unverzagt, University of Wyoming; 2nd Place, Carol Lange, New Mexico State University.
Graduate Poster - 1st Place Maria Zapiola, Oregon State University; 2nd Place, Tanya Skurski, Montana State University; 3rd Place, Suphannika Intanon, Oregon State University.
Papers (Weeds of Agronomic Crops and Basic Science) – 1st Jordan Hoefing, North Dakota State University; 2nd Place, Melissa Bridges, Colorado State University; 3rd Place, John Frihauf, Kansas State University.

Papers (Weeds of Range and Forest and Weeds of Wildlands and Wetlands) - 1st Place, Brad Lindenmayer, Colorado State University; 2nd Place, Melody Rudenko, Oregon State University.

Old Business
Constitution and Bylaws Revisions
Motion: Bob Parker makes a motion to accept the changes to the constitution, changing the Education Committee from an ad hoc committee to a standing committee. Seconded by Jill Schroeder.

Celestine where will the noxious weed short course wind up. Kai notes that it will be part of the education committee.

Motion passed unanimously.

New Business
Motion: Roland Schirman made a motion that the WSWS Executive Committee appoint an ad hoc committee to develop the concept and explore funding sources for weed management studies that place emphasis on sustainability of agricultural production and natural resources. Seconded by Alex Ogg.

Vanelle Peterson asks for clarification. Roland explains how he envisions the committee would function for the society. Alex notes that, based on the success of the Jointed Goatgrass Program, we as a society need to identify long term funding for weed science projects that emphasize long term research, and not focus it on a single weed.

The Motion passed unanimously.

Passing of Gavel
Dan Ball officially passed the gavel to the incoming President, Jesse Richardson after which Jesse presented a plaque to Dan and thanked him for doing a great job as the WSWS President this year.

Motion: It was moved and seconded to adjourn the meeting and **the motion passed unanimously.**

Respectfully submitted – Ian C. Burke WSWS Executive Board Secretary – June 25, 2009.

WSWS Board of Directors Meeting
Thursday, March 12, 2009
Lunch Board Meeting
Embassy Suites Hotel, Albuquerque, NM

Call to Order - Jesse Richardson.

Present at the meeting: Marvin Butler, Pat Clay, Kai Umeda, Bill Cobb, Ed Peachy, Tim Miller, Tony White, Phil Munger, Phil Banks, Ian Burke, Joe DiTomaso, Phil Stahlman, Vanelle Peterson, Dan Ball, Jesse Richardson, Keith Duncan

The board agreed to the 17th and 18th of July for the Summer Board Meeting. Phil Banks notes that 7 members of the board are within driving distance of Portland. The second option would be somewhere in southern California or perhaps Phoenix. The Embassy Suite is very near the airport in Pullman.

Motion: Dan Ball moves to hold the summer board meeting in Portland on the 17th and 18th of July. Phil Munger seconded. **The motion passed unanimously.**

Jesse notes that we usually meet at noon on Friday and finish up at noon on Saturday. Phil Banks asks if there would be anyone interested in a room on Thursday or Saturday. Three members of the board indicate that they will.

Symposium Ad Hoc Committee Report

Discussion was started on the program arrangement, both at Alburquerque and in Hawaii. Tim Miller suggested we contact James Leary as a good contact for a symposium title. He suggested an invasive perennial grasses topic. Joe DiTomaso noted that several invasive species are very similar between the western States and Hawaii. Tim Miller noted that we really need to get organized as there is only a single year to organize the symposium. Phil Banks noted that April had already organized a lot of the symposium. Tim Miller notes that we could do an invasive weed tour instead of a symposium.

Dan Ball notes that he is close to finalizing the operating guide for the symposium committee. Jesse Richardson notes that we had discussed a topic – perennial invasive grasses – we should be moving quickly.

