

**Title: Improvement and Propagation of Native Plants for Water-Conserving and Traditional Landscapes**

**Grant # NAC/ISDA 2010-1**

**Authors:** Dr. Stephen Love, Horticulturist, University of Idaho  
Thomas Salaiz, Support Scientist, University of Idaho  
Aberdeen R & E Center, 1693 S 2700 W, Aberdeen, ID 83210;  
(208-397-4181); slove@uidaho.edu

**Abstract**

The objective of this research is to acquire, evaluate, and release native plant materials, particularly new varieties of trees, shrubs, perennials, and ornamental grasses, for use in water-conserving commercial and home landscapes. In 2010, plant collection activities were curtailed and emphasis placed on evaluation of existing accessions, establishment of increase blocks, and development of a marketing system. During the summer months, heavy selection pressure was placed plant materials in the evaluation plots. All inferior and mediocre plants were eliminated, leaving approximately 500 accessions representing nearly 300 species. This represented a 40% reduction in material under evaluation. Superior plant accessions were considered for establishment in seed increase blocks. During 2009 and 2010, a total of 89 plant accessions were established in a one acre propagation field. The first small amounts of seed destined for commercialization uses was harvest in the fall of 2010. A concentrated effort was made to identify cooperating nurseries with technical ability to resolve commercialization issues and provide critical propagation services.

**Objectives**

This project is guided by two major objectives:

- 1) Evaluate native and adapted species of plants for use in traditional and water-conserving landscapes in order to enhance the diversity of available material.
- 2) Develop and release new landscape-worthy plants in the form of trees, shrubs, and perennials for use by the Idaho landscape industry.

The eventual and ultimate goal is to develop unique plant materials that will attract new consumers and help make Idaho nurseries more competitive and profitable, especially, but not limited to, nurseries specializing in the production and sale of plants for sustainable landscapes. This report specifically summarizes the fifth year of research accomplishments on this project but also includes overall research progress over the life of the project.

## Accomplishments

### **Summary of 2010 Activities**

Established plants were subjected to an additional year of evaluation to determine horticultural value. In 2010, roguing of plants to eliminate inferior or marginal plant materials was applied aggressively. Entire accessions or plants within accessions were eliminated if they showed excessive winter injury, weakened growth due to lack of adaptation to soil or climate, poor flowering characteristics, unsightly appearance during any part of the growing season, disease or pest susceptibility, or any other inferior horticultural trait. Superior accessions were retained in the plots and seed collected from the best plants within each accession for the purpose of initiating a second cycle of selection and to provide propagation material for establishing seed increase blocks. Arrangements were made to move the first material into commercial channels for both evaluation and production.

### **Details of 2010 Activities**

#### Ongoing Evaluation of Native Plant Accessions:

*Methods:* Evaluations were continued on 3 acres of plant materials established in the years 2006 to 2009. Observations were recorded on hardiness, adaptation, mature appearance, flowering period, and horticultural value. Two difficult environmental factors were imposed on these plants. First, they were planted in a moderately heavy silt-loam soil with a high pH (8.2). Also, these established plots were irrigated with only 25 to 30% of the amount of water (based on evapotranspiration) typically used to maintain a bluegrass lawn in SE Idaho. On average, six inches of supplemental (above natural precipitation) water was applied to the plots over the period June to September. These

conditions provided opportunity for selecting plants that can thrive in southern Idaho water-conserving gardens.



Lacy buckwheat in the evaluation plots at the Aberdeen R & F Center

*Results:* In 2010, emphasis was placed on eliminating all inferior or marginal plant materials among germplasm established during the first three years of the project. The result was an overall reduction in the plant germplasm pool from nearly 800 accessions (representing over 500

species) to less than 500 accessions (representing approximately 300 species). The remaining plants, although still too numerous to commercialize, all have superior horticultural traits. A partial list of accessions that performed in a superior manner in 2010 (and have not been listed in previous reports) is found in Table 1.

Table 1. Native plant species - previously undescribed - expressing exceptional horticultural value in trials at the Aberdeen R & E Center in 2010.

