PRIMARY SEED DORMANCY IN AMBROSIA TRIFIDA L. (GIANT RAGWEED). Brian J. Schutte, Emilie E. Regnier, and S. Kent Harrison, Graduate Research Associate, Associate Professor and Professor, Department of Horticulture and Crop Science, The Ohio State University, Columbus, OH 43210

Giant ragweed is a summer annual that interferes with the production of summer annual crops. Year-to-year persistence of giant ragweed populations requires a period of seed dormancy immediately following autumn seed dispersal, yet little is known about primary seed dormancy of giant ragweed. Giant ragweed dispersal units are embryos encapsulated by a series of covering structures including a membranous layer, pericarp and involucre. In general, seed dormancy can be attributed to an inhibitory mechanism within the embryo (embryo dormancy) or constraints on the embryo imposed by the embryo-covering structures (coat-imposed dormancy).

We monitored the progress of putative embryo- and coat-imposed dormancy loss for giant ragweed dispersal units in natural winter conditions. Dispersal units were buried, regularly retrieved and dissected to produce embryos, and embryos with covering structures for germination assays at 20°C under 12 hr photoperiods. Proportions that failed to germinate (lack of visible radicle protrusion) indicated dormancy intensities and comparisons between isolated and covered embryos provided measures of coat-imposed dormancy. Results showed that winter-induced removal of giant ragweed seed dormancy involves a sequential reduction of embryo dormancy and coat-imposed dormancy. This suggests that the final barrier to radicle protrusion is the interaction between a non-dormant embryo and an inhibitory set of covering structures.

We also determined the effects of three environmental conditions on seed dormancy with a laboratory 2x2x2 factorial experiment. First, seeds were treated for up to 273 days with two thermal environments (4°C, 20°C) and two hydric environments (free water available, free water absent). Following thermal and hydric treatments, seeds were subjected to germination assays of two light environments (illuminated, dark). Seed dormancy was reduced most rapidly by moist, cold (4°C) conditions followed by illuminated germination assays (72% dormancy reduction attained at a rate of 0.82% reduction per day at 4°C). Seed dormancy was reduced by moist, cold (4°C) conditions followed by germination assays in darkness (54% dormancy reduction attained at a rate of 0.57% reduction per day at 4°C). Dormancy was slowly reduced in dry, cold (4°C) conditions followed by illuminated germination assays (7% dormancy loss attained at a rate of 0.02% reduction per day at 4°C). These results indicate giant ragweed seed dormancy reduction has a near absolute requirement for cold conditions. The promotional effect of light was not expected since light requirements are not common for large-seeded species like giant ragweed. Light requirements affect seed performance in the field and therefore, additional research into the giant ragweed light requirement for termination of primary seed dormancy is warranted.

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