

Plant Guides Highlighting California Native Plant Varieties



United States Department of Agriculture



Releases from the NRCS Lockeford, California Plant Materials Center



Table of Contents

Plant Guide	Scientific Name
Fourwing Saltbush	Atriplex canescens
Greenleaf Manzanita	Arctostaphylos patula
Quailbush	Atriplex lentiformis
Flexible Ceanothus	Ceanothus x flexilis
Mountain Whitethorn	Ceanothus cordulatus
Bladderpod	Cleome isomeris
Nodding Needlegrass	Nasella cernua
Saltgrass	Distichlis spicata
Blue Wildrye	Elymus glaucus
California Buckwheat	Eriogonum fasciculatum
Sulfur Flower Buckwheat	Eriogonum umbellatum
Beardless Wildrye	Leymus triticoides
Purple Needlegrass	Nasella pulchra
Bitterbrush	Purshia tridentata
Western Needlegrass	Achnathurum occidentale
California Brome	Bromus carinatus

FOURWING SALTBUSH

Atriplex canescens

(Pursh) Nutt.

plant symbol = ATCA2

Contributed By: USDA NRCS Idaho State Office & Aberdeen Plant Materials Center



Loren St. John
USDA NRCS Aberdeen PMC

Alternate Names

Chamise, chamize, chamiso, white greasewood, saltsage, fourwing shadscale, bushy atriplex

Uses

Rangeland/Grazing: fourwing saltbush is highly palatable browse for most livestock and big game. It is used primarily in the winter at which time it is high in carotene and averages about four percent digestible protein. The leaves may be as high as 18 percent total protein. It is grazed by all classes of livestock except horses.

Wildlife: fourwing saltbush provides excellent browse for deer season long. It is a good browse plant for bighorn sheep, antelope, and elk in fall and winter. It is also a food source and excellent cover for sharptail grouse, gray partridge (Huns), sage grouse, and other upland birds, rabbits, songbirds, and small mammals.

Erosion Control: fourwing saltbush makes excellent screens, hedges, and barriers. It is especially useful on saline-sodic soils. It has excellent drought tolerance. It has been planted in highway medians and on road shoulders, slopes, and other disturbed areas near roadways. Because it is a good wildlife

browse species, caution is recommended in using it in plantings along roadways. Its extensive root system provides excellent erosion control.

Reclamation: fourwing saltbush is used extensively for reclamation of disturbed sites (mine lands, drill pads, exploration holes, etc.). It provides excellent species diversity for mine land reclamation projects.

Ethnobotanical: American Indians boiled fresh roots with a little salt and drank half-cupful doses for stomach pain and as a laxative. Roots were also ground and applied as a toothache remedy. Leaf or root tea was taken as an emetic for stomach pain and bad coughs. Soapy lather from leaves was used for itching and rashes from chickenpox or measles. Fresh leaf or a poultice of fresh or dried flowers was applied to ant bites. Leaves were used as a snuff for nasal problems. Smoke from burning leaves was used to revive someone who was injured, weak, or feeling faint. Hispanics use the plant for colds and flu.

Status

Consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as state noxious status and wetland indicator values.

Description

Fourwing saltbush is a polymorphic species varying from deciduous to evergreen, depending on climate. Its much-branched stems are stout with whitish bark. Mature plants range from 1 to over 8 feet in height, depending on ecotype and the soil and climate. Its leaves are simple, alternate, entire, linear-spatulate to narrowly oblong, canescent (covered with fine whitish hairs) and ½ to 2 inches long. Its root system is branched and commonly very deep (to 20 feet) when soil depth allows.

Fourwing saltbush is mostly dioecious, with male and female flowers on separate plants. Male flowers are red to yellow and form dense spikes at the ends of the branches. The female flowers are axillary and nondescript. However, some monocious plants may be found within a population. Fourwing saltbush plants can exhibit hermaphroditic characteristics (male and female parts in one flower). The seed is contained in utricles that turn a dull yellow when ripe and may remain attached to the plant throughout winter.

Fourwing saltbush derives its name from the four membranous 'winged' capsules, which encompass

the seed. It is most commonly called fourwing saltbush, but is also known as chamise, chamize, chamiso, white greasewood, saltsage, fourwing shadscale, and bushy atriplex.

Distribution

Fourwing saltbush (*Atriplex canescens* (Pursh) Nutt.) is one of the most widely distributed and important native shrubs on rangelands in the western United States including the Intermountain, Great Basin, and Great Plains regions. Its natural range extends from below sea level to above 8,000 feet elevation. For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

Fourwing saltbush is adapted to most soils but is best suited to deep, well drained; loamy to sandy to gravelly soils. It is sometimes found growing in dense clay soils. It is very tolerant of saline soil conditions and somewhat tolerant of sodic soil conditions. Under saline conditions plants take up salts and accumulate it in the plants scurfy leaf coverings.

Fourwing saltbush has high tolerance to boron. It does not tolerate high water tables or late winter inundation. It is extremely drought tolerant and has fair shade tolerance. It is not very tolerant of fire, but may resprout to some degree if fire intensity is not too severe. Its ability to tolerate extreme cold conditions varies with ecotype.

Fourwing saltbush most commonly grows in areas that receive 8 to 14 inches annual precipitation. It can be found from sea level to 8,000 feet elevation. Depending on ecotype, fourwing saltbush grows in association with bluebunch wheatgrass, basin wildrye, bottlebrush squirreltail, Indian ricegrass, Sandberg bluegrass, sand dropseed, blue grama, galleta, black grama, alkali sacaton, inland saltgrass, globemallow, greasewood, rabbitbrush, shadscale, Nuttall or Gardner saltbush, winterfat, bud sagebrush, black sagebrush, low sagebrush, Wyoming big sagebrush, and basin big sagebrush.

Establishment

Planting: Fourwing saltbush begins growth in mid to late spring. Seed matures 3 to 4 months after flowering. It typically spreads via seed distribution, but may also root sprout following wildfire or layer if covered with sand. Stands typically take three to four years to establish, but once established the plants are fairly competitive with other species. Fourwing saltbush can be established by transplanting in early spring, direct seeding in late fall, early winter or very early spring.

An adapted cultivar/release or local seed source should be used to ensure the ecotype is compatible with the site. Seed should be after-ripened for ten months and dewinged prior to planting. On moist fine soils, seed should be planted ½ inch deep. On sandy to coarse gravelly soils, plant up to ¾ inch deep. Seeding rates of 0.25 to 0.50 pounds per acre is recommended for rangeland seeding mixtures (3 to 7 percent of the seeding mix). Dewinged seed is preferred because seed flow through a drill and planting depth can be controlled more easily. There is no prechilling requirement for fourwing saltbush seed. See Seed Production section for additional planting recommendations

Seedling vigor is generally outstanding and depending on ecotype, young plants may reach heights of 18 inches by the end of the first growing season.

Management

Fourwing saltbush is palatable to cattle, sheep and deer season long. It provides nutritious winter browse on many areas and is a good fall and winter browse plant for bighorn sheep, antelope, and elk.