Phil Banks notes that we have no meeting rooms blocked on Friday, and only 50 hotel rooms, and everything ends at noon on Thursday. Joe DiTomaso notes that he prefers a single day symposium. Joe DiTomaso asks if we should extend the meeting or run more concurrent sessions. Consensus is that we should run more concurrent section. Jesse notes that Tim Miller and Joe DiTomaso are going to get a symposium plan together quickly. Dan Ball notes that the two year planning period was too much, and that it would be better to at least have the topic and potentially a list of speakers. Vanelle Peterson notes that the intent for having a two year plan was to have the topic and the space needs to communicate to Phil Banks. Dan Ball will attempt an operating guide change to reflect that idea. Joe DiTomaso notes that the plan is to have all day symposium, and that Phil Banks needs to arrange to have the meeting space.

Local Arrangements Report, Albuquerque – Keith Duncan

Keith Duncan notes that we worked with the same people throughout the arrangements process and at the site, making things easy to arrange. There were a few surprises; in particular two section chairs did not come with projectors.

Local arrangements report, Hawaii - Phil Motooka

Phil Motooka represents the local arrangements committee

Conference Facilities: The Marriott Waikoloa Beach Hotel is the former Royal Waikoloan, our venue the last time we met in Kona. After extensive renovations and under new management, the hotel has become a first rate conference venue. The conference rooms are off the lobby opposite the registration desk. There are two large ballrooms for our plenary and poster sessions. Depending on configuration, there are as much as 12 other meeting rooms. All the rooms are on the same level and are compactly located.

Ms. Sharon Bianco sharon.bianco@marriotthotels.com is the director of events planning and operations. Ms. Gail Kihoi gail.kihoi~a,marriotthotels.com, who was not in when I visited, is the events manager. She will be directly responsible for managing the hotel's end of things during our conference

Meals: There is a coffee shop just outside our meeting rooms which serves drinks, light meals/snacks which you can consume on the lanai overlooking the pools and beach. The Hawaii Calls Restaurant is on the ground level almost beneath the conference rooms, one floor down on the makai (towards ocean) side.

Across the street from our hotel is the Kings' Shops shopping center. There is a general store there where snacks are available. The food court however is no longer there. There are three restaurants including Roy's, a gourmet restaurant plus a Starbuck's. A short walk mauka (towards the mountain) from the Marriot is the Queens Market Shopping Center. There are a couple of restaurants there as well as a convenience store/deli. And of course, a Starbuck's. There are no fast food joints for miles around.

Recreation: There are two outdoor swimming pools and a keici (kids) pool, all heated no less. Across an ancient fish pond is a reef-protected beach with gentle waves on the shores of `Anaeho' omalu Bay.

The concierge can arrange all manner of recreational activities, sightseeing, snorkeling, deep sea fishing, helicopter tours, golf and so on. Might be a little late for whale watching.

Airport to Hotel: There is no public transportation from the airport to speak of. Your options are taxis or rental cars. It would be a good idea to plan your travel with friends so you can share a taxi or car. If you are driving, turn left (north) onto Queen Kaahumanu Highway as you exit the airport. Eighteen miles from the airport is Waikoloa Beach Road (at traffic light). Turn left onto that road and the Marriott Waikoloa Beach Hotel is another mile further on the left side of the road The Kings Shops will be on the right facing the Marriott.

Tony White suggests that the share ride idea is important. He offers to facilitate shared rides on the website, as a potential idea.

Jesse asks if we have the whole hotel reserved. Phil Banks notes that if we ask that all rooms be reserved, they'll charge us. If it is on the contract, however, they cannot use it for anything else. Phil Motooka notes that some taxis charge for baggage.

New Business

New Project Topics

Jesse Richardson notes that he attended the Range and Wetland project meetings. The majority voted to combine the projects. There was discussion on the name of the combined section. Joe DiTomaso will come up with a couple of names and submit them. Vanelle Peterson suggested that we expand the discussion to the other projects. Dan Ball noted Melissa Bridges suggested a Biology and Ecology section. Others are concerned about how that may affect our uniqueness. Phil Stahlman and Vanelle Peterson suggests forming an ad hoc committee, that includes the research section chair and research section chair elect, section chairs, and perhaps Melissa Bridges. The committed should bring suggestions for changes with pros and cons to the summer

board meeting.The combined project will have to co-chairs at the next meeting and a single co-chair thereafter.

