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57. © The Willamette Valley seed increase program: developing genetically diverse germplasm using an ecoregion approach. Ward, K., Gisler, M., Fiegenger, R., and Young, A. Native Plants Journal 9(3):334-349. 2009.

The Willamette Valley Seed Increase Program

Developing genetically diverse germplasm using an ecoregion approach

| Kimiora Ward, Melanie Gisler, Rob Fiegenger, and Amy Young

ABSTRACT

The goal of the Institute for Applied Ecology's Willamette Valley Seed Increase Program is to develop a supply of ecologically appropriate, genetically diverse native plant material for restoration of prairie ecosystems in the Willamette Valley. In creating restoration germplasm we seek to maximize genetic diversity while simultaneously protecting genetic integrity of extant native populations. In the absence of genetic data to guide appropriate movement of native seeds, we are testing the use of an ecoregion approach using a variety of research techniques. We collected seeds, defined preliminary seed transfer zones, and planted seed increase fields for each of 21 historically widespread, common species. We captured spatial and temporal genetic diversity by sampling from many populations per species over a 3-y period. Seed zone boundaries for each species were drawn at the scale of the ecoregion or smaller, depending on life history characteristics and potential for adverse genetic effects of translocation. To minimize loss of diversity through domestication selection, we planted increase fields using a novel design, the Diversity Enhancement Block. Seedlots from populations with different phenology or from different areas within the ecoregion were planted in separate adjacent blocks. This design allows harvest of each block separately as seeds mature, while still permitting plants from different regions of the valley to cross-pollinate and to produce crop seeds with maximum genetic diversity. All of our production fields have been entered into the Oregon Seed Certification Service Pre-Variety Germplasm program. We are looking for partners to participate in a buyer's cooperative.

Ward K, Gisler M, Fiegenger R, Young A. 2008. The Willamette Valley seed increase program: developing genetically diverse germplasm using an ecoregion approach. *Native Plants Journal* 9(3):334–349.

KEY WORDS

native plant material development, prairies, restoration genetics, seed transfer zones, domestication selection, Diversity Enhancement Block design

NOMENCLATURE

USDA NRCS (2008)

Successful habitat restoration includes sufficient species diversity to create plant communities representative of the original habitat, resilient to environmental fluctuations, and capable of supporting a diverse assemblage of wildlife (Bradshaw 1987; Ehrenfeld 2001; Meninger and Palmer 2006). Within those species, the genetic quality of germplasm can be equally important in achieving success (Falk and others 2006). Restoration germplasm should be both locally adapted and genetically diverse (McKay and others 2005).

The use of locally adapted germplasm improves the chances of establishment and persistence on restoration sites (Gustafson and others 2005), while protecting genetic integrity of indigenous plant populations by preventing swamping of ecologically inappropriate genes (Lesica and Allendorf 1999;

Asclepias speciosa Torr. (Asclepiadaceae) in the Willamette Valley, Oregon. Photo by Matt

Blakeley-Smith