<b>Species</b>	<b>Description</b>
<b>Trees</b>	
<i>Crataegus douglasii</i> Black Hawthorn	A small, multi-stemmed tree that eventually grows to 15 feet. White spring flowers and outstanding red fall color.
<b>Shrubs</b>	
<i>Ericameria nauseosa</i> Rabbitbrush	Very drought tolerant plants that produce bright yellow flowers in late fall. Superior selections include dwarf and silver-leaf forms.
<i>Artemisia frigida</i> Fringed Sage	Very dwarf shrub, to 12". Leaves are silver and very soft. Remains attractive all summer.
<i>Holodiscus discolor</i> Rockspray	6' tall with fairly dense habit and dark green leaves. Best forms have orange-red fall color and are tolerant of alkaline soils.
<i>Ribes aureum</i> Golden Currant	6' tall with light green leaves. Dark yellow flowers are followed by edible yellow, orange, red, or purple berries. Best forms have bright red fall color.
<b>Grass</b>	
<i>Leymus cinereus</i> Great Basin Wildrye	7' tall with persistent green or blue leaves. Flower spikes are stiffly upright and attractive. Best selected forms have dark blue leaves. Drought tolerant, hardy.
<b>Perennial Wildflowers</b>	
<i>Townsendia incana</i> Townsend Daisy	Low growing mat with silver-green leaves and medium-sized white daisies. Summer-long bloom.
<i>Erigeron speciosus</i> Aspen Daisy	20" tall with dark green shiny leaves and numerous small, dark purple daisies. Long bloom period. Some selections have purple fall leaf color.
<i>Wyethia scabra</i> Rough Mulesear	20" tall with rough-hairy light green leaves. Large yellow sunflowers are produced in summer. Easiest to grow of all mulesear and related species.
<i>Aster coloradensis</i> Colorado Aster	Mat growth habit with light green leaves. Flowers are light pink and produced all summer. Very attractive.
<i>Calylophus lavendulifolia</i> Sundrops	Flat mat with toothy medium green leaves. Large, wrinkled, papery flowers are produced all summer.
<i>Oenothera brachycarpa</i> Evening Primrose	8" tall with attractive gray-green leaves. Flowers are very large and dark yellow. Blooms summer-long.

Love and Salaiz: Improvement and Propagation of Native Plants...

<i>Penstemon richarsonii</i> Richardson's Penstemon	20" tall, spreading habit with sparse-looking stems. Flowers are large, pinkish, and present throughout the summer.
<i>Penstemon fruticosus</i> Shrubby Penstemon	12" tall with shrubby growth and evergreen leaves. Late spring flowers are large, purple. Selected forms withstand cold winters with minimal leaf injury.
<i>Penstemon montanus</i> Idaho Penstemon	8" tall with reddish-green leaves present full length of the stems. Flowers are large, light pinkish-purple and appear in late spring. Very unique penstemon.
<i>Penstemon lyalli</i> Lyll's Penstemon	24" tall with spreading growth and light green stem leaves. Flowers are light purple and very large. Blooms in late spring to early summer..
<i>Penstemon triphyllus</i> Riggin's Penstemon	24" tall with shiny dark green leaves. Flowers are light purple and scattered throughout the plant. Long bloom period.
<i>Eriogonum arcuatum</i> Baker's Wild Buckwheat	6" tall with very fuzzy gray-green leaves. Flowers are large yellow pom-poms held just above the foliage. Plants are attractive after late spring bloom.
<i>Eriogonum pauciflorum</i> Fewflower Buckwheat	6" tall with very attractive silver-white fuzzy leaves. Flowers are white to pinkish pom-poms. Bloom is summer-long. Blooms profusely in spite of the name.
<i>Monarda menthaefolia</i> Beebalm	36" tall with dark greenish-purple leaves. Flowers are very large, dark purple-pink, and attractive to many insects. Selected forms have good purple fall leaf color.
<i>Aquilegia formosa</i> Western Red Columbine	30" tall, light green leaves, dark red/yellow flowers. Blooms in early to mid-summer. Drought tolerant.
<i>Aquilegia barnebyi</i> Oil Shale Columbine	24" tall, light green leaves, medium-sized pink and yellow flowers. Attractive foliage. Drought tolerant.
<i>Zauschneria garrettii</i> Firechalice	12" tall with light green leaves. Summer-long bloom. Flowers are dark red and trumpet-like. Very attractive.
<i>Zinnia grandiflora</i> Desert Zinnia	6" tall with medium green leaves. Flowers are bright yellow, flat, and attractive for a long period. Nice into very late fall.

