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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION
LINCOLN, NEBRASKA
and
MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
MONTANA CONSERVATION SEEDLING NURSERY
MISSOULA, MONTANA

NOTICE OF SELECTED GERMPLASM RELEASE BRIDGER ROCKY MOUNTAIN JUNIPER

The United States Department of Agriculture, Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service), the Agricultural Experiment Stations of Montana and Wyoming, the USDA Agricultural Research Service, the U.S. Forest Service, and the Montana Department of Natural Resources and Conservation announce the naming and release of selected germplasm of Bridger-Select Rocky Mountain juniper, *Juniperus scopulorum* Sarg. This germplasm was selected by the USDA/NRCS Plant Materials Center at Bridger, Montana.

Bridger-Select Rocky Mountain juniper has been assigned the NRCS accession number 9078631. It was selected primarily for height, form (as it reflects uniformity and freedom from snow breakage), vigor (as it reflects freedom from signs of winter injury, insect or disease damage), and crown density for use in windbreak and shelterbelt applications in the northern and central Great Plains. In addition, Bridger-Select Rocky Mountain juniper exhibits a high rate of seedling survival.

ORIGIN: Bridger-Select Rocky Mountain juniper is a composite of a 181-tree planting located in Carbon County, Montana, approximately 3 miles south and east of the town of Bridger, at the NRCS Plant Materials Center. The original sources of these selected trees are 26 collection sites in Montana (11 sites), North Dakota (6 sites), Wyoming (4 sites), Nebraska (3 sites), and South Dakota (2 sites).

SELECTION STATEMENT: Rocky Mountain juniper is a long lived, drought tolerant, woody, evergreen species with a wide range of adaptability. It tolerates the severe conditions characteristic of the northern Great Plains including poorly developed and/or high pH soils; low average minimum temperatures; low and irregular annual precipitation; periodic drought; wide temperature fluctuations; strong, drying winds; and heavy ice and snow. Despite these attributes, Rocky Mountain juniper exhibits a slow rate of growth and wide variability in shape that limit its effectiveness in windbreaks and shelterbelts. In addition, lack of commercial seed production and irregular wildland seed crops can result in the use of cultivated and

wildland collections of inferior phenotypes from locations and environmental conditions incompatible with the plantings sites for which the nursery stock is being produced. Also, no genetically improved germplasm of this species for the production of conservation trees for the northern and central Great Plains is currently available.

The Bridger *Juniperus* planting is one of several plantations located across the Great Plains in support of a study conducted in cooperation with numerous agencies and working groups. Bridger-Select Rocky Mountain juniper is the result of a multi-step process that began with the testing of seed sources primarily from the Northern Plains seed zone. Individual tree nominations from those seed sources were based on superior phenotypic characteristics, including better-than-average general appearance; single stem and straight trunk; taller than wide; superior fruit production, color, and crown density; and freedom from signs of winter injury, insect or disease damage. Seed was collected from these trees and used to produce seedlings for the study. Injured and inferior seedlings were eliminated in sorting.

The final selections at Bridger were based primarily on superior height growth, form (as it reflects uniformity and freedom from snow breakage), vigor (as it reflects freedom from signs of winter injury, insect or disease damage), of shape, and crown density. In addition, Bridger-Select Rocky Mountain juniper exhibits a high rate of seedling survival. The results of the Bridger study are supported by the results from seven other plantations located across the Great Plains.

ECOTYPE DESCRIPTION: Bridger-Select Rocky Mountain juniper has the same general botanical, foliage, fruit, seed and phenological attributes noted below for the species as a whole. In addition, this selection has several desirable attributes based on its performance relative to the other trees and seed sources tested in this study. It is assumed that these traits are heritable and that the progeny from these selections will perform in a similar manner.

Over a 16-year period, Bridger-Select Rocky Mountain juniper averaged 18.5 and 16.7 cm of height and width growth, respectively. These values are considered conservative, given the close, within-row spacing used in this study, and probably reflect competition from adjacent trees. Based on the first 12 years of age, a sustained growth rate of approximately 20 cm for height and width is more likely, given a wider row spacing under similar environmental conditions. Planting sites with greater annual precipitation, better soils, longer growing seasons, and generally superior growing conditions should support annual height growth in the 20- to 25- cm range.

Bridger-Select Rocky Mountain juniper has greater than average crown density for this species, and can be described as “moderate” relative to other evergreen species. It has a height-to-width ratio of approximately 1:1, giving this selection a broad conical to pyramidal shape. The shape of trees in this selection is more uniform than wildland populations. Vigor, as it reflects freedom from signs of winter injury, insect or disease damage, is similarly improved. Seedling survival, over the recommended range of this selection, should be excellent and average greater than 85 percent, given good cultural practices.

Bridger-Select Rocky Mountain juniper will perform well in most of central, south-central, and southeastern Montana, north-central and northeastern Wyoming, far western Nebraska, far western South Dakota, and southwestern North Dakota. This selection will perform well in most of Montana at elevations below 1,676 m (5,500 feet). It will probably perform well in eastern Idaho, most of north-central and eastern Wyoming, western Nebraska, and western South Dakota. Rocky Mountain juniper is <u>not</u> recommended for central and eastern Great Plains planting sites because of its susceptibility to foliar diseases in warm, humid environments. Based on the performance of Rocky Mountain juniper at several locations across the Great Plains, a minimum genotype x environment interaction is predicted for locations in the northern and central Great Plains, indicating that performance in these areas should be fairly consistent.

