

ECOVAR DEVELOPMENT ON THE NORTHERN GREAT PLAINS OF NORTH AMERICA

K. W. May¹, B. Wark² and B. Coulman³

¹Agriculture & Agri-Food Canada, P.O. Box 3000, Lethbridge, Alberta, Canada, T1J 4B1.

² Ducks Unlimited Canada, Oak Hammock Marsh, Stonewall, Manitoba, Canada, R0C 2Z0.

³ Agriculture & Agri-Food Canada, 107 Science Place, Saskatoon, Saskatchewan, Canada, S7N 0X2.

ABSTRACT

The objective of this study was to develop sources of seed of native plant species to facilitate commercial seed production of ecovars suitable for revegetation and reclamation of disturbed land. An ecovar or ecological variety is native plant material derived from a composite of germplasm collected throughout the area of adaptation and that contains the natural genetic diversity of the species. Ecovars are currently being developed or proposed for 24 species of grass, legume and shrub species from the northern great plains. The research is conducted by scientists at nine research centres from six agencies in two countries. Seed from the first ecovar, developed from 250 accessions of Needle-and-Thread grass received pedigree status in 1996. Associated research studies will determine the degree of genetic variability existing among the accessions and any shifts in genetic diversity resulting from selection.

KEYWORDS

Ecovar, native plant species, revegetation, reclamation.

INTRODUCTION

In North America there is increasing interest in native plant species for revegetation, reclamation and other uses. Serious limitations are a lack of commercial seed production of many native species and a lack of information on genetic variability of species within native plant stands. Under the auspices of the North American Waterfowl Management Plan, Ducks Unlimited Canada establishes 10,000-15,000 acres of native vegetation annually on the Canadian prairies, in an effort to offset declining waterfowl nest success. Their objective is to create long-lived, diverse cover that is attractive to a wide array of wildlife species. Obtaining sufficient quantities of high quality, reasonably priced native seed that will thrive under northern great plains conditions is essential for their program.

An Ecovar Development Program was initiated by Ducks Unlimited Canada in 1991 to develop biologically diverse sources of native plant species required for their revegetation program. An ecovar or ecological variety is native plant material derived from a composite of germplasm collected throughout the area of adaptation and that contains the natural genetic diversity of the species.

MATERIALS AND METHODS

Plants or seeds are collected from remnant native stands by Ducks Unlimited Canada (DUC) staff. The current range of each species is sampled within an ecoregion to ensure that the genetic variability of the species is represented in the collection. Propagation and evaluation with minimal selection of plant material is done by scientists at their research centres. Scientists are employing different propagation and selection methods to accommodate the different agronomic and pollination requirements of each species and to maintain maximum genetic diversity in the ecovar. Quantities of seed from each plant or clone are combined to represent the species for increase, evaluation and release as ecovars.

RESULTS AND DISCUSSION

The research is conducted by scientists at nine research centres from six agencies in Canada and the United States (Table 1). Continual consultation is maintained among scientists at the various centres and DUC staff for generating ideas, solving problems and preventing duplication of effort. Consultation is facilitated through personal contact and semi-annual meeting of the Native Plant Materials Development Group.

Ecovars are currently being developed or proposed for 24 species of grass, legume and shrub species from the northern great plains (Table 1). Some examples of the present programs are presented below:

Ecovar development of needle-and-thread grass (*Stipa comata* Trin. & Rupr.) began in 1991 from 250 plants collected in Manitoba, Saskatchewan and Alberta. A seed increase composed of equal quantities of seed from all 250 plants, was planted in 1994. Seed from this field is the first ecovar developed from the DUC Native Plant Program and received pedigree status in 1996. At the University of Manitoba, ecovars of little bluestem (*Schizachyrium scoparium* (Michx.) Nees), blue grama (*Bouteloua gracilis* (HBK.) Lag.) and prairie June grass (*Koeleria gracilis* Pers.) are being developed from plants collected from remnant stands across southern Manitoba. Anh Phan, MSc student, is determining the range in genetic diversity among plants of each species. Shifts in genetic diversity resulting from selection are also being determined.

