

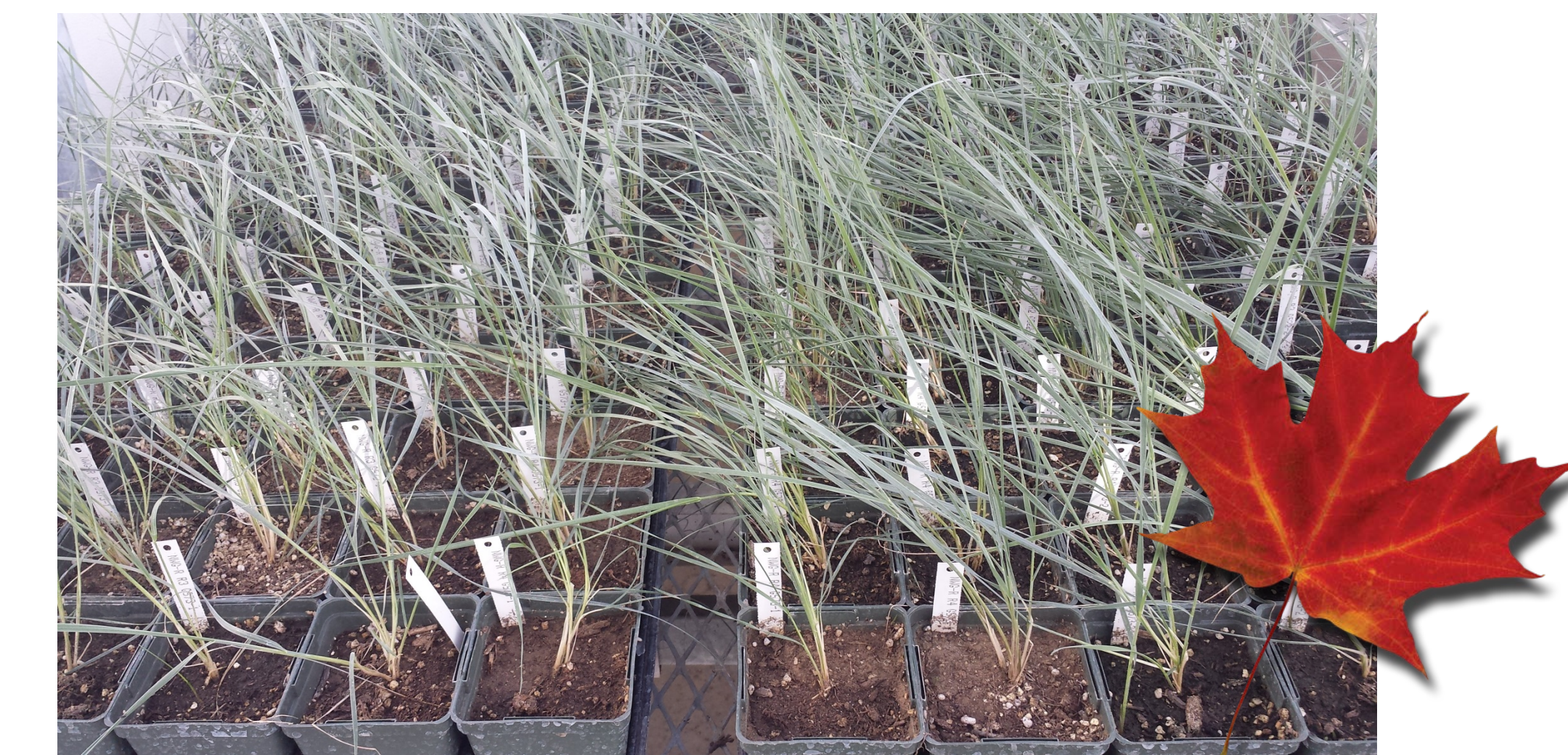
# Promising native forage options for semi-arid prairies of western Canada