Roland Schirman's Ad Hoc Committee Proposal:

Dan Ball notes the idea probably originated in the Jointed Goatgrass session, as that funding source has ended. Phil Stahlman clarifies, suggesting the committee's intent was to identify or explore strategies to develop funding sources to address Roland's Ad Hoc Committee. The discussion was tabled, to be discussed at the Summer Board Meeting.

Site Selection for 2013 Meeting

Motion: Dan Ball moves to accept the site selection committee's suggestion for Reno in the 2013 meeting. Tim Miller seconded the motion. Joe DiTomaso asks when the last time we were in Reno, which was 2006. Dan Ball reaffirms his motion, but notes that several members expressed their reservations about cigarette smoke. Phil Banks notes that the price differences are large, with a lot of very low bids. **Motion passed unanimously.**

Phil Banks suggests the Past President or the President write a letter to the manager of the hotel.

Motion: Dan Ball moves to adjourn. Tim Miller seconds. **The motion passed unanimously.**

Respectfully submitted – Ian C. Burke WSWS Executive Board Secretary – June 5, 2009.

WSWS Honorary Member – Mr. Tom Brokaw

Mr. Tom Brokaw, American broadcast journalist and author, grew up in South Dakota and graduated from Yankton High School. He received a B.A. degree in Political Science from the University of South Dakota in Vermillion. His broadcast journalism career began in 1962 at KMTV in Omaha, Nebraska, followed by stints in increasingly larger markets in Atlanta, Georgia and Los Angeles, California. From 1973-1976 he was a White House correspondent for NBC News, and from 1976-1981 he anchored NBC News' *Today* program. Then he co-anchored the *NBC Nightly News* for a short time before becoming sole anchor and managing editor in 1983. During his tenure, *NBC Nightly News* became the most watched and trusted cable or broadcast news program in the United States. In 2004, he stepped down after 21 years as anchor and managing editor of *NBC Nightly News*, but continues to serve as a NBC News Special Correspondent and for several months in 2008 was interim moderator of NBC's top-rated Sunday morning public affairs program, *Meet the Press*, following the untimely death of the programs long-time moderator.

In addition to his accomplishments in broadcast news journalism, Mr. Brokaw has authored five books, including the bestseller *The Greatest Generation*, depicting Americans living through and coming of age during the Great Depression and World War II years. And he's completed numerous long form documentaries on subjects ranging from race, AIDS, the war on terror, Los Angles gangs, literacy, immigration, the evangelical movement, and an Emmy-winning documentary on global warming. He is a noted speaker and is bullish on the American West.

In his own words spoken during an address at the Western Governors' Association Conference in Jackson Hole, WY in 2008, Mr. Brokaw said he is a child of the American West. As a young man, he left for the bright lights of the big cities but frequently returned to the West as an itinerant backpacker, occasional climber, hunter, angler and summer resident. Then, in 1989, he and his wife Meredith, whom he wed in 1962, bought a 5,000 acre ranch in Montana, thinking it would take care of itself while they enjoyed the grandeur of the West and of Mother Nature. They quickly learned that one lives in the West on its terms, not their own.

He learned first-hand about the detrimental impact of weeds on their ranch and of the threat of invasive species on biodiversity and fragile ecosystems. It was in that context that Mr. Brokaw told those attending the Western Governors' Association Conference that the Western Society of Weed Science publication *Weeds of the West* was one of his favorite books.

In appreciation of Mr. Brokaw's endorsement of *Weeds of the West*, and for his acknowledging the detrimental impacts that weeds can have on the environment, and to ranching and agricultural operations in the western U.S., the Western Society of Weed Science is pleased to welcome Mr. Tom Brokaw as an Honorary Member of the Society.

Mr. Brokaw accepted the award presented by WSWS President Dan Ball via telephone link during the Annual Awards Luncheon.