In new plantings, utilizing good seedbed and weed control techniques should enhance establishment and reduce competition with other plants. In interseedings plant competition should be reduced by chemical, scalping, furrowing or other techniques that help control existing vegetation and weeds. Animals utilizing the area should be removed from new plantings for at least two growing seasons or until plants are well established and reproducing. Irrigation may be needed for transplants on harsh sites to ensure establishment. Young seedlings are not tolerant of excessive insect, rabbit, and rodent damage and plantings may require control measures if severe damage appears.

In established plantings, deferred rotation grazing systems are recommended for fourwing saltbush management. Plants can be grazed from late spring through winter, but plant health is best maintained if used primarily as a winter browse. Fourwing saltbush tolerates browsing very well, but will decrease in abundance under continuous close browsing. Proper use of fourwing saltbush as browse is approximately 40 - 50 percent of current year's growth.

Excessive use results in damage or loss of plants from breakage of brittle branches. During dry periods, branches and stems may be brittle and trampling by livestock may damage plants. Damaged

plants generally recover if rested, but production will be reduced until fully recovered. No injury to livestock results from grazing this plant. However, it can cause bloat and scours in spring if it is the primary dietary source. Rabbits, rodents, and grasshoppers utilize fourwing saltbush and may damage stands under severe conditions requiring pest control measures.

Environmental Concerns

Fourwing saltbush is native, long-lived, and spreads primarily by seed distribution. It is not considered "weedy", but could slowly spread into adjoining vegetative communities under ideal climatic and environmental conditions. This species is well documented as having beneficial qualities and no negative impacts on wild or domestic animals.

Seed Production

Establishing plants in a greenhouse and transplanting to the field will result in the most satisfactory stands for seed production. (Note: studies are underway to determine the feasibility or success of propagating fourwing saltbush from stem cuttings)

Plant spacing should be 6 to 8 feet within row and 8 to 10 feet between rows. Planting one male plant for every 5 female plants is recommended. Transplanting into weed barrier fabric can also improve plant establishment, seed production, weed control, and moisture conservation. Transplanting is recommended in the spring prior to summer heat. Full seed production is usually reached the third year following transplanting.

Plantings can also be established with seed. A minimum of 15 to 20 Pure Live seeds per linear foot of drill row should be planted. Hand seeding in late fall or very early spring may also be an option. Plant 5 to 10 seeds in a close group at desired spacing. Thin plants to desired spacing and ratio of male to female plants when fruiting starts (about 3 years). Full seed production may be reached the fourth year following direct seeding.

Fourwing saltbush requires an equivalent of 10 to 14 inches annual precipitation for seed production. Irrigation may only be needed for establishment and during drought years to ensure a seed crop. If irrigation is available, irrigate to promote vegetative growth. Make sure soil moisture is adequate at early flowering, during seed set and early maturation. Irrigate to field capacity prior to fall freeze-up. Expected seed yields may range from 200 to 400 pounds per acre. Fertilization is not generally recommended unless soil tests indicate severe

nutrient deficiencies. Rabbits and rodents can damage stands and may destroy seedlings. Insects such as grasshoppers and Mormon crickets infrequently damage stands beyond recovery.

Seed generally ripens in late August and September and can be harvested from mid September through December. Harvesting seed is best accomplished for woody ecotypes by hand stripping. Mechanized harvesting has been used on Wytana, but seed requires additional conditioning to properly dry and clean out excessive trash (leaves, stems, other inert matter). Harvested seed is usually threshed (dewinged) by processing seed through a hammermill (1500 rpm) equipped with a ¼ inch screen and then running seed through a fanmill to the desired grade.

Dewinging may hasten after-ripening of seed resulting in shorter viability of seed. Seed can be stored and remain viable for 6 to 10 years. The dewinging process greatly enhances the ability of the seed to flow through planting equipment. Removing the hull that surrounds the embryo can injure the seed resulting in reduced viability, seedling vigor, and stand establishment. One must be extremely careful when threshing to limit the amount of mechanical action on the seed to minimize damage.

Fourwing saltbush seed requires about 10 month's after-ripening following harvest before accurate percent germination can be determined. Seeds per pound will vary by accession or ecotype, but averages 38,000 seeds per pound winged and 78,000 seeds per pound dewinged.

Cultivars, Improved and Selected Materials (and area of origin)

Foundation and registered seed is available through the appropriate state Crop Improvement Association or commercial sources to grow certified seed.

'**Marana**' fourwing saltbush was released in 1979 by the NRCS Plant Materials Center in Lockford, California. It originated from plants near El Cajon, California and was selected for ease of establishment and drought resistance. It is best adapted to areas in the southwest including southern New Mexico, southern Arizona and southern to central California.

'**Rincon**' fourwing saltbush was selected by the Forest Service, Shrub Science Laboratory in Provo, Utah and cooperatively released with the NRCS Plant Materials Center, Meeker, Colorado in 1983. The original seed was collected at Rincon Blanco near Canjilon, Rio Arriba County, New Mexico at 7,800 feet elevation. Rincon is an erect, leafy form with

early season green-up. It is best adapted to the southwest areas of central Utah, central Nevada, western Colorado, to central New Mexico and central Arizona.

‘Santa Rita’ fourwing saltbush was cooperatively released by the NRCS Plant Materials Center, Tucson, Arizona, ARS, and University of Arizona in 1987. It is best adapted to areas in the southwest including southern New Mexico, southern Arizona and southern to central California.

Snake River Plains Germplasm fourwing saltbush was selected by the NRCS Plant Materials Center, Aberdeen, Idaho and cooperatively released by the Aberdeen PMC, Pullman, Washington PMC and University of Idaho in 2001. Snake River Plains Germplasm is a composite of 4 accessions of fourwing saltbush collected from the Snake River Plains of southern Idaho. It was selected for superior establishment and cold hardiness. It is better adapted to the northern range of fourwing saltbush including southern Idaho, eastern Oregon, western Wyoming, northern Utah and northern Nevada than other fourwing saltbush releases.

‘Wytana’ fourwing saltbush was released by the NRCS Plant Materials Center, Bridger, Montana in 1976. Wytana is a natural cross between fourwing saltbush and Gardner or Nuttall saltbush. It is a short, herbaceous type that is best adapted to the Great Plains and mountain foothills of Idaho, Montana and Wyoming.

Prepared By

Daniel G. Ogle
USDA NRCS Idaho State Office
Boise, Idaho

Loren St. John
USDA NRCS Plant Materials Center
Aberdeen, Idaho

Species Coordinator

Daniel G. Ogle
USDA NRCS Idaho State Office
Boise, Idaho

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS <<http://plants.usda.gov>> and Plant Materials Program Web sites <<http://Plant-Materials.nrcs.usda.gov>>.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

GREENLEAF MANZANITA

Arctostaphylos patula E.
Greene
plant symbol = ARPA6

Contributed By: Santa Barbara Botanic Garden &
USDA, NRCS, National Plant Data Center



William R. Hewlett
© California Academy of Sciences
@ CalPhotos

Uses

The fruits of greenleaf manzanita are utilized by bear, deer, other small mammals, and a wide array of birds. Infusions of the leaves and bark were used by some native Americans to treat cuts and burns. The crooked wood of central stems and lower branches are used in several cottage industries, including lamp stands and other decorative wood crafts.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status and wetland indicator values.