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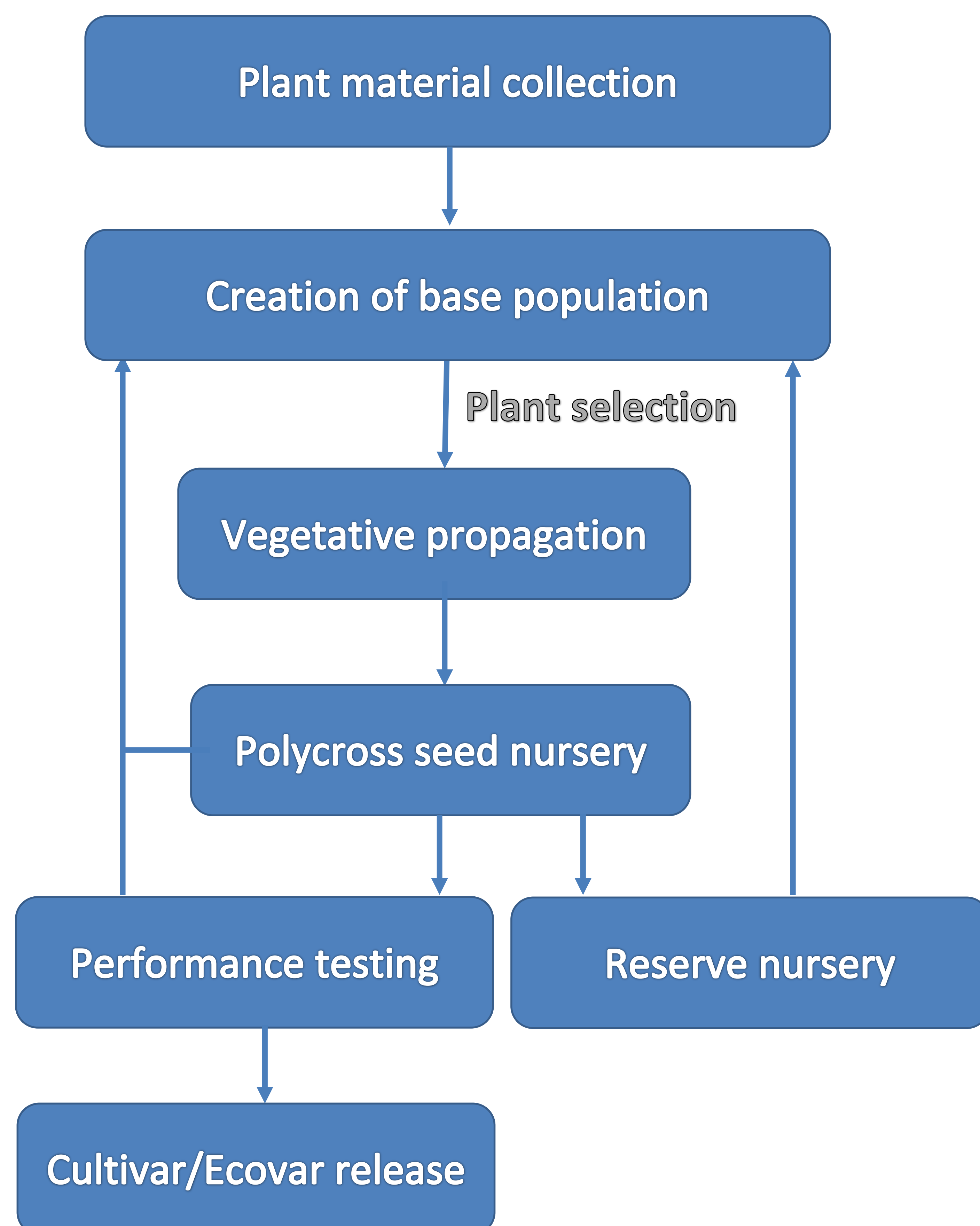
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## Introduction

Evaluation of native and introduced forage species has been an ongoing program at Swift Current Research and Development Centre since its inception. Some 290 species have been evaluated for their adaptation and possible use as forage crops. Changing social values and increasing ecological knowledge have engendered growing interest in native plant species for forage, pasture and energy crop production as well as land reclamation and revegetation. In Canada, an initiative for promoting the native forage species has been taken through ecovar™ (ecological variety) or Selected Class Pre-variety Germplasm development approach since the early nineties. This presentation provides a glimpse at the promising native plant materials that are ready for selected class pre-variety releases.