Tom Brokaw, Honorary Member

Carol Mallory-Smith- Outstanding Weed Scientist Public Sector

Carol is highly respected nationally and internationally for her contribution to weed science especially in the field of herbicide resistance and gene flow. Her accomplishments as a researcher and teacher employed as a professor in the Department of Crop and Soil Science at Oregon State University are a great example of what a productive weed scientist should be. Carol's research and extension program has been instrumental in helping Willamette Valley producers with weed management, and her efforts have resulted in a prolific record of publications. Carol is very involved in undergraduate and graduate level weed science teaching and advising. Her research assistantships are highly coveted and she was awarded Outstanding Teacher in Crop and Soil Science in 1997.

Carol is very active in service to the weed science profession. She has participated on several international committees and was secretary of the International Weed Science Society. Carol recently served as WSSA President and was instrumental in helping weed societies raise awareness for the implications of herbicide resistance for weed management. She served on several WSWS committees and was honored as Fellow in 2003.

Those supporting Carol's nomination are impressed with her motivation, creativeness, and curiosity. They also applaud Carol's enthusiasm and leadership that has inspired many of her students to strive for excellence.

Pete Forster- Outstanding Weed Scientist Private Sector

As an ambassador for Syngenta, with tenure of 27 years, Pete Forster sets the benchmark for R&D field scientists. He grew up on his family's tree fruit farm in California's central valley and received his undergraduate and masters degree in Plant Science from California State University Fresno. Pete started his career with Syngenta in 1982 as a farm assistant at the Ciba-Geigy Western Research Farm in Sanger, California. Over the subsequent 18 years, he progressed in roles and responsibilities eventually becoming station supervisor. In 2001, Pete moved to Colorado to assume the role of a territory scientist for Colorado, Wyoming, western Nebraska, and Kansas.

As a project leader, he has been responsible for developing the directions for use for several herbicides, including pinoxaden, florasulam, trifloxysulfuron and tralkoxydim. As a scientist, he sets extremely high standards for quality research and is a member of Syngenta's Internal Data Quality Team. Pete is extremely well thought by his colleagues and is often referred to as the team's 'anchor' and 'social chairperson'. As a professional society member, he has supported both the WSWS and NCWSS by presenting papers, organizing spouse and graduate student functions, and being an active committee member. All of this is underpinned by Pete's genuine nature, generosity, intense scientific curiosity, and joyful spirit.

Alan Helm – Outstanding Weed Scientist-Early Career

This award was presented to Alan Helm for his excellence in regional leadership and service within Northeast Colorado, Western Kansas, and the panhandle of Nebraska. Alan assumed the Golden Plains Area Weed Specialist-Agronomist position for Colorado State University Extension in 2002. Alan's areas of interest include weed science, crop rotational effects on weed populations, and alternative crops for the production of food, feed, fuel, and fiber. Alan's research and extension program in association with weed control in alternative oilseeds is recognized regionally, and he has built a great reputation with growers and his colleagues. Alan has been a member of WSWS since 2003.

Alan grew up in Childress TX. He served America proudly during the first Gulf War, and graduated from Texas Tech University after his honorable discharge from the Marines. Alan's career in weed science began under Dr. Wayne Keeling and Dr. Peter Dotray. He was the assistant to farm manager for the Agricultural Complex for Advanced Research and Extension Systems (AGCARES) in Lamesa TX from 1998 to 2000. From 2000 to 2002, Alan was an Extension Assistant under Dr Randy Bowman for Texas Cooperative Extension. Alan credits the training he received from Dr. Keeling, Dr. Dotray, and Dr. Bowman as the foundation for him to establish his own program and work in a wide variety of crops and environments.

April Fletcher- Outstanding Weed Manager

This award was presented to April Fletcher for her service and excellence in raising awareness and understanding of invasive species on public lands. April received her B.S. in Conservation of Natural Resources from the University of California, Berkeley, and her M.S. in Wildlife Biology and Management from Colorado State University, Fort Collins. Prior to her employment by the U.S. Fish and Wildlife Service, she worked for the Insect Pathology Department and for the Division of Biological Control at the University of California, Berkeley.

She began working for the U.S. Fish and Wildlife Service in Washington, D.C. in 1976 as a wildlife biologist for the Office of Migratory Bird Management. In this position, she helped write the service's first national pollution response plan for oil and hazardous substances and prepared testimony for congressional hearings on oil spills. In 1979, she transferred to the southwest regional office to assume a position as Environmental Education Specialist, and she remained in the regional office in Albuquerque until her retirement the end of February.

