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NATIVE PLANTS OF THE NORTHERN GREAT PLAINS: ETHYLENE INDUCTION OF ASTERACEAE SEED GERMINATION

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As part of our efforts to develop alternative agricultural systems utilizing plants native to the Northern Great Plains, methods for overcoming seed dormancy are being tested. Seeds of *Achillea millefolium* L., *Antennaria neglecta* Greene, *Chrysopsis villosa* (Pursh) Nutt., *Echinacea angustifolia* DC, *Helianthus maximiliani* Schrad, *Liatris punctata* Hook., *Ratibida columnifera* (Nutt.) Woot. & Standl., and *Townsendia exscapa* (Richards.) Porter were collected from several populations within the state of South Dakota. Initial germination tests showed varying degrees of seed dormancy between populations and species. *Liatris*, *Achillea*, *Echinacea* and *Ratibida* showed germination rates of ~10 to 20 %, while the other four species showed almost no germination without extensive periods of stratification. Seed source and seed maturity have been shown to significantly affect germination rates. Therefore, only well developed seeds (relatively high dry weight) taken from flower heads that readily released the seeds, were used for this experiment. To improve germination without months of stratification, the seeds were treated using the ethephon protocol developed for *Echinacea* (Feghahati and Reese, 1994). Briefly, the seeds were exposed to two weeks of continuous light (40 W cool white fluorescent tubes), in the cold (5 C), and in the presence of the phytohormone ethylene, applied as ethephon (1mM). This treatment has been shown to eliminate the need for months of stratification. Germination was significantly increased for all seed sources (with final germination ranging from ~30 to 85%) except for those of *Liatris* and *Ratibida*, which showed no improvement. Tetrazolium tests were conducted to allow calculation of germination rates of viable seeds. The results indicated that the variability in the increased rates of germination, in response to the ethephon treatment, reflected the variability in seed viability and that germination of live seeds ranged between 70- 85%. Furthermore, the lack of response by *Liatris* and *Ratibida* seeds to the treatment reflected the fact that most of the viable seeds germinated without any need of stratification or ethephon treatment. Factors affecting seedling emergence from soil were also examined during these experiments. Preliminary observation suggest that many of these factors may need study to ensure the success of agronomic protocols for successful plant production.

Feghahati and Reese (1994). J. Amer. Soc. Hort. Sci. 119(4):853-858.