Description

General: Heath Family (Ericaceae). Greenleaf manzanita is an erect evergreen shrub 1-2 m tall, with a broad, rounded crown. It has a basal burl and consequently resprouts after fire. The bark of young twigs is resinous to short hairy with golden glands, but mature bark is smooth and bright red-brown. Leaves have short petioles with ovate to almost round blades that are 2-5 cm long, 1.5-4 cm wide, bright yellowish green, and glabrous on both sides. The flowers, which open from April to June, are arranged in panicles with glandular scale-like bracts that are 3-

7 mm long. The urn-shaped corollas are white, sometimes tinged with pink, and 6-8 mm long. The fruits are globose, 7-11 mm in diameter, smooth and chestnut brown, with a mealy pulp that encloses several, hard-walled seeds.

Hybrids between greenleaf manzanita and the prostrate kinnikinnick (*A. uva-ursi*) are found wherever the two species come into contact. Such hybrids have a spreading form, dense foliage, and white to pinkish flowers, which offer some promise as landscape ornamentals in areas experiencing cold winters.

Distribution

Arctostaphylos patula is one of the most widespread manzanitas, ranging throughout the mountains of western North America as far east as Colorado. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Establishment

Adaptation: It inhabits well-drained, rocky slopes in association with coniferous forests and high elevation chaparral. Its general geographic range is characterized by cool, relatively dry summers and wet winters with precipitation ranging from 50 to 80 inches per year, partly as snow. It prefers well-drained, acidic soils in open sunny sites. Greenleaf manzanita has a high tolerance for cold, below-freezing winters, but depends partly on snow cover to protect dormant buds. Occasional fires may be important to successful seed germination and establishment and to crown sprouting in senescent plants.

Natural Establishment: *Arctostaphylos patula*, like most manzanita species, requires insect visitation to ensure seed-set. The flowers are pollinated most effectively by bees that grasp the flower and shake it by actively beating their wings. This process, like shaking a salt and pepper container, permits efficient collection of the pollen, which is used for food. Fruits are dispersed primarily by animals, which presumably aid later germination by ingesting and digesting the fruit and softening the outer seed coat. However, natural germination is sporadic except after fire, which cracks the hard coat of seeds that have accumulated in the litter layer. Greenleaf manzanita prefers loose, well-drained soils and, like other members of the heath family (Ericaceae), has an obligate relationship with mycorrhizal fungi.

Seed Propagation: Propagation from seed is difficult, because of the thick, bony seed walls and low rates of

germination (less than 10%) without treatment. However, if propagation from seed is desired, treatment must ensure that the seed coat is broken without damaging the embryo. Individual seeds may be filed with a steel file, but larger quantities can be treated by placing them into a container of boiling water that is removed from the source of heat after 1-2 minutes. Seeds also respond well to burning, which is accomplished by firing a 4-inch deep layer of combustible leaves and twigs over a flat planted with seeds. These treatments crack the seed coats but may reduce viability. Treated seeds should be stratified in a moist mix of milled sphagnum and beach sand for 2-8 months until they germinate. Other techniques, including use of sulfuric acid to soften the seed coat, may enhance germination, but also requires special precautions against spillage and contamination.

Vegetative Propagation: Vegetative propagation is preferred over seeds. Greenleaf manzanita is most easily propagated by cutting terminal shoots that include 1-2 inches of the woody stem from the previous year. Cuttings work best if taken between March and May and should be dipped in a rooting hormone before being placed in a moist sand-peat mixture. Cuttings need to be kept moist by regular watering or misting until roots appear. Once rooted, they should be transplanted into small containers using potting soil, to allow for proper root development. Manzanitas generally do not transplant well, so they should be grown to vigorous conditions in one-gallon containers and then moved to a permanent position in the late fall or early winter. Relatively slow growth rates during the first few years can be expected. If plants are used in an urban landscape, the use of organic-rich soils and acidified fertilizers is recommended.

Management

Under natural conditions, no special management is required to maintain established manzanitas. Either scarified seeds or well-rooted container plants may be used to revegetate cleared sites. In the urban landscape, several horticultural techniques should be used to ensure healthy plants. All manzanitas should be planted higher than the surrounding soil to prevent crown rot, which can result from excessive water and soil moisture, especially during the summer. Overhead watering should also be avoided because it tends to encourage fungal diseases (e.g., *Botryosphaeria*) that cause branch die-back and leaf spot. Manzanitas are also susceptible to gall-producing aphids (*Tamalia*), which cause young leaves to curl and cease growth.

Periodic watering every 4-6 weeks will keep foliage healthy without weakening plants. Mulching is desirable to control weeds, retain soil moisture, and reduce the need for irrigation. Rock mulches have proven more successful than organic mulches. Pruning should be avoided and used only to remove dead wood and diseased branches.

Cultivars, Improved and Selected Materials (and area of origin)

'Altura' Greenleaf Manzanita was released in 1989 by the NRCS Plant Materials Center in Lockeford, California. This is a native, erect to semi-erect, evergreen shrub, 3-6 feet high and about 3-5 feet wide. It was collected from native plants in August and September of 1972 at South Lake Tahoe, California and was developed as a critical area stabilization plant for dry, rocky slopes and droughty, well-drained soils. It is slow to establish ground cover, but 3-4 year old plants provide good cover and erosion control. Stems root at nodes when put in contact with the ground by heavy snows. It seems to be useful for environmental enhancement and foundation plantings around mountain homes. It grows well in the Tahoe Basin, but is adapted to elevations down to 2000 feet where precipitation is adequate.

References

- Berg, A. 1974. *Arctostaphylos* Adans. *Manzanita*. pp. 228-231. IN C. Schopmeyer (ed.). *Seeds of woody plants in the United States*. Agriculture Handbook Number 450. USDA, Forest Service, Washington, D.C.
- Blum, G. 1977. *Floral biology and pollination strategies of Arctostaphylos glauca and A. pringlei var. drupacea (Ericaceae)*. Ph.D. dissertation, University of California, Riverside, California. 134 p.
- Carlson, J. & W. Sharp 1975. *Germination of high elevation manzanitas*. USDA, Forest Service. Tree Planters' Notes 26:10-11, 25-26.
- Griffin, J. 1966. *Notes on disjunct foothill species near Burney, California*. Leaflets of Western Botany 10:296-298.
- Griffin, J. 1967. *Soil moisture and vegetation patterns in northern California forests*. USDA, Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California. 27 p.