Increase Block Establishment:

Methods: Additional accessions of native plants were established in increase blocks at the Aberdeen R & E Center. Increase blocks will be used to produce seed and/or cuttings for commercialization activities. In order to qualify for increase, an accession of a species must demonstrate exceptional horticultural value and show limited visible variability. Seed for the increase blocks was collected from eligible accessions in the fall of 2009. The seed was stratified, planted, and seedlings transplanted to the field in the spring of 2010.

**Results:** Seed increase blocks now include one acre of plant material. In 2010, the number of accessions planted in increase blocks nearly tripled. Including plant materials established in 2009, 89 accessions were successfully established.

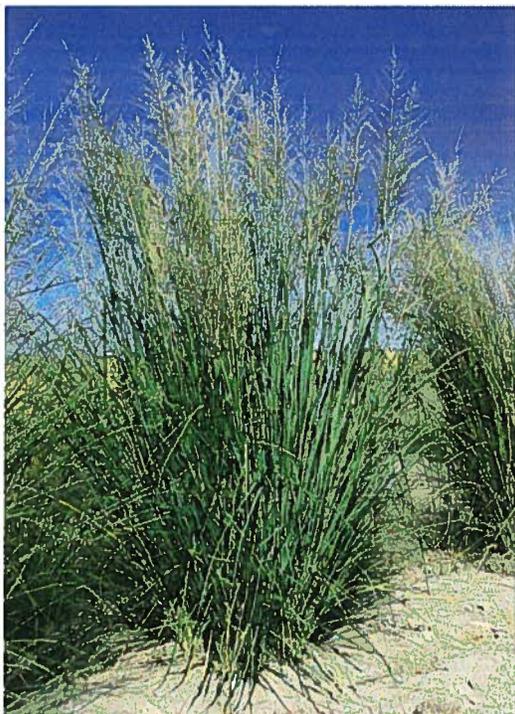
During the summer of 2010, the increase blocks were utilized to improve the uniformity and performance of selected plant materials. Off-type or poor-performing plants were removed. In the fall, the first small amounts of seed were harvested from the plants established in 2009. During the winter months, this seed will be cleaned and prepared for delivery to commercial enterprises.

Some of the new plants established in the increase blocks include selections from the following species:

*Syringa (Philadelphus lewisii)* is the Idaho state flower. It has been selected for flower production, compact growth habit, and resistance to iron chlorosis (due to high pH soil). The syringa plant has outstanding landscape value. It produces very fragrant white flowers in late spring. For the rest of the summer, it is a clean-looking shrub with attractive leaves and bark.



Fragrant flowers of syringa, Idaho's state flower (*Philadelphus lewisii*)



Giant sacaton (*Sporobolus wrightii*), one of the best of the tall native ornamental grasses

Giant sacaton (*Sporobolus wrightii*) is an outstanding tall ornamental grass. It has been selected for hardiness, density of spike production, and red coloration in the seed head. This species will produce plants up to 7 feet tall under conditions of limited irrigation. Its appearance is outstanding and it will compete with the best large grasses available in the nursery industry, plus provide significant water savings.

Western red columbine (*Aquilegia formosa*) is the attractive red and yellow flowered species that is common in many parts of Idaho. It is more drought tolerant than most other species of columbine and does very well in a dry garden. Plants have been selected for flower production, flower color intensity, and healthy leaves after bloom. The unusual form and color of the flowers makes this an attractive plant for any landscape style.



Intense color and unique form of a western red columbine (*Aquilegia formosa*) flower.



Tall, waving form of the sundancer daisy (*Hymenoxys acaulis*).