Plants of plains rough fescue (*Festuca hallii* (Vasey) Piper) collected in 1993 from remnant stands in Alberta and Saskatchewan were vegetatively propagated at Lethbridge. Evaluation trials were established at five locations throughout the collection area. Notes are being recorded on spring vigour, frequency of heading, plant height, rate of growth of rhizomes, seed yield and seed germination. In the year after transplanting, there was considerable genetic variability among clones for all characteristics and approximately 80% of the plants produced seed. Plants of western wheatgrass (*Agropyron smithii* Rydb.) were collected in 1995 from remnant stands in southeastern Saskatchewan and southern Manitoba. Plants were propagated during the winter in the greenhouse and transplanted to field nurseries in 1996 along with clonal propagules from Alberta and southwestern Saskatchewan seedlots. The genetic variability within and among populations will be determined by measuring plant height, basal spread, heading date, flowering date, seed yield, seed weight and seed germination.

CONCLUSIONS AND IMPLICATIONS

Cooperation without duplication of effort among individuals from public and private agencies in two countries has allowed this project to proceed with maximum efficiency. The release of genetically diverse ecovars for commercial seed production will reduce the cost of reclamation and revegetation through increased seed supplies and reduced seed production costs. Information obtained on the genetic variability of the plant species in remnant native stands will be

valuable for additional preservation, conservation and development activities. Seeding genetically diverse ecovars across the prairies will provide *in situ* conservation of these species. This research goes towards implementing Canada's biodiversity strategy and Canada's response to the United Nations Convention on Biological Diversity.

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Table 1

Current and proposed (x) ecovars and cooperating agencies in the Native Plant Materials Program.

Common	Scientific	Cooperating Agency
Spangletop (Whitetop)	<i>Scolochloa festucacea</i> (Willd.) Link	NRCS/DUC*
June Grass	<i>Koeleria gracilis</i> Pers.	U of MB, AEC**
Little Bluestem	<i>Schizachyrium scoparius</i> (Michx.) Nees	U of MB, AAFC**
Needle-and-thread	<i>Stipa comata</i> Trin. & Rupr.	AAFC
Porcupine Grass	<i>Stipa spartea</i> Trin.	AAFC
Green Needlegrass	<i>Stipa viridula</i> Trin.	AAFC
Plains Rough Fescue	<i>Festuca hallii</i> (Vasey) Piper	AAFC
Blue Grama	<i>Bouteloua gracilis</i> (HBK.) Lag.	U of MB
Prairie Sandreed	<i>Calamovilfa longifolia</i> (Hook.) Scribn.	AAFC
Prairie Cordgrass	<i>Spartina pectinata</i> Link	NRCS/DUC*
Awne Wheatgrass	<i>Agropyron subsecundum</i> (Link)	AAFC
Western Wheatgrass	<i>Agropyron smithii</i> Rydb.	AAFC
Northern Wheatgrass	<i>Agropyron dasystachyum</i> (Hook) Scribn.	AAFC
Purple Prairie Clover	<i>Petalostemon purpureum</i> (Vent.) Rydb.	AAFC, NRCS**
White Prairie Clover	<i>Petalostemon candidum</i> (Willd.) Michx.	DUC
Winterfat	<i>Eurotia lanata</i> (Pursh) Moq.	U of SK/AAFC*
Snowberry	<i>Symphoricarpos occidentalis</i> Hook	PFRA
Woods Rose	<i>Rosa woodsii</i> Lindl.	PFRA
Shrubby Cinquefoil	<i>Potentilla fruticosa</i> L.	PFRA
American Hedysarum	<i>Hedysarum alpinum</i> L. var. <i>americanum</i> (Michx.)	AAFC
Reed Grass	<i>Calamogrostis</i> spp.	NRCS/DUC (x)
Canada Wildrye	<i>Elymus canadensis</i> L.	(x)
Hookers Oatgrass	<i>Helictotrichon hookeri</i> (Scribn.) Henr.	(x)
American Vetch	<i>Vicia americana</i> Muhl.	(x)

AAFC= Agriculture & Agri-Food Canada, AEC=Alberta Environment Centre, NRCS = Natural Resources Conservation Service, PFRA= Prairie Farm Rehabilitation Act, U of MB= University of Manitoba, U of SK= University of Saskatchewan.

* joint effort on a single germplasm collection.

** Each agency is working on a separate population base collected from different geographic areas.

Scientific names according to Budd's Flora of the Canadian Prairie Provinces, J. Looman and K.F. Best, 1987.