Hanes, T. 1988. *California chaparral*. pp. 417-469. IN M. Barbour and J. Major. *Terrestrial vegetation of California*. Special Publication No. 9. California Native Plant Society, Sacramento, California. 1030 p.

Kruckeberg, A. 1982. *Gardening with native plants of the Pacific Northwest*. University of Washington Press, Seattle, Washington. 252 p.

Mallory, J., W. Colwell, & W. Powell 1973. *Soils and vegetation of the French Gulch Quadrangle, Trinity and Shasta counties, California*. Bulletin 12. USDA, Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California. 42 p.

Rundel, P., D. Parsons, & D. Gordon 1988. *Montane and subalpine vegetation of the Sierra Nevada and Cascade Ranges*. pp. 559-599. IN M. Barbour & J. Major. *Terrestrial vegetation of California*. California Native Plant Society, Special Publication No. 9. Sacramento, California. 1030 p.

Sawyer, J. & D. Thornburgh 1988. *Montane and subalpine vegetation of the Klamath Mountains*. pp. 699-732. IN M. Barbour & J. Major. *Terrestrial vegetation of California*. California Native Plant Society, Special Publication No. 9. Sacramento, California. 1030 p.

Sawyer, J., D. Thornbaugh, & J. Griffin 1988. *Mixed evergreen forest*. pp. 359-381. IN M. Barbour & J. Major. *Terrestrial vegetation of California*. California Native Plant Society, Special Publication No. 9. Sacramento, California. 1030 p.

Smith, N. 1995. *Manzanitas: A gardener's guide*. *Pacific Horticulture* 56(1):18-33.

Sweeney, J. 1968. *Ecology of some "fire type" vegetations in northern California*. pp. 111-125. IN *Proceedings of the Tall Timbers Fire Ecology Conference*, Tall Timbers Research Station, Tallahassee, Florida.

Thorne, R. 1988. *Montane and subalpine forests of the Transverse and Peninsular ranges*. pp. 537-557. IN M. Barbour & J. Major. *Terrestrial vegetation of California*. California Native Plant Society, Special Publication No. 9. Sacramento, California. 1030 p.

Vankat, J. 1970. *Vegetation change in Sequoia National Park, California*. Ph.D. dissertation, University of California, Davis, California. 197 p.

Whittaker, R. 1960. *Vegetation of the Siskiyou mountains, Oregon and California*. *Ecological Monographs* 30:279-338.

Whittaker, R. 1961. *Vegetation history of the Pacific coast states and the central significance of the Klamath region*. *Madrono* 16:5-23.

Prepared By

Dieter Wilken & Julie Burgher
Santa Barbara Botanic Garden, Santa Barbara, California

Species Coordinator

Dieter Wilken
Santa Barbara Botanic Garden, Santa Barbara, California. Email: dwilken@sbbg.org

Edited 04dec00 jsp;03feb03ahv; 7Mar05 rln

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS <<http://plants.usda.gov>> and Plant Materials Program Web sites <<http://Plant-Materials.nrcs.usda.gov>>.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

QUAILBUSH

Atriplex lentiformis (Torr.)

S. Wats

plant symbol = ATLE

Contributed By: USDA, NRCS, National Plant Data Center



© Barbara J. Collins
California Lutheran University

Alternative Names

big saltbush

Uses

Ethnobotanic: The Native American Pima groups eat quailbush seeds. They ground the seeds into a meal and used them as a thickener in soups or added them to flour for making bread. Most of this shrub is edible, young shoots are suitable for greens. Several tribes used this shrub for its salty taste. The crushed leaves and roots were used as soap for washing clothes (Moerman 1998).

Native Americans tribes ground the roots and flowers and applied it to ant bites. The leaves were chewed to treat head colds. The crushed flowers and stems can be steamed and inhaled to treat nasal congestion (Moerman 1998).

Wildlife: Rabbits, lizards, rattlesnakes, coyotes, quails, and other birds use the seeds and foliage for food and habitat. The foliage and twigs provide shelter for many small mammals and livestock.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status and wetland indicator values.

Description

General: Quailbush is a large, fast growing shrub. It occurs in river floodplains, on roadsides, and in the borders of drainage. The branches are widespread, slender, and flexible. The leaves are alternate, triangular or ovate to oblong, and are 1 ½ to 2 inches long. The plants are male or female and have the ability to alter their sex due to environmental conditions.

Distribution: It ranges from the Upper San Joaquin and Salinas Valley southward to lower California, in Lower and Upper Sonoran Life Zones (McMinn 1939). It extends eastward into Nevada, Utah, Colorado, and New Mexico. For current distribution, please consult the Plant profile page for this species on the PLANTS Web site

Adaptation

Quailbush grows best with full sunlight in any well-drained but not too fertile soil. It tolerates very alkaline soils and can succeed in hot and dry climates. This species is not often found in colder areas of the country but it can tolerate temperatures between -5 and -10° C.

Establishment

Propagation from Seed: The seed is best sown in April or May and placed in containers or seed trays containing a compost of peat and sand to which a slow-release fertilizer has been added. Firm the medium gently, sow the seed thinly and evenly on top, and cover with its own depth of medium (Heuser 1997). Place the pots in a cold frame at 13° C and the seed should germinate between one to three weeks. The seedlings should be placed into individual pots and grown in a greenhouse for the first winter.

Management

Atriplex lentiformis will defoliate under extreme drought conditions. They need to be under some form of water stress, salt stress, or drought stress. The salt they accumulate in their leaves allows them to extract water from the soil. They tolerate and remove the excess salts by bladders in their leaves that act as salt sinks, keeping the salt from the plant cells.

Cultivars, Improved and Selected Materials (and area of origin)

‘Casa’ - Released 1979 by the Lockeford Plant Materials Center, CA, this cultivar has exhibited excellent performance as a conservation plant on various critical areas, for upland game cover and for environmental enhancement on deep, medium, or fine-textured soils that are well to poorly drained. It can be grown on slightly acidic to strongly alkaline soils (pH 6-8.5) and survive on an annual precipitation of 20-25 cm (8-10 inches) when irrigated for initial establishment. This species occurs from the upper San Joaquin and Salinas valleys south to lower California. It extends eastward into Nevada, Utah, and New Mexico.

References

- Collins, B.J. 2001. *Wildflowers of Southern California*. California Lutheran University, Thousand Oaks, California. Accessed: 11Jan02. <<http://www1.clunet.edu/wf/index.htm>>
- Heuser, C.W. 1997 *The complete book of plant propagation*. The Taunton Press, Newtown, Connecticut.
- Junah, S., T. Ayers, R. Scott, D. Wilken, & D. Young 1995. *A flora of San Cruz Island*. Santa Barbara Botanic Garden, Santa Barbara, California.
- Kearney, T.H., R.H. Peebles, J.H. Howell, & E. McClintock 1960. *Arizona flora*. 2nd ed. University of California Press, Berkeley, California.
- McMinn, H.E. 1939. *An illustrated manual of California shrubs*. University of California Press, Berkeley, Los Angeles, & London.
- Moerman, D. 1998. *Native American ethnobotany*. Timber Press, Oregon.
- Mozingo, H.N. 1987. *Shrubs of the Great Basin: a natural history*. University of Nevada Press, Reno, Las Vegas & London.