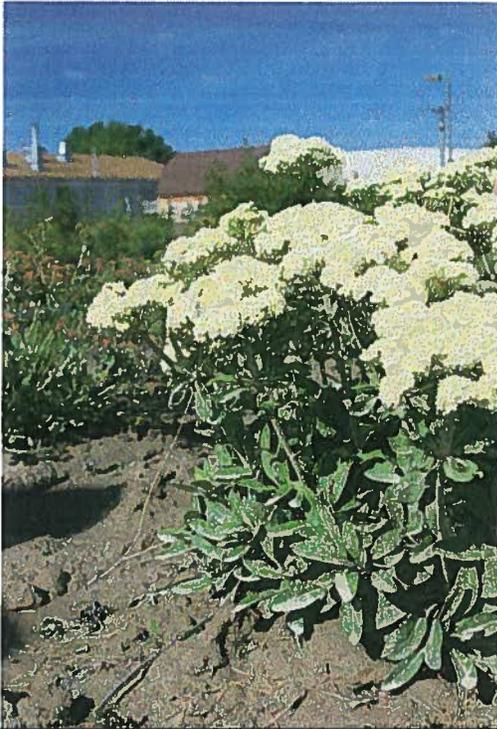
Sundancer daisy (*Hymenoxys acaulis*) is a very drought tolerant small (10" tall) perennial that produces pretty yellow flowers on wand-like stems. The plants flower all summer and into late fall. They will grow with little or no irrigation. This is an outstanding plant for water-conserving landscapes.

Venus penstemon (*Penstemon venustus*) is one of Idaho's native gems. The 3 foot plants produce prodigious amounts of bloom in early summer. The flowers are light to dark purple and large for the genus. Species was selected for flowering profuseness, flower color intensity, upright growth habit, and resistance to powdery mildew. Few plants can equal the show put on by venus penstemon when in flower, which lasts 5-6 weeks. After bloom, the plants remain attractive due to nice form and pigmented seed capsules.



Floriferous nature of venus penstemon (*Penstemon venustus*)

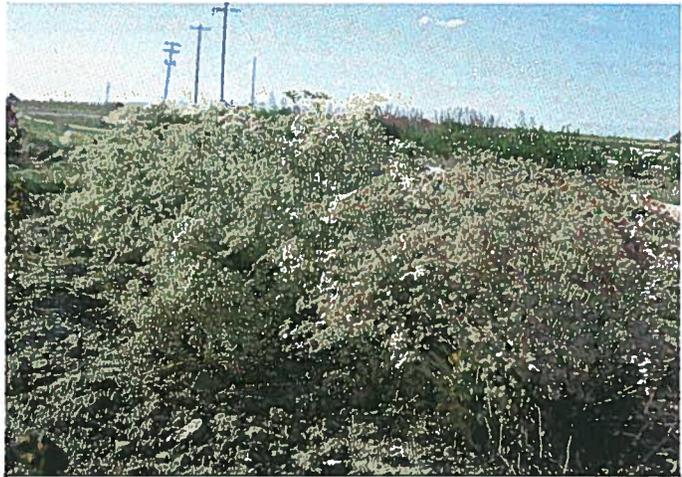
Typical natural forms of Wyeth's buckwheat (*Eriogonum heracleoides*) lack refinement and



Exceptional form of Wyeth's buckwheat (*Eriogonum heracleoides*).

have unimpressive flower form and color. An accession from the Island Park, Idaho region was found to be an exception, with huge clusters of creamy white flowers and large, healthy, evergreen leaves. Selection improved on these traits, making this an outstanding landscape specimen.

Strict buckwheat (*Eriogonum strictum*) provides beauty during the late summer and fall season when color in the water-conserving garden is



Late fall bloom of strict buckwheat (*Eriogonum strictum*).

hard to come by. The attractive silver leaves give rise to white, yellow, or pink inflorescences that form a sphere around the plant. It has been selected for long bloom time, flower density, and healthy foliage. This species is an important addition to the dry garden plant palette.



Bright orange flowers that emerge each morning on stems of *Papaver radicum*.

Rooted poppy (*Papaver radicum*) is one of the few poppy species that has thrived in the difficult soils and climate at Aberdeen. Fuzzy dark green leaves give rise to summer-long waves of dark orange flowers. This is an easy plant to propagate and grow.

*Monarda menthaefolia* is one of several species known as beebalm. This species produces unique, attractive flowers up to 3 inches across. Plants have been selected for purplish-red coloration in the leaves, dark flower color, flower profusion,

pigmented seed heads, fall leaf color, and resistance to powdery mildew. The result is a plant that can provide beauty and interest for much of the summer.



Large, unusual flowers of beebalm (*Monarda menthaefolia*).

#### Plant Collection Activities:

Collection activities were curtailed in 2010. Emphasis was placed on completing the evaluation process for existing accessions. A few new species were purchased from professional collectors. These will be established in the field in the spring of 2011.