During her career with the fish and wildlife service, she had numerous accomplishments and was very dedicated to spreading information about the control and management of invasive plants. She reviewed numerous pesticide use proposals for wildlife refuges and provided oversight, support, and technical guidance on invasive species management to staff of 46 National Wildlife Refuges in Texas, Oklahoma, Arizona, and New Mexico.

She was an active member of the Southern Weed Science Society for several years, during which time she assisted the society in expanding inclusion of invasive plants in their annual meetings. She has been an active member of WSWS since 2000, and this year she was on the Arrangements Committee and was Co-Chair for the Symposium on Biological Control.

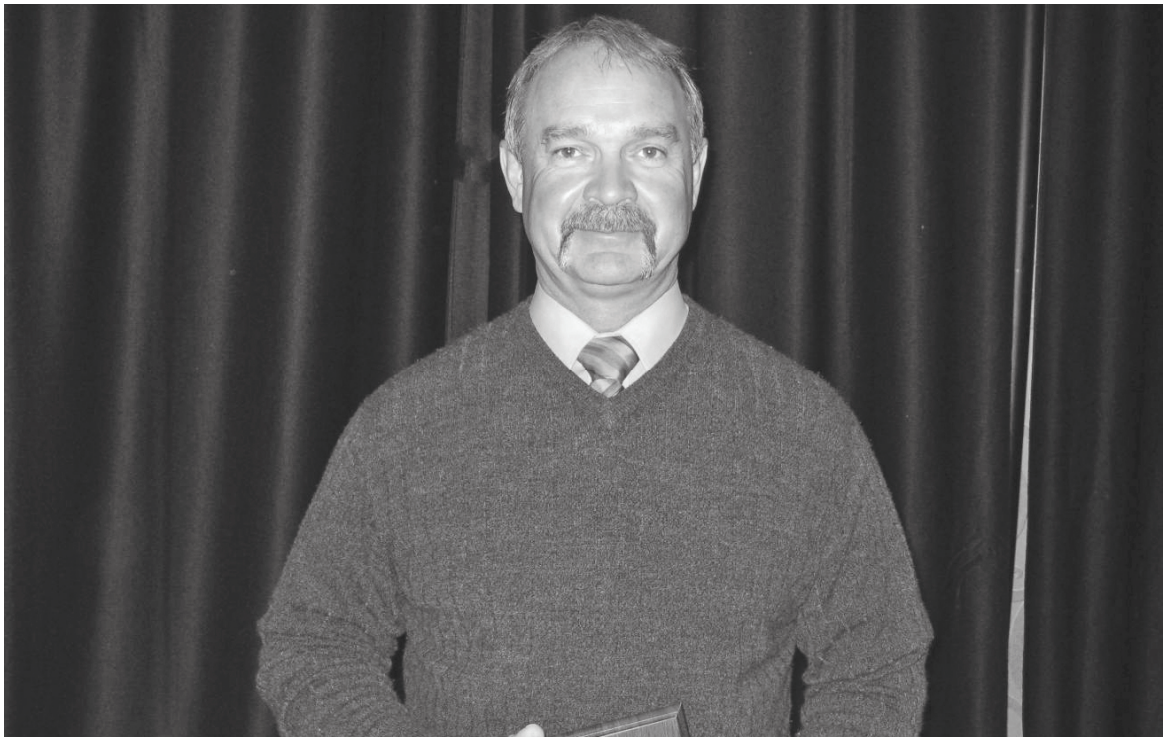
Gary Willoughby- Professional Staff Award

The 2009 outstanding professional staff recipient is Gary Willoughby. Gary was raised on a family farm in north central North Dakota where he developed exceptional mechanical skills and strong work ethic. Gary received an Associate degree from North Dakota State College of Science and a Bachelors degree from Minot State University. In 1983, he took over the family farm where he continued to gain valuable knowledge and experience in production agriculture.