Thomas, J.H. 1961. *Flora of the San Cruz mountains of California: a manual of the vascular plants*. Stanford University Press, Stanford, California.

Van Dersal, W.R. 1939. *Native woody plants of the United States, their erosion control & wildlife values*. United States Department of Agriculture, Washington, D.C.

Vines, R.A. 1960. *Trees, shrubs, and woody vines of the southwest*. University of Texas Press, Austin, Texas.

Prepared By

Jammie Favorite

formerly, USDA, NRCS, National Plant Data Center
Baton Rouge, Louisiana

Species Coordinator

Lincoln M. Moore

USDA, NRCS, National Plant Data Center
Baton Rouge, Louisiana

Edited: 09Jan02 jsp; 25Feb03 ahv; 14Mar05 rln

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>>.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

FLEXIBLE CEANOTHUS

Ceanothus x flexilis
Greene ex. McMinn
Plant Symbol = CEFL4

Contributed By: USDA NRCS California State Office
& Lockeford Plant Materials Center, California



USDA NRCS Lockeford PMC

Uses

Ceanothus x flexilis is used as a ground cover that provides erosion control and is used for restoration projects due to its low and wide growth pattern. Its maintenance is low and it is used for ornamental value on road slopes revegetation and landscaping slopes around rural and mountain homes.

Status

Consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as state noxious status and wetland indicator values.

Description

Buckthorn Family (Rhamnaceae). *Ceanothus x flexilis* is a native, evergreen, semi-erect shrub that grows 0.6 to 1.2m (2 to 4 feet) high and spreads to 0.6 to 2.4m (2 to 8 feet) wide. It is a naturally occurring hybrid between buckbrush (*Ceanothus cuneatus*) and squawcarpet (*Ceanothus prostratus*). The leaves are opposite and the flowering period is April and May. Flower clusters are small with white to bluish, umbellate flowers.

Distribution

Ceanothus x flexilis is native to California. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

Ceanothus x flexilis is adapted to lower elevations that receive a coastal influence.

Establishment and Management

After *Ceanothus x flexilis* has formed a third pair of leaves they can be transplanted individually to larger ½ to 1 gallon containers. The young plants will be ready for their permanent location in 1 ½ to 2 years. New plants should be watered occasionally until they are well established; after which, deep watering every 1 to 1 ½ months will be adequate to maintain uniform growth.

Container plants may be available from local nurseries. Dig a hole two to three times the diameter of the root ball and at least six inches deeper. Backfill the hole with six inches of native soil. Make a few, 1/8 inch deep vertical cuts in the root ball, or carefully "tease" roots away from the root ball with your hands to encourage roots to grow into the new soil. Set the plant into the hole with 8 feet spacing between each plant and fill in around roots, firming the soil with your hands as you fill until the hole is half full. Fill the hole with water and allow to settle. This will settle the silt and eliminate air pockets around the roots. Backfill with enough planting mix so the plant will set at the same level it was growing in the container. Water to allow soil to settle, then add more soil if necessary. Build a berm of soil to form a watering basin around the outer edge of the hole. Break the basin down after two or three years. Provide the plant with weed control measures during the first year.

Seed Production

Ceanothus x flexilis is a hybrid cross and does not produce seed.

Cultivars, Improved and Selected Materials (and area of origin)

'Cuesta' Cultivar- Collected from a native stand near the Grass Valley airport, Nevada County, California in 1974. Stem cuttings were collected from mature plants on this site and used to grow container plants for experimental plantings in the Sierra Nevada foothills. It was initially selected for its possible use on CALTRANS revegetation projects and compared to about 60 different species of shrubs in the Sierra

Nevada foothills. It showed superior performance in establishment, maintenance and ornamental value.

References

USDA NRCS. 1991. *Notice of Release of 'Cuesta' Ceanothus x flexilis*. Ecological Sciences Division, Washington D.C. and California Agricultural Experiment Station, University of California, Davis, CA.

Prepared By

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, and Reina O'Beck, California State Office, Davis, California.

Species Coordinator

Dave Dyer, USDA NRCS Lockeford Plant Materials Center, California.

Edited: 8Sep2005 rb; 23sep05 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS <<http://plants.usda.gov>> and Plant Materials Program Web sites <<http://Plant-Materials.nrcs.usda.gov>>.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

MOUNTAIN WHITETHORN

Ceanothus cordulatus

Kellogg

Plant symbol = CECO

*Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California*



© Gary A. Monroe
@ plants.usda.gov

Alternative Names

Snowbush

Uses

Mountain whitethorn can be used for ground cover on slopes, terraces or steep banks and as a barrier plant. Mountain whitethorn may be allowed to assume natural forms or may be shaped through pruning and pinching off the growing tips.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Buckthorn Family (Rhamnaceae). Mountain whitethorn is a densely branched, spiny, evergreen, flat-topped native shrub, which reaches heights of 2 to 5 feet. However, at elevations, such as the Lake Tahoe Basin, it assumes a low spreading growth form. Individual plants may spread to form continuous ground cover over areas with a diameter up to 12 feet. The numerous stems terminate in a hard sharp point thus, the name whitethorn.

Whitethorn flowers form in a small, dense cluster 1 to 2 inches long. The flowers, which bloom from late spring to mid summer, have a heavy penetrating fragrance. During the flowering season, the abundant white flowers may cause areas to appear covered with snow.

Distribution

California, Nevada, and Southwest Oregon. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

Mountain whitethorn is well suited to dry open flats and rocky slopes with well-drained soils.

Seed Establishment, Production and Management

Mountain whitethorn seeds mature in late August and September. The seeds are contained within a triangular capsule. Collected capsules should be stored in paper bags and allowed to dry until they open and reveal the seeds.

The seed has a hard exterior coat and therefore a combination of soaking in hot water and cold storage pretreatments are necessary. Seeds should be placed in hot water, preheated to 180 degrees F., and then allowed to cool and soak for 24 hours. Following this hot water treatment, mix the seed with moist sand, place the mixture in plastic bags and store in the refrigerator.

Periodically check the bags for moisture and for swelling of the seed which indicates that they are close to germinating. Once the seeds have swollen, plant them in containers of potting soil and cover them with approximately ½ inch of soil.

After the plants have formed a third pair of leaves they can be transplanted individually to larger ½ to 1 gallon containers. The young plants will be ready for their permanent location in 1 ½ to 2 years. New plants should be watered occasionally until they are well established. Afterward, deep watering every 1 to 1 ½ months will be adequate to maintain uniform growth.