SITE DESCRIPTION: The planting site is located outside Bridger, Montana, at an elevation of 1,128 m (3,700 ft) in a 254- to 330-mm (10-to 13-in.) annual precipitation zone. Bridger falls in USDA hardiness zone 4b, with annual minimum temperatures of -20° to -25°F (-28.9° to -31.6°C). The site is located in Major Land Resource Area (MLRA) 32, Northern Intermountain Desertic Basin. This classification consists of sites in Montana and Wyoming ranging in elevation from 1,100 to 1,800 m (3,609 to 5,905 ft).

The climate averages 125 to 225 mm (4.9 to 8.9 in.) of annual precipitation with most precipitation in the spring and fall. Precipitation is low and erratic. The average annual temperature is about 7°C (44.6°F) with an average frost-free period of 120 to 140 days.

The planting site slopes gradually from south to north and moderately from east to west. The soils are Heldt Series, Heldt silty clay loam, fine, montmorillonitic, mesic, Usteric, Camborthid, on 4 to 8 percent slopes. The upper 46 cm (18 in.) of the profile are characterized as mildly alkaline, whereas the lower 46 to 152 cm (18 to 60 in.) are strongly alkaline. These soils are formed in deep alluvium and have moderate shrink-swell potential but high frost-action potential. Although permeability is slow, these soils are well-drained and runoff is considered medium with only a slight risk of erosion. The mean annual soil temperature is 8.9° to 10.6°C (48° to 51°F) and the frost-free period is 120 to 130 days. This soil falls in the Windbreak Group 1 suitability group, and is characterized by deep, friable, nearly level to steep, well-drained soils on stream terraces and fans. Soils in this group are well suited to caragana (*Caragana arborescens* Lam.), honeysuckle (*Lonicera* spp.), lilac (*Syringa* spp.), chokecherry (*Prunus virginiana* L.), American plum (*Prunus americana* Marsh), skunkbush sumac (*Rhus trilobata* Nutt.), buffaloberry [*Shepherdia argentea* (Pursh) Nutt.], sand cherry [*Prunus pumila* var. *besseyi* (Bailey) Gleason], dogwood (*Cornus sericea* L.), and Russian olive (*Elaeagnus angustifolia* L.). The natural vegetation is mixed mid- and short grasses, forbs, shrubs, and cottonwoods along the streams. The dominant vegetation in uncultivated areas adjacent to the site include bluebunch wheatgrass [*Pseudoroegneria spicata* (Pursh) A. Love], needleandthread (*Hesperostipa comata* Trin. & Rupr.), prairie junegrass [*Koeleria macrantha* (Ledeb.) J.A.Schultes], big sagebrush [*Artemesia tridentata* ssp. *spiciformis* (Osterhout) Kartesz & Gandhi], Rocky Mountain juniper (*Juniperus scopulorum* Sarg.), and limber pine (*Pinus flexilis* James).

The study site has been maintained under clean cultivation by a combination of regular mechanical cultivation and periodic spot spraying. Each seedling was given approximately 3.8 liters (1 gallon) of water at planting time and then flood irrigated on May 6, 1980. No additional moisture was provided until after the final selection process in 1994. No supplemental fertilizer has been used to date.

ECOLOGICAL IMPACT STATEMENT: Bridger-Select Rocky Mountain juniper demonstrates growth, reproductive habits, and ecological niche functions comparable to the species as a whole. It does not spread aggressively by sexual means, and is not known to be invasive or weedy under any circumstances.

AVAILABILITY OF PLANT MATERIALS: A limited amount of seed will be made available for the production of seedlings for commercial sale as it becomes available. Stem cuttings are available for grafting for the establishment of G0 orchards. Grafted or rooted ecotypes will be made available for the establishment of seed orchards designed to facilitate efficient cross-pollination and minimize inbreeding depression.

PREPARED BY: Joseph D. Scianna, Research Horticulturist, USDA/NRCS, Plant Materials Center, Route 2, Box 1189, Bridger, MT 59014.

APPROVALS

_____ _____

SHIRLEY A. GAMMON
State Conservationist Date
Natural Resources Conservation Service
Montana

_____ _____

LINCOLN E. BURTON
State Conservationist — Date
Natural Resources Conservation Service
Wyoming

_____ _____

THOMAS J. McCOY
Director — Date
Montana Agricultural Experiment Station
Dean, College of Agriculture

_____ _____

JAMES J. JACOBS
Director — Date
Wyoming Agricultural Experiment Station

_____ _____

BUD CLINCH
Director — Date
Montana Department of Natural Resources and Conservation

_____ _____

DIANE GELBRUD
Director — Date
Ecological Sciences Division
United States Department of Agriculture
Natural Resources Conservation Service

_____ _____

JUDITH B. ST. JOHN
Associate Deputy Administrator — Date
Agricultural Research Service

_____ _____

DENVER P. BURNS
Station Director — Date
Rocky Mountain Forest and Range Experiment Station