In 1998, Gary was hired as a Research Specialist at the NDSU North Central Research Extension Center in Minot. Gary's skill in welding and fabrication of research equipment has saved NDSU thousands of dollars and has significantly enhanced their weed research capabilities. Likewise, his knowledge in equipment operation, maintenance, and repair ensures that research tasks are completed in a timely manner. Gary has helped write grant proposals, research reports, and has presented posters at WSWS since 2001. He has been a co-author or major contributor to many papers and posters at the WSWS.

Gary excels in areas outside of weed science as well. For example, he is a source of information for the media when it comes to biodiesel. He has worked with the NDSU Ag Engineering Department conducting canola biodiesel studies with tractors. Gary has been running one field tractor on 100% canola biodiesel for five years and is currently testing bio-fuel for cold weather operation. He has been interviewed by TV and radio stations across the state and news reporters in several states. Gary is a proud father of three daughters, caring for them while their mother was deployed to Iraq.

Gary is well deserving of this recognition for his significant contributions to weed science research and his devotion to the American farmer.

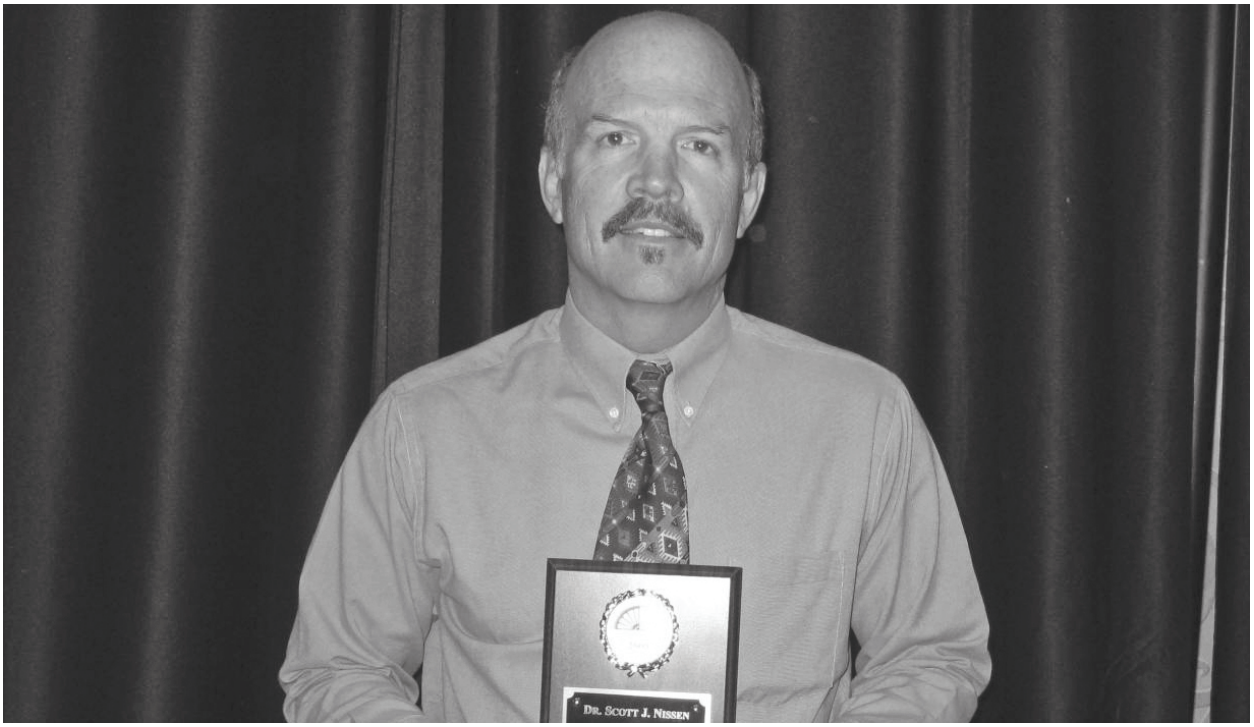


WSWS Fellow – Dr. Kassim Al-Khatib

Dr. Kassim Al-Khatib received B.S. and M.S. degrees from the University of Baghdad (Iraq), and a Ph.D. in Crop Physiology from Kansas State University. He has been an active member of the WSWS since 1989, and also is an active member of the NCWSS and WSSA. He has provided considerable service to each of those societies, and has made significant contributions to the discipline of Weed Science. He has served the WSWS in numerous capacities, including Chair of the Basic Sciences Project, Chair of the Alternative Weed Control Method Project, Chair of the Graduate Student Contest Committee, Chair of the Program Committee, and has served multiple terms on the Board of Directors. He was elected President-Elect of the WSWS in 2006 and served as President in 2007. Kassim began his professional career as Technical Development Manager of Intrachem SA in Geneva, Switzerland for three years before coming to the U.S. to begin doctoral studies. After obtaining his Ph.D. in 1984, he served as a post-doctoral research associate in crop physiology at Kansas State University for five years. Then, in 1989, he accepted a position of Assistant Agronomist with Washington State University at Prosser, and from 1992-1996 was Extension Weed Specialist at Washington State University, Mt. Vernon. In 1996, he returned to K-State as Assistant Professor of Weed Science and quickly progressed to the rank of Professor. At K-State, he has directed five Post-Doctoral Associates, nine Ph.D. students, and six M.S. students. Several of his students have won outstanding paper or poster awards from WSWS and NCWSS. Dr. Al-Khatib directs a multi-faceted research program that focuses on various aspects of herbicide-plant interactions, including herbicide resistant weeds, herbicide drift, environmental interactions, basic herbicide