Germination Response of *Uniola latifolium*

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Abstract. Broadleaved uniola (*Uniola latifolium* Michx.) caryopses and florets were prechilled or not prechilled, supplied with potassium nitrate (KNO₃) or water only, and diurnal germination temperature alternations of 15/30C or 20/30C were used. Caryopses and florets both reached 50% germination by 10 days after planting with KNO₃; however, in water, caryopses reached 50% germination significantly earlier than florets (18 vs. 30 days). Germination temperature and prechilling had no effect on days to 50% germination. Final germination percentages were significantly higher for caryopses than florets at both germination temperatures and for caryopses germinated at 15/30C than at 20/30C (85% vs. 74%). Significantly more seeds germinated with KNO₃ than in water (85% vs. 57%). Prechilling had no effect on final germination percentage. Caryopses germinated with KNO₃ at 15/30C achieved the highest final germination percentage.

Germination requirements for many species of grasses, such as broadleaved uniola, used increasingly in landscape plantings are not available. Studies of the grass species *Miscanthus tinctorius* (Steud.) indicated a benefit from prechilling the seeds at $\approx$ 3C for 3 months (Matumura and Yukimura, 1975). In the same study, fresh seeds of *M. sacchariflorus* (Maxim.) had lower germination rates at a constant 25C, compared to seeds germinated at alternating temperatures of 20 and 30C. Germination rates of seeds under constant temperature reached those at alternating temperatures only after 195 days of prechilling. For shorter prechill periods, alternating between 20 and 30C gave higher rates of germination than use of a constant 25C.

Weaver and Jordan (1985) showed that a low concentration (0.02 M) of KNO₃ may promote germination of A-68 Lehmann lovegrass (*Eragrostis lehmanniana* Nees.). Solutions of 0.1% to 0.2% KNO₃ are recommended by the Association of Official Seed Analysts (AOSA) and the International Seed Testing Association for germination tests of many species (Copeland and McDonald, 1985). Gadd (1955) showed that KNO₃ increased the germination percent of New Zealand browntop (*Agrostis tenuis* Sibth.). The purpose of this study was to evaluate the effects of several seed treatments on germination of broadleaved uniola.

We collected seeds of broadleaved uniola from along the banks of the Bosque River in Erath County, Texas, during Fall 1985. Only

fully developed, plump, mature seeds were used. All seeds were stored at 22C and ambient relative humidity (25% to 30%) until the test was initiated.

Seeds, visually selected for the study on the basis of size uniformity to minimize potential seed size effects, were divided into two equal samples, and caryopses were separated by hand from the lemma and palea of one sample. From each sample, 100 seeds were uniformly spaced in 9-cm petri dishes onto three layers of filter paper serving as seed germination blotters in each of 32 petri dishes for caryopses and 32 for florets. The petri dishes of each seed treatment were subdivided into two equal subsamples; one-half was placed at 10C in darkness to chill for 2 weeks immediately before initiation of the study and the other half was held at room temperature in light (22C). Immediately before the test, each of the subsamples was divided into two equal parts, and the filter paper within the petri dishes was moistened with either 0.02 M KNO₃ solution or distilled water. Germination was conducted according to the AOSA rules for testing (1981) at either of two diurnal temperature alternations-15C for 16 hr and 30C for 8 hr or 20C for 16 hr and 30C for 8 hr. A Stultz Model 6EBSS-J392 (Stultz Scientific Engineering Corp., Springfield, Ill.) germination chamber was used for environmental control. Light was provided by four Sylvania Mainliner 40-W fluorescent tubes during the high-temperature cycle of each treatment. Gadd (1955) showed that light is important for uniform and fast germination and that the combination of light, KNO₃, and alternating temperatures was essential for optimum germination in *Agrostis tenuis*.

A split-plot experimental design with four replications was used, with germination temperatures (15-20C, 20-30C) as main plots and treatment combinations, consisting of two seed classes (caryopses, florets), two pre-germination temperatures (10C, 22C), and

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two germination pretreatments (KNO_3 , H_2O), arranged factorially in a completely random design as subplots, a petri dish being a replicate. Seeds were considered germinated when the epicotyl and radicle had emerged and were counted four times weekly, beginning 5 days after planting and continuing until germination was complete 40 days after planting. Data were collected on days from planting until 50% germination and final germination percentage. Standard arcsin square-root transformations were performed on the germination data before computing the analysis of variance. Means were compared using Duncan's multiple range test (Steel and Torrie, 1980), and germination percentages were backtransformed for presentation:

Germination temperature had no effect on the, number of days from planting until 50% germination, with 17 days being required at both temperature regimes. All interactions involving temperatures also were not statistically significant, indicating that the temperatures used were well within the requirements of *Uniola latifolium*.

Prechilling tended to reduce 'the number of days from planting until 50% germination, requiring 16 days, as compared to 18 days for nonprechilled seeds. This difference, although of some practical importance for time conservation, was not significant, as were all interactions involving prechilling.

Caryopses and florets did not differ significantly in days from planting until 50% germination when germinated in KNO_3 , requiring 9 and 10 days, respectively. However, when grown in water, caryopses reached 50% germination 18 days after planting, which was significantly ($P > 0.01$) earlier than the 30 days required for florets. Although the first-order interaction of seed Classes and pregermination treatments was significant, none of the higher order interactions were.

Final germination percentages were significantly ($P > 0.01$) higher for caryopses than florets at both germination temperatures and for caryopses germinated at 15/30C (85%) than at 20/30C (74%). Florets had a final germination of 63% at both temperatures. All other interactions involving seed classes and germination temperatures were not significant.

Seeds germinated with KNO_3 had a final germination of 85%, which was significantly ($P > 0.01$) higher than the 57% for seeds germinated in water. This trend was consistent for both prechilled and nonprechilled seeds and at both germination temperatures.

Prechilling had no effect on final germination percentage. Prechilled seeds averaged 73% germination, as compared to 71% for nonprechilled seeds. None of the interactions involving prechilling were significant, indicating that prechilling was not effective in promoting germination in this species.

From these studies, the optimum procedures for germination of broadleaved *Uniola* seeds appear to be 1) removal of the caryopses from the lemma and palea and 2) germinating the caryopses for 2 weeks with

KNO_3 at 15/30C.

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