NOTICE OF RELEASE OF

AMETHYST GERMPLASM HOARY TANSYASTER

SELECTED CLASS OF NATURAL GERMPLASM

Derek J Tilley

ABSTRACT

The US Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), Aberdeen Plant Materials Center, Aberdeen, Idaho, announces the release of Amethyst Germplasm hoary tansyaster (*Machaeranthera canescens* (Pursh) A. Gray [Asteraceae]), a selected class natural track germplasm identified by NRCS accession number 9076670 for conservation plantings in the Intermountain US. Amethyst Germplasm hoary tansyaster is a native forb collected near St Anthony Sand Dunes in Fremont County, Idaho. This forb flowers and produces seed during the first growing season and provides late summer and early fall blossoms for native pollinators. It is recommended for pollinator plantings, wildlife areas, and rangeland rehabilitation seedings in arid to semiarid plant communities where native forb diversity is desirable.

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KEY WORDS
forb, rangeland, restoration, pollinators, Asteraceae

NOMENCLATURE
Plants: USDA NRCS (2015)
Animals: ITIS (2015)

Photos by Derek J Tilley

JUSTIFICATION

At present, conservationists and land managers have relatively few native forbs from which to choose for conservation seedings (Walker and Shaw 2005). Native forbs improve ecosystem resiliency by increasing plant species diversity, improving wildlife habitat, and providing food for numerous birds and mammals. Within the area of recommended use, sage grouse (*Centrocercus urophasianus* Bonaparte [Phasianidae]), a potentially threatened upland bird, depends on native forbs and the insects they attract (Connelly and others 2000). Native forbs also provide pollen and nectar for native pollinator species (Mader and others 2011).

In the Intermountain West region of North America, native forbs adapted to arid and semiarid habitats are needed, particularly species that blossom during the first growing season and provide nectar and pollen quickly after planting (Ogle and others 2011). Mass disturbances such as wildfire deplete food sources for native pollinators, many of which are unable to travel long distances to find alternate food sources. Releases of native forbs that flower during the first growing season following a restoration seeding are necessary to sustain native pollinators until other seeded perennial forbs reach flowering maturity (Cane 2008).

This germplasm selection addresses the need for a late-blooming forb that blossoms during the establishment year. It is suitable for use in rangeland restoration on arid and semiarid sites throughout much of the Intermountain West.

DESCRIPTION

Hoary tansyaster (*Machaeranthera canescens* (Pursh) A. Gray [Asteraceae]) is a short-lived perennial forb with pale to dark purple flowers (Figure 1). Plants are 15 to 75 cm (6 to 30 in) tall with diffuse branching. The leaves are about 5 cm (2 in) long and 6 mm (0.25 in) wide, oblong or lance shaped with entire to sharply toothed margins. Flower heads have many subtending bracts that are white and membranous at the bottom and green at the tip, that reflex away from the flower at the tip (Welsh and others 2003). The flower heads and vegetation are very sticky and heavily scented. The fruit is an achene, 3 to 4 mm (0.12 to 0.16 in) in length (Cronquist and others 1994).

Figure 1. A western white butterfly (*Pontia occidentalis* Reakirt [Lepidoptera: Pieridae]) collects nectar from Amethyst Germplasm hoary tansyaster in a seed production field.

The pappus of the achene is dirty white and hairlike. Seed heads contain approximately 2.0 million seeds/kg (1.3 million/lb) based on seed counts conducted by Aberdeen Plant Materials Center.

Hoary tansyaster occurs naturally in a variety of plant communities from shadscale saltbush (*Atriplex confertifolia* (Torr. & Frém.) S. Watson [Chenopodiaceae]) and Wyoming big sagebrush (*Artemisia tridentata* Nutt. ssp. *wyomingensis* Beetle & Young [Asteraceae]) shrub communities on the valley floors to mountain big sagebrush (*A. tridentata* Nutt. ssp. *vaseyana* (Rydb.) Beetle), quaking aspen (*Populus tremuloides* Michx. [Salicaceae]), and lodgepole pine (*Pinus contorta* Douglas ex Loudon [Pinaceae]) communities at higher elevations (Welsh and others 2003). This species is recommended in pollinator and wildlife plantings in areas receiving 200 to 380 mm (8 to 15 in) mean annual precipitation (Ogle and others 2011). Hoary tansyaster is very common in low seral, degraded and disturbed sites and has been considered by some as a weedy species in meadows and rangelands (Whitson and others 1996).