mode of action, and the ecological impacts of herbicide programs and cropping systems. Some of Kassim's more notable research accomplishments include the identification, transformation, patenting, and release of sorghum germplasm with resistance to ALS- and lipid synthesis-inhibiting herbicides; project management of an experimental herbicide owned by Kansas State University; identification of the source of herbicide resistance incorporated into Clearfield sunflowers; initial confirmations of waterhemp resistance to PPO-inhibitor herbicides and common sunflower resistance to ALS-inhibitor herbicides; gene flow among related crop and weed species; and the effects of herbicide drift on non-target crops. Dr. Al-Khatib was previously recognized for his research accomplishments by receiving the WSWS Outstanding Weed Scientist Award.

WSWS Fellow – Dr. Scott J. Nissen

Dr. Scott J. Nissen received a B.S. in Botany from the University of Montana, a M.S. in Agronomy/Soil Science from the University of Nevada, Reno, and a Ph.D. in Crop Science/ Biochemistry from Montana State University. Scott has been an active member of the WSWS since 1977 and has served the Society in several capacities including Research Section Chair and as a member of the Board of Directors. He has been a long time member of the Education Committee and Distance Education Sub-committee, has served on the Local Arrangement Committee, and as Chair of the Physiology Section. Scott began his professional career as a post-doctoral researcher at the University of California for two years before joining the University of Nebraska faculty as an Assistant Professor in 1989. In 1995, he moved to Colorado State University where he progressed to the rank of Professor of Weed Science in the Department of Bioagricultural Sciences and Pest Management. He has advised or co-advised 11 M.S. and four Ph.D. students. Five of the M.S. students have gone on to complete Ph.D. degrees at other universities and several students have received awards for outstanding papers or posters from the WSWS or NCWSS. Dr. Nissen has a three-way appointment split among research, teaching, and extension. His responsibilities include integrated weed management in crop and non-crop environments and involve field, laboratory, and greenhouse studies to understand herbicide performance, weed biology, and application technology in addition to outreach programming and extension education. Scott has authored or co-authored 55 refereed journal articles in a variety of journals and he has contributed his expertise to several comprehensive extension publications. Scott has contributed to the education mission of the WSWS by collaborating with others to develop award-winning online herbicide-mode-action modules offered for graduate credit offered through Montana State University's distance education program. He regularly provides educational training and programs for land managers dealing with invasive weeds through the Colorado Weed Management Association and Upper Arkansas Cooperative Weed Management Area.



Graduate Paper Award - Agronomic Crops & Basic Sciences
Jordan Hoefing, 1st Place; Melissa Bridges, 2nd Place; John Frihauf (not pictured), 3rd Place.

