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AGRICULTURAL EXPERIMENT STATION  
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**NOTICE OF RELEASE FOR  
EAGLE GERMPLASM WESTERN YARROW  
(SELECTED GERMPLASM, NATURAL TRACK)**

The United States Department of Agriculture, Forest Service, Rocky Mountain Research Station; United States Department of the Interior, Bureau of Land Management, Idaho State Office; Utah State University, Agricultural Experiment Station; and University of Idaho, Agricultural Experiment Station, announce the release of a selected germplasm (natural track) of western yarrow (*Achillea millefolium* L. var. *occidentalis* DC.) for use on adapted sites in the Snake River Plain and northern Great Basin. As a Selected Germplasm release this plant will be referred to as Eagle Germplasm western yarrow, named for its collection area near Eagle, Idaho.

This pre-variety germplasm (natural track) release procedure is justified as there are no other releases of native western yarrow from the Snake River Plain or Great Basin. The release will be used in native seedings following wildfires and on other disturbed sites to reestablish diverse native communities, provide site stabilization, and to improve wildlife habitat. It is also a quickly establishing species for use in conservation and low-maintenance landscape plantings.

Eagle western yarrow is a native perennial forb adapted to low elevation, semi-arid sites with long, hot growing seasons. Eagle yarrow's drought tolerance, competitive nature, and ease of establishment make it an excellent choice for post-fire restoration of cheatgrass (*Bromus tectorum* L.) dominated landscapes and for conversion of introduced perennial grasslands to native plant communities.

**Scientific Name:** *Achillea millefolium* L. var. *occidentalis* DC.

**Common Name:** Western yarrow

**Prevarietal Germplasm Name:** Eagle

**Identification Number:** Forest Service B37-88; W6 37201; PI 661151.

**Origin:** Seed of Eagle Germplasm western yarrow was first collected in 1988 by Stanley Kitchen, Research Botanist, USDA Forest Service, Rocky Mountain Research Station, Provo, Utah, from plants at growing along the lower margins of the Boise Front about 5 km north of Eagle, Ada Co., Idaho (43° 76' N, 116° 36' W) at an elevation of about 880 m. The area is within the Intermountain Semidesert Province 342 (Bailey 1995) and EPA (Omernik) Level III Ecoregion 12j (Snake River Plain: Unwooded Alkaline Foothills) (US EPA 2000).

**Taxonomy:** Western yarrow (Asteraceae: *Achillea millefolium* L. var. *occidentalis* DC.).  
Synonyms: *Achillea gracilis* Raf., *Achillea lanulosa* Nutt., *Achillea subalpina* Greene, *Achillea millefolium* subsp. *lanulosa* [Nutt.] Piper, *Achillea millefolium* subsp. *occidentalis* [DC.] Hyl., *Achillea millefolium* var. *lanulosa* [Nutt.] Piper.

Western yarrow is native to every western state in the United States. It is morphologically variable and has been treated as either a single species with varieties or as multiple distinct species, with at least 58 names applied to North American specimens (Trock 2006). Some early taxonomists believed the native North American material was distinguishable from introduced, Old World plants, while others have treated *A. millefolium* as a cosmopolitan Northern Hemisphere polyploid complex of native and introduced plants that have hybridized (Trock 2006). Cronquist et al. (1994) determined that all North American tetraploids with three-dimensional leaves fell into the broadly defined subspecies *lanulosa* (Nutt.) Piper. They believed that collections of *A. m.* subsp. *lanulosa*, including those from the Intermountain Region, are mostly woollier than material from the eastern United States and further subdivided them into var. *lanulosa* (Nutt.) Piper and var. *alpicola* (Rydb.) Garrett. Under this system, variety *lanulosa* consists of many confluent ecotypes that occur from lowlands to middle elevations, typically below 2700 m. Variety *alpicola* is a smaller (1 to 3 dm tall) subalpine to alpine ecotype that occurs above 2700 m to about 3300 m (Cronquist et al. 1994). Further revisions have recently been made (Kartesz 1994; USDA NRCS 2011), and 10 native varieties of *A. millefolium* are now accepted (vars. *alpicola*, *arenicola*, *borealis*, *californica*, *gigantea*, *litoralis*, *nigrescens*, *occidentalis*, *pacifica*, and *puberula*), as is the introduced variety *millefolium* (common yarrow). This classification, to which we ascribe, considers *Achillea millefolium* var. *occidentalis* to be the most wide ranging variety at low to moderate elevations in the western United States.