## Materials & Methods



**Figure 1:** Native germplasm improvement scheme adopted at Swift Current Research and Development Centre.

## Results: Promising Selections

### Northern wheatgrass (*Elymus lanceolatus* (Scribn. & J.G. Sm.) [syn. *Agropyron dasystachyum* (Hook.) Scribn. & J.G. Sm.]

- a hardy, long-lived native perennial
- Elbee - the first cultivar released in 1980
- an ecovar™ 'Polar' created in 2004 from 40 collections of SK & MB
- further selections led to two morpho-types - Fine-leaf & Rough-leaf
- two nurseries with 35 selection lines each established in 2012

**Table 1:** Northern wheatgrass plants selection using an index of productivity & health in 2014

Population variables	Fine-leaf	Rough-leaf
No. of entries	35	35
No. of plants	140	140
Selection intensity	16.4%	17.8%
Persistence over 3 winters	92.1%	97.1%
<b>Selection differential for:</b>		
- Selection index	136%	144%
- Seed yield	90%	113%
- Biomass	56%	55%
- Disease score	- 39%	- 36%
- Regrowth vigour	30%	20%
- Regrowth disease score	- 50%	- 34%

- synthetic polycross progenies being raised in greenhouse
- two breeder's seed plots to be established in the field in 2016
- breeder's seed will be available for 2017 season.

### Purple prairie clover (*Dalea purpurea* Vent.)

- a native, perennial forage legume with warm-season growth
- contains high concentrations of condensed tannins that safeguard animals from bloat, & also inhibit *Escherichia coli* O157:H7 activity

**Table 2:** Purple prairie clover nursery established in 2013 and plant selection done in 2015

Population variables	Values
No. of entries	49
No. of plants	784
Selection intensity	10.5%
Persistence over 3 winters	65.2% (25 to 78%)
<b>Selection differential for:</b>	
- Seed yield	263.6%
- Biomass	237.2%

- successful vegetative propagation to create polycross population
- breeder's seed plot will be established in 2017 for cultivar release.

### White prairie clover (*Dalea candida* Michx. ex Willd, synonym *Petalostemon candidum*. Michx. ex Willd)

- a native warm-season, perennial leguminous forb
- contains higher levels of condensed tannins, crude protein & organic matter digestibility than the popular forage sainfoin
- a spaced plant nursery was established in 2012 with six collections recovered from three prairie provinces
- three prostrate type & other three erect type growth

**Table 3:** White prairie clover nursery established in 2012 and plant selection done in 2015

Population variables	Values
No. of entries	6
No. of plants	150
Selection intensity	28.6%
Persistence over 3 winters	78% (64-88%)
<b>Selection differential for:</b>	
- Seed yield	45.2%
- Biomass	75.7%

- polycross seeds were produced in-the-field in 2015 season
- greenhouse polycross with vegetatively propagated materials
- plan to establish a breeder's seed plot in 2016 season.

### Plains rough fescue (*Festuca hallii* (Vasey) Piper)

- a perennial, late-seral bunchgrass valued for its off-season grazing
- an Ecovar™ 'Roughrider' created in 1996 with 14 SK collections
- 11 selected populations as descendants of Roughrider
- a new nursery was established in 2011 with 11 populations
- selection of 19 plots with higher combined seed yield for 2013-14 resulted in the selection differential of 80% for seed yield & 53% for biomass yield
- seedlings being raised in the greenhouse to establish breeder's seed plot in 2016 season.

## Conclusions

Assuming that the phenotypic characters have reasonable heritability, the large selection differential values suggest ample scope for selection gain for the desirable traits.

Seed shattering is one of the challenges facing the domestication and commercialization of the native plant species. Studies are needed to devise plant growth regulation or other agronomic measures for seed production at commercial scale.

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