Seed Dormancy and Germination Characteristics of Jointed Goatgrass

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Introduction

- Studies of seed dormancy and germination characteristics contribute to an understanding of weed biology and field emergence patterns. This information can be used to successfully time weed control strategies for maximum efficiency.
- Winter wheat yield and quality losses due to competition with jointed goatgrass have been well documented.
- 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.
- A comparison of the germination responses between dormant and non-dormant jointed goatgrass seed in varied incubation environments provides some insight into the depth and origin of seed dormancy, and methods to relieve it.

Materials and Methods

- Seed dormancy and germination behavior were evaluated in several jointed goatgrass populations of Oregon and Washington origin over multiple years.
- Seed were grown by population in common gardens at Moro and Pendleton, OR.
- The effects of light, dark, maternal environment, spikelet structures, temperature, and time on germination were evaluated for seed harvested from the common gardens. Standard germination protocols were used.
- Germination was recorded by seed position within the spikelet.
- Data were analyzed using common statistical procedures.

In Summary

- 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. Tillage and herbicide applications will be most effective in the fall when primary dormancy is lost, but before secondary dormancy is imposed.
- 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.

Synopsis of Results and Photo Collage

Fig. 1 The effect of day/night incubation temperature on germination of dormant seed from two jointed goatgrass populations. Seed in the primary floret did not germinate.

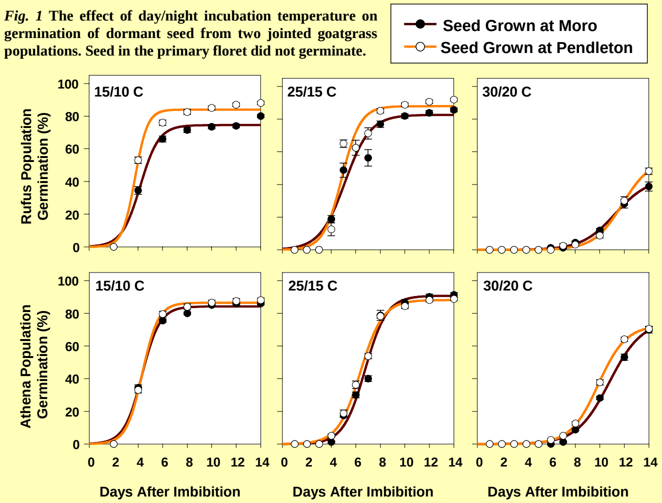
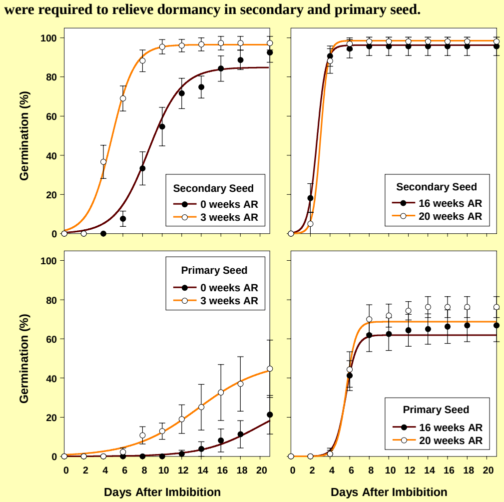


Fig. 2 The effect of after-ripening (AR) in weeks on germination of dormant seed from a single jointed goatgrass population. Approximately 16 wks AR were required to relieve dormancy in secondary and primary seed.

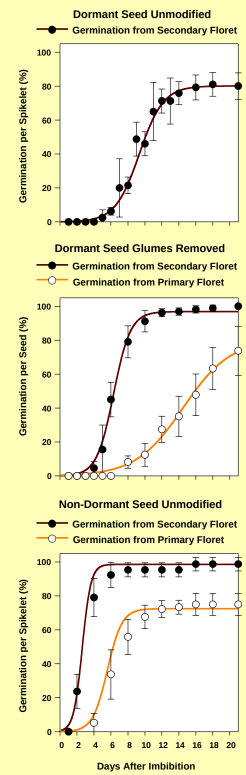


Original drawing of jointed goatgrass spikelet structures (above) courtesy of Sugae Wada, Oregon State Univ.

Lynn Fandrich (below) examines floral development in jointed goatgrass.

Fig. 3 (left) The effect of spikelet structures on germination of dormant seed.

Fig. 4 (right) The effect of photoperiod on germination of dormant and non-dormant seed. Both experiments used a single jointed goatgrass population.



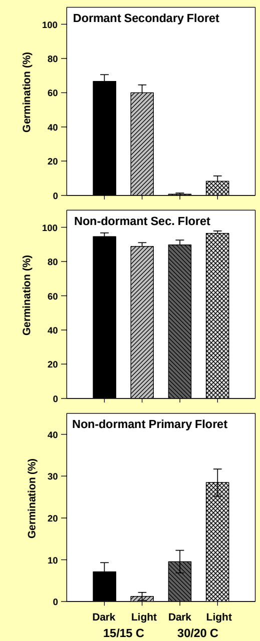


Table 1 The effect of maternal environment on final germination value after 14 d incubation at three temperatures. Three jointed goatgrass populations were studied.

Population	Location	Estimate ± Confidence Interval 15/10 C	25/15 C	30/20 C
Athena, OR	Moro	84 ± 3.4	90 ± 3.8	75 ± 13.2
Athena, OR	Pendleton	86 ± 3.0	88 ± 3.2	72 ± 7.3
Helix, OR	Moro	74 ± 3.0	81 ± 3.9	61 ± 15.7
Helix, OR	Pendleton	85 ± 3.0	87 ± 3.8	71 ± 9.6
Rufus, OR	Moro	74 ± 3.0	82 ± 3.4	43 ± 15.1
Rufus, OR	Pendleton	84 ± 2.8	87 ± 3.2	55 ± 18.6