Container grown plants may be available from local nurseries. Dig a hole two to three times the diameter of the root ball and at least six inches deeper. Backfill the hole with six inches of native soil. Make a few, 1/8 inch deep vertical cuts in the root ball, or carefully "tease" roots away from the root ball with

your hands to encourage roots to grow into the new soil. Set the plant into the hole and fill in around the roots, firming the soil with your hands as you fill, until the hole is half full. Fill the hole with water and allow it to settle. This will settle the silt and eliminate air pockets around the roots.

Backfill with enough planting mix so the plant will set at the same level it was growing at in the container. Water to allow soil to settle, then add more soil if necessary. Build a berm of soil to form a watering basin around the outer edge of the hole. Break the basin down after two or three years.

Pests and Potential Problems

Fairly free from diseases, but is susceptible to crown and root problems related to agricultural soils and wet and poorly drained soils.

Cultivars, Improved, and Selected Materials (and area of origin)

‘Maleza’ Cultivar: This was released by the Lockeford, Plant Materials Center, Lockeford, California in 1989. Maleza mountain whitethorn is well suited for medium to coarse textured, well-drained soils. It is adapted to the Tahoe Basin, but grows well at elevations down to 3500 feet where precipitation is adequate.

References

USDA NRCS (Sept.) 1988. *Proposed Notice of Designation of Tested Germplasm of ‘Maleza’ Mountain Whitethorn for Conservation Use on Critically Eroded Areas in the Tahoe Basin and Surrounding Areas*. Lockeford Plant Materials Center, Lockeford, California.

USDA NRCS. *Plants for the Lake Tahoe Basin*.

USDA NRCS. 2005. *The PLANTS database*. National Plant Data Center, Baton Rouge, Louisiana. Accessed: 29MAR2005.

Prepared By:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford and Reina O’Beck, California State Office, Davis, California.

Species Coordinator:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, California.

Edited: 07Mar2005 ; j9mar05 jsp; 27sep05 jsp

PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the

BLADDERPOD

Cleome isomeris Greene

Plant Symbol = CLIS

Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California



© J.S. Peterson
@ plants.usda.gov

Alternate name
Bladderpod spiderflower

Uses

Wildlife: It serves as a good wildlife plant for upland game, especially quail. It does provide some escape cover and shade for loafing areas and is a source of food. The pea-like seeds are taken readily by a variety of game and song birds.

Ethnobotanical Uses: The Diegueno Indians used the seeds and flowers for food.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Caper Family (Capparaceae). Bladderpod is a native, erect, round, shrub four to six feet high and at least as wide. The leaves are alternate and trifoliate. The flowers, which are yellow with six stamens, bloom much of the year and are quite attractive. The seed pods are large, inflated and pendulous with only a few hard, smooth seeds with a prominent end curved.

Distribution

Bladderpod often grows in disturbed areas, and also on coastal bluffs, hills and desert washes. The

shrub's native distribution is southern California, Baja California, and Arizona from 200 to 3,000 feet in elevation. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

This native plant is a desert type. In California, it occurs in San Luis Obispo County and in much of lower California, and in the vicinity of Tehachapi, as well as western Fresno and eastern Monterey counties. In the Bakersfield and Tehachapi regions, it can be found to an elevation of 4,000 feet. In cultivated plantings, it has been grown as far north as southern Butte County. It has a wide range of temperature tolerance from below freezing to over 100 degrees F. It is very drought tolerant. Little is known at this time about its adaptation to soils below a pH of 6.

Establishment

The large seed germinates readily. It requires no treatment before planting. It may be direct seeded on a prepared seed bed in the fall to early spring at a rate of one pound of seed per acre. It should be planted no deeper than one inch. Direct seeding becomes progressively less successful as one moves north, because of competition from annual grasses.

For best results with small plantings, the seed should be propagated in flats and the seedlings should be transplanted to gallon cans. Seedlings can be transplanted to the field in either the spring or fall.

Management

This shrub requires good weed control measures, such as hoeing, cultivating, and chemical control during the establishment period. Elimination of all weed competition on the planting site prior to direct seeding is essential for good stand establishment. Normally, the spring rains are sufficient to establish seedlings when directly seeded on deep soils. Potted plants will normally require some summer water depending on the locality.

There is some difference of opinion as to whether bladderpod is susceptible to livestock damage. Generally, damage occurs only when animals are forced onto it by a lack of preferred feed.

Pests and Potential Problems

This shrub must have good weed control measures such as hoeing, cultivation, or by chemical control.

Seeds and Plant Production

Seed may be collected easily from wild plants by stripping pods from plants and extracting seed. A limited amount of seed is normally available from the California Department of Fish and Game for wildlife plantings. Seed is also available from commercial seed collectors.

Cultivars, Improved, and Selected Materials (and area of origin)

'Dorado' Cultivar- Dorado grows naturally on the desert soils and prefers a pH of 6.5 or higher. It is best adapted to the southern part of California up to elevations of 1,220m (4,000 feet), but several successful plantings have been made in the central and northern part of Sacramento Valley.

Dorado has shown excellent performance as a conservation plant on critical areas, upland game cover and food, and for environmental enhancement on deep to moderately deep, medium to finely textured soils that are well-drained.

References

California Department of Fish and Game/US Soil Conservation Service. 1976. 'Bladderpod' wildlife habitat leaflet no. 2. Compiled by Federal Aid Project W-47-R and Upland Game Investigation.

USDA NRCS. *Notice of Release of 'Dorado' Bladderpod*. Davis, California

Mielke, Judy. 1993. *Native plants for southwestern landscapes*. University of Texas Press.

Dole, J.W. and B. Rose. 1996. *Shrubs and trees of the Southern California deserts*. Foot-Loose Press, North Hills, California.

Hinton, L. 1975. Notes on La Huerta Diegueno Ethnobotany. *Journal of California Anthropology* 2:214-222 (p. 217).

Prepared By:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, and Reina O'Beck. California State Office, Davis, California.

Species Coordinator:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, California.

Edited: 28Mar2005 ro; 23sep05 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

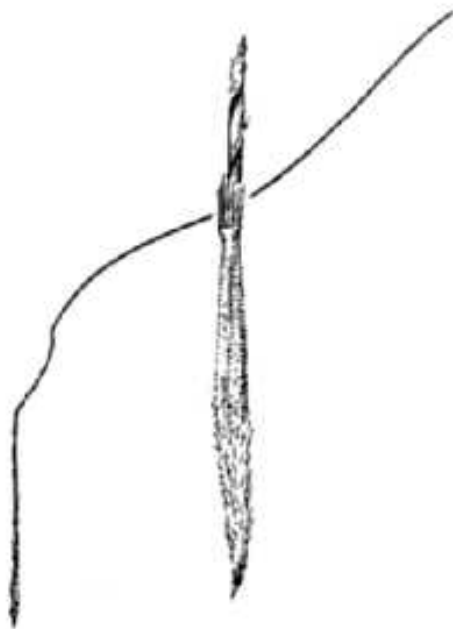
To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

NODDING NEEDLEGRASS

Nasella cernua (Stebbins &
R.M. Love) Barkworth

Plant Symbol = NACE

Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California



From Hitchcock (1950)
@ plants.usda.gov

Alternate Names

Stipa cernua, nodding stipa

Uses

Nodding needlegrass is used for restoration, critical area planting, cover crop, and wildlife habitat. It is probably one of the best grasses available for use in harsh conditions, such as subsoils, low fertility soils, hot and dry meadows, roadcuts, and roadsides. It also provides good early forage for grazing animals.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's

current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Grass Family (Poaceae). Nodding needlegrass is a native, long-lived, cool season tufted perennial bunchgrass. It is very similar to *Nasella pulchra* (purple needlegrass), but is generally smaller, with finer leaf blades, and the terminal segment of the awn flexuous. It also produces more flower spikes. The basal leaf blades are numerous, narrow, and glaucous.