METHOD OF SELECTION

Original seed collections were obtained from August through October 2008. A total of 9 accessions were collected at elevations ranging from 1300 to 2300 m (4300 to 7500 ft) in eastern Idaho and northern Utah (Table 1). Following collection, seed was stored in open collection sacks to dry prior to processing. Seedlots were cleaned using an air-screen cleaner and placed into storage at 10 °C (50 °F) until planting.

A common-garden study was conducted at the USDA NRCS Plant Materials Center Home Farm located 3.2 km (2 mi) north of Aberdeen, Idaho. Weed-barrier fabric was laid over a well-prepared bed to reduce weed competition. Each plot consisted of 3 rows of four 7.6 cm (3 in) diameter planting holes (12 total) with 23 cm (9 in) plant spacing. The plots were

TABLE 1

Collection locations of hoary tansyaster in Idaho and Utah in 2008.

Accession	Date	State	County	Coordinates
9076661	1 Oct 2008	ID	Lincoln	N43°9'1", W113°46'49"
9076662	1 Oct 2008	ID	Lincoln	N43°3'25", W113°44'26"
9076663	1 Oct 2008	ID	Lincoln	N43°8'3", W113°45'56"
9076664	3 Oct 2008	ID	Bingham	N43°3'25", W112°57'20"
9076666	26 Aug 2008	UT	Cache	N41°57'8", W111°29'46"
9076667	23 Sep 2008	ID	Bingham	N43°8'8", W112°54'3"
9076668	24 Sep 2008	ID	Lincoln	N42°56'30", W113°45'8"
9076669	24 Sep 2008	ID	Butte	N43°34'15", W113°4'4"
9076670	24 Sep 2008	ID	Fremont	N44°1'30", W111°47'39"

arranged in a randomized complete block design within the fabric in 4 blocks with each block designated as a replication. The study was hand-seeded on 8 November 2008. Each planting hole was seeded with a target of 12 to 25 seeds.

Weather during the first year of establishment was typical for southeastern Idaho with high temperatures averaging near 32 °C (90 °F) in the summer and dropping into the teens during winter months with occasional dips below -18 °C (0 °F) (USDI BOR 2010). Precipitation for the year was above average. Total accumulated precipitation received was 290 mm (11.5 in) including an abnormal 97 mm (3.8 in) of rain in June. Mean annual precipitation for the site is 238 mm (9.4 in) (USDI BOR 2010). Aberdeen received 153 mm (6.1 in) of precipitation during water year 2010. The plots did not receive supplemental irrigation or fertilization in either year of the study.

On 3 June 2009, the plots were evaluated for percent establishment. Establishment was recorded as the number of plant holes per plot containing plants divided by 12. On 16 October 2009, seed production estimates for each plot were assigned a visual rating of 1 to 9 with 1 being best and 9 being worst. Seed was collected 16 October 2009 from the 3 top seed-producing plots in the trial and was used to develop seed-cleaning protocols.

Plots were evaluated for percent stand on 10 May 2010, and on 16 August 2010 the plots were evaluated for average plant height and plant vigor. Occasional wind storms caused the dispersal of seed from various plots during the evaluation, which complicated seed collection and prevented the comparison of seed yield among accessions. Data were subjected to an analysis of variance in Statistix 8 (Analytical Software 2003) to determine differences among accessions, and least significant difference (LSD) test was used to separate significant means at $P < 0.05$.

Results

No significant differences in plant establishment or estimated seed yields were observed in 2009 (Table 2). The best average establishment came from accession 9076670 with 87%. The lowest establishment percentage was recorded from accession 9076666 with 41%. The highest estimated seed yields were recorded for accessions 9076669 and 9076661, both with an average rating of 2.

In 2010, accession 9076670 continued to have the highest percent stand with 70%, significantly greater than any other accession in the trial (Table 3). Accession 9076670 also had the highest vigor rating (2.0) and tallest plants (60.5 cm [24 in]); no significant difference was observed in either vigor or height.