In 2003, chromosome counts conducted on seed samples of Eagle germplasm western yarrow (*A. m.* var. *occidentalis*) by the Oregon State University Seed Testing Laboratory (Corvallis, Oregon) and U.S. Department of Agriculture, Agricultural Research Service, Forage and Range Laboratory (Logan, Utah) demonstrated that Eagle is tetraploid with chromosome number,  $n=9$  ( $4n=36$ ).

**Description:** Eagle Germplasm western yarrow is similar in appearance to common yarrow, *Achillea millefolium* var. *millefolium* L., a non-native variety of European origin, that has become naturalized in some regions of the United States, including Idaho, Oregon, Washington and California. Common yarrow differs from western yarrow by its non-ascending or flat leaflets, with ultimate segments tending to lie in nearly the same plane (Cronquist et al. 1994), its taller stature and greater aggressiveness (Winslow et al. 2005).

**Area of Origin:**

**Soils and Topography:** The original collection site is classified as the Lacustrine Foothills Soil Map Unit, Quincy-Lankbush-Brent and Cashmere-Tindahay Soil Map Series by the USDA Natural Resources Conservation Service (Anonymous 1980). These soil series, mostly sandy loam or coarse sandy loams, are found at elevations from 750 to 1150 m. The Quincy-Lankbush-Brent sandy loam soil series is characterized by low rainfall, nearly level to steep, excessively drained and well drained, very deep soils on foothills. The Cashmere-Tindahay coarse sandy to loamy soil series is characterized by nearly level to steep, well drained and somewhat excessively drained, very deep soils, in drainageways and on alluvial fans on foothills (USDA NRCS WSS 2011). Ecological Sites include: Loamy 8-12 ARTRW8/PSSPS-ACTH7, South Slope 10-12 ARTRW8/PSSPS, and Sandy Loam 8-12 ARTRW8/ACHY (USDA NRCS WSS 2011).

The potential natural vegetation on the Lankbush soil is dominated by bluebunch wheatgrass (*Pseudoroegneria spicata* [Pursh] A. Love) and big sagebrush (*Artemisia tridentata* Nutt.) (Anonymous 1980). Potential natural vegetation of Ladd soils is similar, with the addition of Idaho fescue (*Festuca idahoensis* Elmer). Other characteristic vegetation includes Thurber needlegrass (*Achnatherum thurberianum* [Piper] Barkworth), Indian ricegrass (*Achnatherum hymenoides* [Roemer & J.A. Schultes] Barkworth), antelope bitterbrush (*Purshia tridentata* [Pursh] DC.), Sandberg bluegrass (*Poa secunda* L.), arrowleaf balsamroot (*Balsamorhiza sagittata* [Pursh] Nutt.), Idaho fescue, and lupine (*Lupinus* sp.) (Anonymous 1980).

The potential natural plant community on the Quincy soil is dominated by Indian ricegrass and needle-and-thread (*Hesperostipa comata* [Trin. & Rupr.] Barkworth).

The potential natural plant community on the Cashmere coarse sandy loam soil is dominated by bluebunch wheatgrass and big sagebrush (Anonymous 1980).