Distribution

Nodding needlegrass is found in the southwestern United States in lower elevations with a coastal influence. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

In California, this grass is especially adapted to sandy, well-drained, loamy soils, but will tolerate rocky soil. It is native to chaparral and dry slopes in lower elevations. It thrives in full sun, and also grows in partial shade. It will tolerate heat and wind.

Establishment

Nodding needlegrass does well in disturbed sites and is valuable for erosion control, because of its strong root system. However, it does not tolerate disturbance after planting. It will go dormant after flowering without additional water (facultatively dormant), and does best with no summer water after the first year in the ground. Small amounts of routine watering may keep it green all year, but may also kill it. It is very drought tolerant, and intolerant of flooding. In dense stands, it can completely inhibit certain weeds, such as yellow starthistle. Abundant seed production is usually what helps maintain natural stands in non-grazed or lightly grazed areas. Plants need some protection from grazing during flowering to ensure seed formation and food storage in the crown. Once established, it is generally fire tolerant, but not fire resistant. The season of a burn is the most important factor in determining the severity of the effects on the plants. It will re-sprout after spring or fall burns, but summer burns can be damaging. Smaller plants are often less damaged by fire than larger plants because they burn less intensely and don't smolder for long periods of time.

Management

Nodding needlegrass will withstand mowing, especially after seed set and some traffic. It also

requires some protection from grazing during the flowering period (late May-April).

Seeds and Plant Production

Abundant seed matures in mid to late spring, with collection possible for 2 - 3 weeks. There are between 118,000 and 250,000 seeds/lb., and if planted at a rate of 1 lb./acre, there will be approximately 4.3 seeds/square feet. Sharp points on the seeds are augured into the soil by the twisting action of the awns. Also, seed can be harvested using a flow-vac or combine.

Cultivars, Improved, and Selected Materials (and area of origin)

'LK415f' Germplasm: Collected from San Luis Obispo County, California; Trusedale and Shells Roads. Township 27S and Range 15E Section 10. Elevation is approximately 1200 feet. Mean annual precipitation is 12-20 inches. Mean annual temperature is 60 degrees F.

References

Clunet.edu. 2005. *Wildflowers of California: A photographic gallery*. Accessed: 12 Sep 2005. <http://www1.clunet.edu/wf/chap/common/bjc-1404.htm>.

USDA NRCS. *Notice of release of foothill needlegrass for major land resource area 15f selected class of natural germplasm LK415f germplasm*. Lockeford, CA.

Wrysinski, Jeanette. 2000. *Know Your Natives: A Pictorial Guide to California Native Grasses*. Yolo County Resource Conservation District, Woodland, California.

Prepared By:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, and Reina O'Beck, California State Office, Davis, California.

Species Coordinator:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, California.

Edited: 12Sep2005 ro; 23sep05 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status.

(Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

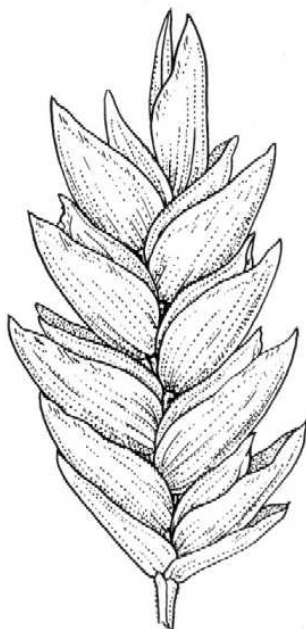
To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

SALTGRASS

Distichlis spicata (L.) Greene

plant symbol = DISP

Contributed by: USDA NRCS National Plant Data Center & the Louisiana State Office



Hitchcock (1950)
Texas A&M University

Alternate Names

Inland saltgrass, seashore saltgrass, spike grass, and alkali grass

Uses

Livestock: Under favorable soil and moisture conditions, studies have shown Saltgrass favorable for pastures irrigated with saline water. The total dry matter yields were 9081 kg/ha with a total protein production of 1300 kg/ha. Saltgrass is grazed by both cattle and horses and it has a forage value of fair to good because it remains green when most other grasses are dry during the drought periods and it is resistant to grazing and trampling. It is cropped both when green and in the dry state; however, it is most commonly used the winter for livestock feed. Saltgrass along the Atlantic coast was the primary source of hay for the early colonists.

Wildlife: Saltgrass is a larval foodplant for the Wandering Skipper (*Panoquina panoquinoides errans*) butterfly. It is also an important food in the

diet of waterfowl and the Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*), which is on the Endangered and Threatened Species List of Southeastern United States. Ducks are reported to occasionally eat the dried seeds and controlled burning provides tender forages for wild geese. *Distichlis spicata* is significant in the salt marshes, which provide nesting grounds for birds, fish and larvae of many species of marine invertebrate animals. As salt marsh plants decompose, their stored nutrients provide a steady source of food for clams, crabs, and fish.

Wetland Restoration: The thick entangled roots of salt marsh plants acts as a guard between the ocean and the shore protecting the land from pollutants and other chemicals associated with runoff water. It is particularly useful in saline/alkaline wetlands.

Medicine: Saltgrass is a respiratory allergenic plant that is offered by Miles Pharmaceutical and used by Florida physicians to treat respiratory allergies.

Spice: Indians that inhabited California used saltgrass as a seasoning. They collected the salt crystals by threshing the blades. The seasoning provided is gray-green and said to have tasted like a salty dill pickle.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

General: Grass Family (Poaceae). Inland saltgrass is a native, dioecious low, glabrous perennial, with scaly rhizomes. Culms are erect, varying in heights of 1.5 – 4.5 dm, less tall in dense colonies. Lower leaves consist of sheaths only, which are overlapping and glabrous. Sheath margins are scarious and sparsely ciliated apically. Leaves are mostly cauline and vertically two-ranked. Blades are firm, the edges often flat at the base and folded or rolled inward meeting in the middle, therefore, appearing attenuate. Blades are generally less than 10 cm long. Salt crystals may be found on the leaves and stems. The ligules are stiff, membranous and apically ciliate. Ligules range in lengths between 0.2-0.5 mm long. The inflorescences are dense, spike-like panicles, which range from 5-7 cm long or less. Spikelets are 3-10 flowered and are laterally flattened.