Discussion

Most accessions performed similarly for stand, vigor, and plant height. Accession 9076670 was chosen for release as a selected class germplasm for having superior establishment and stand in 2009–2010 and greatest vigor rating in 2010. This accession also had the tallest plants in the study. Although we were not able to evaluate seed production in 2010 because of loss of seed caused by untimely wind storms, accession 9076670 plots were observed to have above average seed production.

The original source population of accession 9076670 is located near the St Anthony Sand Dunes in Fremont County, Idaho, at 1524 m (5000 ft) elevation. Soil at the collection location is Eginbench loamy fine sand supporting an antelope bitterbrush (*Purshia tridentata* (Pursh) DC. [Rosaceae]), Indian ricegrass (*Achnatherum hymenoides* (Roem. & Schult.) Barkworth [Poaceae], rubber rabbitbrush (*Ericameria nauseosa* (Pall. ex Pursh) G.L. Nesom & Baird [Asteraceae]), lemon scurfpea (*Psoralidium lanceolatum* (Pursh) Rydb. [Fabaceae])

TABLE 2

Percent stand and seed yield potential of hoary tansyaster accessions in 2009, USDA NRCS Idaho Plant Materials Center, Aberdeen, Idaho.

Accession	State	County	Collection date	3 Jun Stand (%)	16 Oct Seed yield
9076670	ID	Fremont	24 Sep 2008	87	3[y]
9076669	ID	Butte	24 Sep 2008	81	2
9076663	ID	Lincoln	1 Oct 2008	79	4
9076662	ID	Lincoln	1 Oct 2008	73	5
9076664	ID	Bingham	3 Oct 2008	70	5
9076668	ID	Lincoln	24 Sep 2008	64	3
9076661	ID	Lincoln	1 Oct 2008	62	2
9076667	ID	Bingham	23 Sep 2008	56	5
9076666	UT	Cache	26 Aug 2008	50	3
Mean				69	4
LSD				NS[z]	0.20

[z] Not significant.

[y] Seed yields were assigned a visual rating of 1 to 9 with 1 being best and 9 being worst.

Table 3

Percent stand and seed yield potential of hoary tansyaster accessions in 2009, USDA NRCS Idaho Plant Materials Center, Aberdeen, Idaho, 2010.

Accession	10 May Stand (%)	16 Aug Vigor[z]	31 Aug Height (cm)
9076670	70 a	2 a	61
9076669	42 b	4	59
9076663	38 b	5	57
9076662	38 b	5	49
9076664	29 b	6	45
9076668	38 b	5	48
9076661	33 b	5	50
9076667	33 b	6	60
9076666	46 b	6	46
Mean	41	5	
LSD (0.05)	21	NS[y]	NS

Note: Letters within a row denote significant differences at the $P < 0.05$ probability level.

[z] Plant vigor was assigned a visual rating of 1 to 9 with 1 being best and 9 being worst.

[y] NS, Not significant.

plant community. The location receives approximately 305 mm (12 in) mean annual precipitation (USDA NRCS 1993).

ANTICIPATED CONSERVATION USE

Hoary tansyaster should be considered for use in pollinator plantings and for adding biodiversity in rangelands. It is especially useful for post-wildfire seedings where quick establishment of pollen and nectar sources is desired and to enhance sage grouse habitat. The primary intended users are land management agencies or landowners enrolled in USDA conservation programs.

ANTICIPATED AREA OF ADAPTATION

Amethyst Germplasm hoary tansyaster is suited for conservation plantings in MLRA B11 Snake River Plains and B13 Eastern Idaho Plateaus (USDA NRCS 2006). It is also likely adapted for use in arid locations throughout the Intermountain West but has not been tested to that extent.

AVAILABILITY OF PLANT MATERIALS

G1 and G2 seed of Amethyst Germplasm hoary tansyaster will be maintained by the USDA Natural Resources Conservation Service, Aberdeen Plant Materials Center, Aberdeen, Idaho. Seed through the G5 generation will be eligible for certification. G1 and G2 seed will be made available to commercial growers

for distribution by the University of Idaho Foundation Seed Program and the Utah Crop Improvement Association. Small quantities of seed will be provided to researchers by request to the corresponding author.

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