



Seed Polymorphism in Two Western Nevada Indian Ricegrass Communities

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Introduction

Indian ricegrass (*Achnatherum hymenoides*) is a dominant perennial grass species in salt desert communities and lower sagebrush (*Artemisia*) vegetation zones of western North America. This perennial bunchgrass reaches its heaviest densities on sandy soils and is an important winter forage species for domestic livestock. Indian ricegrass may form relatively pure stands, and may extend several thousand hectares in area (Fig. 1). Therefore, it is a valuable forage species and a monospecific dominant of harsh, arid environments (Young and Evans 1984). Due to these conditions, Indian ricegrass has become popular as a restoration/revegetation species. Young et al. 1983 and Young and Evans 1984 as well as others have reported on the highly polymorphic seed characteristics of Indian ricegrass and the germination of these polymorphic seeds, yet little is reported on whether all or most plants actually produce all of these polymorphic forms or do individual plants produce specific forms. This research was conducted under a High School Internship Program with the mentoring of the USDA, Agricultural Research Service, Exotic and Invasive Weeds Unit in Reno, Nevada (Fig. 2)



Figure 1. Pure stand of Indian ricegrass at Nixon, Nevada.

Methods

We selected two study sites to collect Indian ricegrass seed from. The first site, Flanigan, is located 100 km north of Reno, NV and is a burned Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community and is dominated by Indian ricegrass with cheatgrass (*Bromus tectorum*), Barbwire Russian thistle (*Salsola paulsenii*) and the native annual, fiddle neck (*Amsinckia tessellate*) present on most years. The soil is eolian sand. The second site, Nixon, is located 70 km north of Reno, NV and is a Lahontan sand that is dominated by Indian ricegrass with Barbwire Russian thistle also very abundant with a sparse 4-wing saltbush (*Atriplex canescens*) shrub density. Ten individual Indian ricegrass plants were randomly selected at each site and the seed from the individual plants were collected and sorted by polymorphic type: 1) large dark, 2) small dark, 3) tan and 4) cream (Fig. 3) Total numbers of seed as well as polymorphic types were recorded. Plant height, width and weight were recorded as well.

Results and Discussion

All plants collected yielded all 4 polymorphic types of seed. The Flanigan site selection yielded an average 694 seeds per plant with a range of 35 to 2,457 seeds per plant. The majority of polymorphic seeds represented were the tan seeds at 50% while the cream seeds represented 10% of the total seed per plant (Table 1). The average plant height was 28.5 cm (17-39.8 cm) and the average biomass weight was 6.9 g (2.1-15.7g). The Nixon site selection recorded an average of 2,001 seeds/plant (range 210-4544). Tan seed made up the majority of polymorphic type seed at this site (39%) as well, but was more closely followed by large dark seed at 31% and small dark seed at 27% (Table 1). The average plant height was 78 cm, (60.7-120.2 cm) and the average biomass weight was 15.9 g, (2.2-29.3g). While not significant, there does seem to be more even representation of each seed type besides cream seeds, with the larger plants sampled at Nixon. Large dark seeds weighed the most at each site averaging 0.0031g and 0.0034g at Flanigan and Nixon respectively followed by small dark, cream and tan seed. Young and Evans 1984 reported that small dark seeds germinated at the highest levels when no germination enhancing techniques were used followed by large dark and then tan. Ecologically it makes sense that smaller plants may not have developed under as good conditions or habitats as larger plants and therefore it would be beneficial to produce more dormant seeds (tan) to wait out the less than good environmental or habitat conditions as a seed bank. Larger plants from “better” habitats may not require this strategy. Young and Evans 1984 found that cream seeds did not germinate with or without enhancement. Large dark seed did much better when enhanced and therefore are important as granivorous rodents may perform this enhancing technique when harvesting and caching this seed species (McAdoo et al. 1982). The collecting and processing of wildland plants with polymorphic seed characteristics, such as Indian ricegrass, must be accounted for when using these species in restoration/revegetation efforts.

Table 1. Collection of Indian ricegrass seed per site with percent of each polymorphic seed type represented.

Site	Ave. Plant Biomass (g)	Ave. Seed/Plant	Large Dark	Small Dark	Tan	Cream
Flanigan	6.9	694	28%	22%	50%	10%
Nixon	15.9	2,001	31%	28%	39%	2%

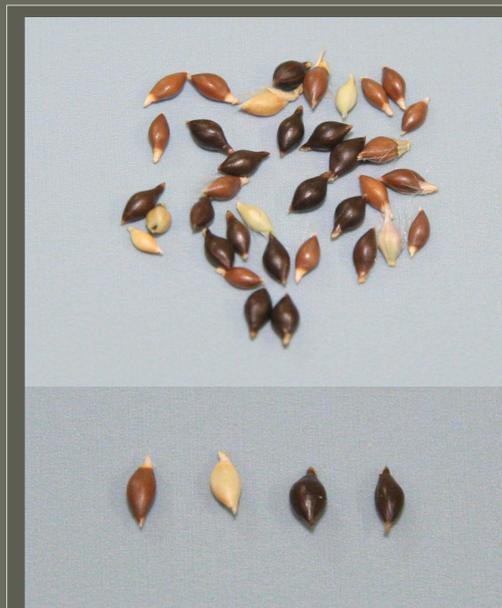


Figure 3. Polymorphic types of Indian ricegrass seed and (bottom) each seed type, left to right, Tan, cream, large dark, and small dark



Figure 2. Rachel Ezzell, high school intern, at the Nixon Indian ricegrass selection site.

Literature Cited

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