#### Planting of New Accessions:

Methods: The limited number of accessions obtained in 2009 were established in the field in the spring of 2010. Part of this seed was obtained from professional collectors, the rest was replanted from accessions collected in previous years. New species of the following genera were established: *Penstemon*, *Eriogonum*, *Castilleja*, *Erigeron*, *Melanpodium*, *Hymenoxys*, *Oenothera*, *Antennaria*, *Sedum*, *Yucca*, *Calylophus*, *Ribes*, *Ceanothus*, *Spiraea*, and *Artemisia*.

In January-February of 2010, seed was mixed with moist potting soil/sand, placed in Ziploc bags, and stratified for approximately two months at 40° F. In March, seed was planted in flats and allowed to germinate in a greenhouse at the Aberdeen R&E Center. When plants were 3-4 weeks old, a maximum of 40 plants from each seed lot were teased out of the flats and planted into individual cells of cone flats. In June, plants were transplanted to the field on the Aberdeen R&E Center.



Approximately 1/4 acre of land was required for establishment of 2009 accessions.

Plant establishment practices were designed to mimic nursery handling procedures. The intent was to provide selection pressures that give preference to plants capable of thriving through typical production and transplanting procedures. Detailed notes were maintained on germination and survival during establishment.

**Results:** Germination in the greenhouse of seed collected in 2009 was mixed. Approximately half of the accessions stratified were eventually established in the field. A positive change in propagation medium resulted in large, healthy transplants. This helped with field survival.

#### **Development of Propagation Methods:**

**Methods:** In 2010, a strong emphasis was placed on developing propagation methods for those species requiring vegetative reproduction. Various techniques were employed, including rooted stem cuttings, root cuttings, and air layering.

Additionally, a small research study was conducted to help define parameters for establishing Indian paintbrush from seed. Factors studied included *Castilleja* species used, species of companion plant, addition of nutrients, and supplemental irrigation.

**Results:** A number of important woody and perennial species were successfully propagated, including *Rhus trilobata* (rooted stem cuttings), *Penstemon spp.* (rooted stem cuttings), *Gaillardia aristata* (rooted stem cuttings), *Zauschneria garrettii* (root cuttings and rooted stem cuttings), *Aquilegia spp.* (crown divisions), and several grass species (crown divisions). One notable failure was the inability to vegetatively propagate a unique and attractive plant of serviceberry (*Amelanchier alnifolia*) either through rooted stem cuttings or air layering.

The *Castilleja* propagation study provided some interesting and useful information. This study will be continued in 2011.

#### **Development of a Native Plant Marketing System:**

**Methods:** Seed of superior native perennials were provided to cooperating native plant nurserymen for purposes of evaluation and initial commercialization. Various marketing models for commercializing native plant materials were considered and explored. A team of business students were recruited to help explore marketing possibilities. The UI Office of Technology Transfer was also approached for assistance.

**Results:** During this initial phase of commercialization, it quickly became apparent that a sustainable system for producing improved native plant materials does not exist within the state of Idaho. The missing link in the system is the increase of breeder seed to produce commercial quantities of foundation seed. Investigation led to the conclusion that very few native plant (or traditional) nurseries have the ability to provide their own seed (or vegetative propagules) in a routine manner, for more than a very few new plants. Further attempts are now being made to identify one or more nurseries that are willing and able to start with a very small amount of breeder seed (or propagules) and subsequently complete the commercialization process.

## Love and Salaiz: Improvement and Propagation of Native Plants...

An overarching philosophical principle that will determine the ultimate structure of a commercialization system is universal potential benefit to the Idaho nursery industry. Accomplishing this will require a procedure to systematically move selected plants through a commercialization process, while at the same time providing some form of access. There are several models under consideration for completing this process.

### Expenditure Report

<u>Category</u>	<u>Amount Allocated</u>	<u>Amount Expended</u>
Salaries, wages and fringe benefits	\$7,685	\$7,685
Travel for marketing activities	\$1,800	\$1,656
Seed, pots, trays, labels, soil mix, etc	\$ 1,600	\$ 1,540
Field charges, local motor pool, seed	\$1,850	\$1,850
Total funds allocated	\$12,935	
Total expensed to date		\$12,731
Amount remaining as of 3 Jan 2011	\$ 204	