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21. © Improving seed germination of native perennial *Phlox longifolia*. Ridout, M. E. and Tripepi, R. R. Native Plants Journal 10(2):80-89. 2009.

Photo by Matthew Fisk

ABSTRACT

Seeds of native species of perennial phlox often germinate poorly for producers of native plants. To determine seed treatments that might improve germination, we conducted a study on the native longleaf phlox (*Phlox longifolia* L. [Polemoniaceae]). Seed treatments included a 7 °C (45 °F) cold treatment, a 21 °C (70 °F) warm treatment, 10 or 20 ml/l liquid smoke, 1000 or 2000 ppm KNO_3, 100 or 500 ppm GA_3, and a 21 °C distilled water control. Seeds were placed on filter paper in Petri plates and germinated in the dark. All treatments except the 7 °C stratification were incubated at 21 °C for 4 wk. At least 90% of *Phlox longifolia* seeds germinated during the 7 °C cold treatment within 7 to 10 d and had the highest germination percentages of all treatments. The 500 ppm GA_3 treatment induced approximately 37% of *P. longifolia* seeds to germinate in 4 wk, but germination in GA_3 treatments was characterized by cotyledons emerging first with few radicles emerging. The 21 °C stratification, liquid smoke, or KNO_3 seed treatments failed to induce germination. Germination percentages of *P. longifolia* seeds in all treatments increased sharply when seeds were moved from 21 °C and into the 7 °C refrigerator. Seeds of *P. longifolia* exposed to a 7 °C cold treatment germinated quickly at high percentages (> 90%), making this treatment practical for nursery propagation of this native perennial.

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KEY WORDS

seed treatments, stratification, cold treatment, dormancy

NOMENCLATURE

Turner and Gustafson (2006)
USDA NRCS (2009)

Improving seed germination of native perennial *Phlox longifolia*

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For growers producing native plants in the nursery industry, propagation of native species often presents serious challenges. Native species are adapted to their native environments—environments characterized by fluctuations in temperature and moisture conditions. Many native plant species have varied and sometimes ecotypical behavior in reproduction and redistribution that facilitates their survival (Parish and others 1996; Wooten 2003; Turner and Gustafson 2006). Varying life cycles and seed dormancies protect the plants' regeneration potentials but, in consequence, present a challenge for controlled propagation (Meyer and Paulsen 2000). To propagate native species successfully in controlled situations, growers and researchers must artificially reproduce conditions at which these species break dormancy and germinate in the wild.

Native perennial species in the genus *Phlox* (Polemoniaceae) are among those species that have been difficult for producers to propagate by seeds in nursery settings. Low seed germination percentages have made nursery production of these species somewhat cost prohibitive. Most perennial phlox species native to the Pacific Northwest are geographically distributed in primarily arid environments from low to mid-elevations (Parish and others 1996; Turner and Gustafson 2006). A few hardier species are found at higher elevations in the alpine zone (Parish and others 1996; Turner and Gustafson 2006). Their native climate is characterized by hot, dry summers and cold, dry winters with a narrow window of marginal precipitation during the early spring and late fall. Native soils are shallow and rocky. Longleaf phlox (*Phlox longifolia* L.) is a species native to shrub steppe ecosystems of Idaho, Washington, and Oregon as well as parts of northern California, Utah, Colorado, and Wyoming (Taylor 1992; Turner and Gustafson 2006). This species' environment, natural history, and available germination data indicate seed treatments are necessary to maximize and improve germination for controlled propagation of the species. The research available indicates the presence of some form of dormancy, because germination percentages are low (Ellis and others 1985; Springer and Tyrl 1989; Madeiras and others 2007), and growers and propaga-