**Associated vegetation:** Additional native plant species observed at the collection site include bottlebrush squirreltail (*Elymus elymoides* [Raf.] Swezey), red threeawn (*Aristida purpurea* Nutt. var. *longiseta* [Steud.] Vasey), rubber rabbitbrush (*Ericameria nauseosa* [Pallas ex Pursh] Nesom & Baird subsp. *nauseosa* var. *speciosa* [Nutt.] Nesom & Baird), basin big sagebrush (*Artemisia tridentata* Nutt. subsp. *tridentata*), Sandberg bluegrass, bulbous bluegrass (*Poa bulbosa* L.), cheatgrass, bluebunch wheatgrass, hoary aster (*Machaeranthera canescens* [Pursh] Gray), long-leaf phlox (*Phlox longifolia* Nutt.), and woolly-pod milkvetch (*Astragalus purshii* Dougl. ex Hook.). Indian ricegrass and needle-and-thread were present primarily in drainage bottoms. Scattered remnants of antelope bitterbrush and Thurber needlegrass persist at the site.

**Climate:** From 1949 to 1995, the average annual precipitation at the nearest weather station (Boise, ID) was 303 mm. Most precipitation falls from November to June, with July and August being the driest months. The average annual temperature ranges from 7.5° to 13.5° C, with an average of 11° C. The average daily maximum temperature for the entire year is 17.1° C. Maximum daily temperatures are 31° to 32° C in July and August. From November through February, average minimal monthly temperatures range from -0.5° to -5.7° C. The frost-free period ranges from 110 to 150 days.

**Method of Selection:** Eagle Germplasm western yarrow was selected from a series of comparative field trials involving collections from six western states, including Oregon, Nevada, Idaho, Utah, Montana, and Washington. Field trials of Eagle germplasm and Great Northern germplasm western yarrow were established at the Orchard Research Site near Boise, Idaho in November 2004. The Orchard Research Site is located in Ada County, Idaho, 24 km southeast of Boise at an elevation of 975 m (43.3516° N, 116.0047° W). It is administered by the Boise District office of the USDI Bureau of Land Management. The site receives an average of 270 mm of annual precipitation and is characterized by basin and Wyoming big sagebrush-bluebunch wheatgrass-Thurber needlegrass vegetation. Eagle yarrow outperformed Great Northern in terms of plants/ft<sup>2</sup> by May of the establishment year (5.4 vs. 1.0 plants/m<sup>2</sup>). By May of the second year, Eagle yarrow retained 0.8 plants/m<sup>2</sup> compared to none for Great Northern (St. John and Ogle 2008).

Eagle yarrow was also planted at Nephi, Utah, in a common garden study in 1999. Plantings were evaluated to compare survival, growth habit and rate, establishment, vigor, plant size and stature. Differences in various growing traits were not significant. Eagle exhibited comparatively good growth traits, survival, and vigor as compared to the other western yarrow accessions.

**Disease Problems:** No detrimental diseases have been observed in Eagle Germplasm western yarrow plantings by the USDA Forest Service, Rocky Mountain Research Station. It is possible that the volatile oils and glycosides in the leaves and flowers limit pathogen infection and insect herbivory of this species to some degree. Winslow et al. (2005) report common leaf bugs and flea beetles in Great Northern germplasm western yarrow, and root rot and mildew in poorly drained soils.

**Environmental Considerations and Evaluation:** This selection is a native species widely distributed throughout the United States. The collection site near Boise, Idaho is several hundred kilometers from other released western yarrow germplasms: Yakima germplasm western yarrow and Great Northern germplasm western yarrow. Yakima germplasm western yarrow was released by the USDA Agricultural Research Service, Forage and Range Research Laboratory and Utah Agricultural Experiment Station as a Source Identified Certified (natural track) germplasm, primarily for use in Washington and Oregon (Waldron et al. 2006). Great Northern germplasm western yarrow is a Selected germplasm release from Flathead County in northwest Montana (1100 m) (Winslow et al. 2005). Great Northern is adapted for use in northern Idaho and all of Montana and Wyoming except the Red Desert and Bighorn Basin (Winslow et al. 2005).