Graduate Paper Award - Range, Forestry, Wetlands
Brad Lindenmayer, 1st Place; Melody Rudenko, 2nd Place.

Graduate Poster Award
Maria Zapiola, 1st Place; Tanya Skurski, 2nd Place; Suphannika Intanon, 3rd Place.

Undergraduate Poster Award
Jared Unverzagt, 1st Place; Carol Lange, 2nd Place.

Board of Directors

Presidential Award of Merit, Mike Edwards

HONORARY MEMBERS

1976	Dick Beeler
1978	Dale W. Bohmont
1982	R. Phillip Upchurch
1983	Virgil H. Freed
1984	Warren C. Shaw
1987	Norman B. Akesson
1988	Logan A. Norris
1989	Gary A. Lee
1990	Earl Spurrier
1992	Bruce Ames
1993	Jerry Caulder
1994	Will D. Carpenter
1995	K. James Fornstrom
1997	F. Dan Hess
2001	Darrell Hanavan
2002	Senator Larry Craig-Idaho
2003	Roy Nishimoto
2004	Doug Schmale
2006	Wanda Graves
2007	Rob Hedberg
2008	Robert Zemetra

WSWS FELLOWS

1968	Robert B. Balcom	1989	John O. Evans
	Walter S. Ball		W.B. “Jim” McHenry
	Alden S. Crafts	1990	Harry S. Agamalian
	F.L. Timmons		Bart A. Brinkman
	D.C. Tingey	1991	Larry W. Mitich
1969	Lambert C. Erickson		Edward E. Schweizer
	Jesse M. Hodgson	1992	Donald C. Thill
1970	Lee M. Burge		Harold M. Kempen
	Bruce Thornton	1993	Paul J. Ogg
1971	Virgil H. Freed		Peter K. Fay
	W.A. Harvey	1994	Sheldon E. Blank
1972	H. Fred Arle		Gus J. Foster
	Boysie E. Day	1995	Stephen D. Miller
1973	Harold P. Alley		John T. Schlesselman
	K.C. Hamilton	1996	Don Colbert
1974	William R. Furtick		Robert Parker
	Oliver A. Leonard	1997	Steven A. Dewey
1975	Richard A. Fosse		Mike Newton
	Clarence I. Seely	1998	Doug K. Ryerson
1976	Arnold P. Appleby		Tom D. Whitson
1977	J. LaMar Anderson	1999	Charlotte V. Eberlein
	Arthur H. Lange		John E. Orr
1978	David E. Bayer	2000	Rodney G. Lym
	Kenneth W. Dunster		Frank L. Young
1979	Louis A. Jensen	2001	Barbra Mullin
	Gary A. Lee		Jill Schroeder
1980	W.L. Anliker	2002	Jeff Tichota
1981	P. Eugene Heikes		Philip Westra
	J. Wayne Whitworth	2003	Vanelle Carrithers
			Carol Mallory-Smith
1982	Bert L. Bohmont	2004	Don Morishita
	Lowell S. Jordan		Phil Banks
1983	Richard D. Comes	2005	Nelroy Jackson
	Clyde L. Elmore		Roland Shirman
1984	Larry C. Burrill	2006	Joan Campbell
			Celestine Duncan
1985	L.E. “Jack” Warren	2007	Bill Cobb
			Phil Stahlman
1986	Dwight V. Peabody	2008	Rick Boydston
			George Beck
	Robert L. Zimdahl		
1987	Alex G. Ogg, Jr.		
	Jean H. Dawson		
1988	Harvey D. Tripple		
	E. Stan Heathman		

2009 WSWS Sustaining Members

Agriliance LLC

AGSCO, Inc.

AMVAC Chemical Corp.

Arysta LifeScience

BASF Corp.

Bayer CropScience

Dow AgroSciences

DuPont Crop Science

FMC

Gowan Co.

Helena Chemical Co.

Kootenai Valley Farm & Research LLC

Marathon Agricultural & Environmental Consulting

Monsanto Co.

North Star VMS/Helicopters

PBI Gordon Corp.

Syngenta Crop Protection

Valent USA Corp.

Wilbur-Ellis Co.

Winfield Solutions LLC

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