No attempt has been made to segregate or eliminate genetic characteristics inherent to the Eagle western yarrow ecotype. No definitive attributes have been reported that would suggest this selection would interfere with or prevent natural recovery of associated plants existing in native plant communities. It is an important species that is widely used to restore disturbed areas and re-establish native plant communities.

**Area of Adaptation:** Eagle Germplasm western yarrow is widely adapted to the Snake River drainage and southern Idaho; and has been seeded and successfully established in numerous BLM fire rehabilitation projects in northern Nevada, eastern Oregon, and northern Utah (Snake

River Plain and Northern Basin and Range Ecoregions). It is recommended for areas receiving at least 250 mm of annual precipitation, and it is adapted to a broad range of sites occupied by big sagebrush, bitterbrush, bluebunch wheatgrass, Thurber needlegrass, mountain shrub, and juniper dominated plant communities. Eagle germplasm western yarrow can be planted on sites supporting mountain big sagebrush (*Artemisia tridentata* Nutt. subsp. *vaseyana* [Rydb.] Beetle), basin big sagebrush, Wyoming big sagebrush (*A. tridentata* Nutt. spp. *wyomingensis* Beetle & Young), or xeric big sagebrush (*A. tridentata* Nutt. spp. *xericensis* Winward ex Rosentreter & Kelsey). It is adapted to well-drained, light and medium-textured silt loam soils that may dry early in the growing season. It can also be seeded on well-drained clay loams. It would not be recommended as a replacement for species in salt desert shrub communities.

**Anticipated Use:** Eagle Germplasm western yarrow may be used to restore extensive areas once dominated by big sagebrush, bluebunch wheatgrass, antelope bitterbrush, and other shrub communities in eastern Oregon, southern Idaho, northern Nevada, and northern Utah; and possibly other similar areas in the western USA. It is particularly useful for seeding semi-arid regions supporting only remnant populations of this species. Eagle germplasm western yarrow may establish better on dry sites than other western yarrow germplasm releases, and it competes relatively well with exotic annuals. It can be used in conjunction with other native plants to re-establish native communities in areas presently occupied by exotic annuals or sites where stands of introduced perennial grasses have been established. It is an important species for re-establishing native communities to regain species diversity, improve wildlife habitat, increase seasonal forage quality, and reduce the incidence of extensive and destructive wildfires. Sage-grouse, especially chicks, and other upland game birds rely heavily on the foliage of western yarrow as a food source, and chicks benefit from eating insects associated with yarrow (Winslow et al. 2005). Eagle germplasm western yarrow is expected to receive some ornamental application in low water or naturalized landscapes.

**Increase and Distribution:** In mid-July 2003, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station employees collected approximately 2 kg of G0 seed 1.6 km north of the original site near Eagle, ID. The original collection site was on private land and no longer supported a very large population of western yarrow. In 2004, G0 seed was made available to two growers through the Utah Crop Improvement Association buy-back program (Great Basin Native Plant Selection and Increase Project). Yields ranged from 110 to 335 kg of cleaned seed per ha. Seed collected in 2003 retained its viability when kept in cold storage (34° F), dropping from 93% to 84% in 3 years.

Stock seed can be obtained from the Utah Crop Improvement Association. Growers may produce Certified seed through four generations (G4) of seed.

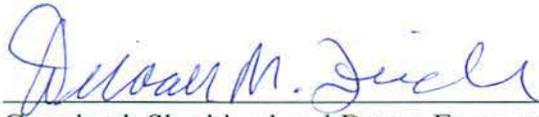
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**SIGNATURES FOR RELEASE OF:**

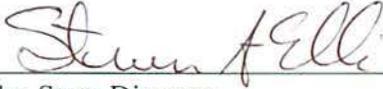
**Eagle Germplasm Western Yarrow**  
*Achillea millefolium* L. var. *occidentalis* DC.



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