Disarticulation is above the glumes and between the florets. The two glumes are unequal in size. Glumes are keeled and hard on the back. The margins of the

glumes are scarious; the first glume is 1-3 nerved and 1.5-2.5 mm long. The second glume is 3-5 nerved and 2-3 mm long. The lemmas are rounded on the back and have 9-11 faint nerves. Lemmas are acute to cuspidate and 3-4 mm long. The lemma margins are scarious. Paleas are 2-nerved, 3-5 mm long, falcate, and are sharply keeled, the keel very finely hispid-ciliate. The palea margins are scarious and are in-rolled.

Distribution

For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Establishment

Adaptation: Saltgrass is found in saline areas, brackish marshes, and in salt flats along the coasts of the Atlantic and Pacific Oceans, the Gulf of Mexico and the along the coast of South America. It inhabits upper/high marsh (irregularly flooded) areas, in which the water levels vary between 2 inches above the soil surface and 6 inches below the soil surface. It is also commonly present in the dry West, where it is one of the most drought-tolerant species. Saltgrass is located in both organic alkaline and in saline soils. It is found in planting zones 7,8,9,and 10. *Distichlis spicata* can be found in flower from June to October. The inflorescence is yellowish in color, turning straw brown as it dries.

General: It may be propagated by seeds, which are produced many times in a growing season and are dispersed by wind and water. It is easier and more often propagated by its extensively creeping underground rhizomes.

Rhizomes: Saltgrass can be established by seeds or by rhizome cuttings. If using rhizome cuttings, they must not dry out. They may be stored up to 28 days. It is recommended that the rhizomes be stored in a temperature range of 35-50° F and in 60-75% relative humidity. Rhizomes are can be planted any time of the year at a depth of 1-2 inches. However, rhizomes sprout better at 77-86° F.

Seeds: Saltgrass seeds demand more than rhizomes to sprout. The seeds need moist soil, low alkalinity and high temperatures. Although many seeds are produced, only a small percentage of those seeds may germinate naturally.

Management

Saltgrass can be managed by burning between September 1 and February 1 biannually, when the water level exceeds the soil surface. Following

burning, four inches of re-growth should be obtained before grazing is allowed. Water control systems may need to be installed to maintain correct water levels to avoid prolong inundation, which kills saltgrass. Cattle walkways are usually installed to make the forage more accessible.

Pests and Potential Problems

Saltgrass is the alternate host for the red rust (*Puccinia aristidae*, also known as *Puccinia subnitens*) that infects spinach. Although the red rust disease is difficult for shippers to detect, it grows rapidly during transit. Since little is known about this disease, there are no recommended control techniques. Saltgrass eradication has been the only method used so far because the pathogen cannot complete its life cycle without this alternate host plant.

Control

This species can behave invasively in some situations. Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA, NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

Cultivars, Improved, and Selected Materials (and area of origin)

‘LK517f saltgrass’ is a California native, perennial, warm season grass with extensive creeping, yellowish, scaly rhizomes forming large colonies. Establishment should be in late spring using rhizomes or plugs planted on one-foot centers. Irrigation water should be applied the first summer to ensure stand establishment. LK517f is used for riparian restoration and bank and shoreline stabilization.

References

- Ahlgren, G.H. 1956. *Forage crops*. McGraw Hill Book Company, Inc., New York, New York. 7 p.
- Allen, C.M. 1992. *Grasses of Louisiana*. 2nd ed. Cajun Prairie Habitat Preservation Society, Louisiana. 96 p.
- Austin, D.F. 1998. *Respiratory allergenic plants*. AUG00.
<http://www.fau.edu/divdept/science/envsci/allergy.html>

Bentley Community College 1997. *Salt marshes*. AUG00.
<http://web.bentley.edu/sum97/ns314/ecosystems/saltcomm.html>

Comer, W.L. & D.G. Lugg 1983. *Yield and quality of saltgrass (Distichlis spicata (L.) Greene) grown in two soils and several salinities*. Western Society of Crop Science Abstracts. AUG99.
<http://ectc.ext.missouri.edu:70/R13180-14574-1m/info/wscs/abstracts/83.html>

The University of Arizona 1997. *Arizona range grasses*. College of Agriculture, Cooperative Extension. AUG99.
http://phylogeny.arizona.edu/pubs/natresources/az97105/desert_saltgrass.html

Colorado State University 1996. *Red rust on spinach*. Cooperative Extension Pest Alert Bulletin, Vol. 13, No. 7 May 31, 1996. Red Rust on Spinach. AUG99.
<http://www.colostate.edu/Depts/IPM/news/pestalrt/Vol13/pest13-7.htm>

USDI, FWS 1992. *Endangered and Threatened species of southeastern United States (The Red Book) FWS Region – 4 As of 11/92*. AUG99.
<http://www.fws.gov/r9endspp/i/a/saa98.html>

Godfrey, R. K. & J.W. Wooten 1979. *Aquatic and wetland plants of Southeastern United States – Monocotyledons*. University of Georgia Press, Athens, Georgia. 213 p.

Gordon–Garrison, M. 1994. *Gardening naturally*. AUG00.
<http://sdcc12.ucsd.edu/~wa12/garden11.94.html>

Kim, J.G. & B. Grenwell 1999. *UCD wetlands lab/wetland plants*. AUG99.
<http://www.des.ucdavis.edu/wetlands/plants/ds.html>

Leithead, H.L., L.L. Yarlett, & T.N. Shiflet 1971. *100 native forage grasses in 11 southern states*. USDA Handbook No. 389. 83 p.

Oregon Coast.Com 1999. *Netarts Bay: Oregon coast – salt marsh & mudflats*.
<http://www.oregoncoast.com/Netarts/nbay3.htm>

Sampson, A.W. 1924. *Native American forage plants*. John Wiley & Sons, Inc., New York, New York. 172 pp.

Struttman, J. 1999. *Butterflies of New Jersey*. USDI, GS, BRD, Northern Prairie Wildlife Research Center. AUG00.
<http://www.npwrc.usgs.gov/resource/distr/lepid/BFLYUSA/nj/5159.htm>

Szalay, F.A. & V.H. Resh 1996. *Responses of wetland invertebrates and plants important in waterfowl diets to burning and mowing of emergent vegetation*. Wetlands 17: (1996). AUG99.
<http://www.sws.org/wetlands/abstracts/volume17n1/SZALAY.html>

Uchytel, R.J. 1990. *Distichlis spicata*. IN: *The fire effects information system* [Database]. USDA, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory, Missoula, Montana.

Prepared By

Selena Dawn Newman
USDA NRCS Louisiana Plant Materials Program
Alexandria, Louisiana

Maraya Gates

Formerly USDA NRCS National Plant Data Center

Species Coordinator

Mike Materne
Louisiana State University, Agricultural Center
Baton Rouge, Louisiana

Edited 07dec2000 jsp; 10feb03 ahv; 10aug03 jsp; 27Apr05 rln

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

BLUE WILDRYE

Elymus glaucus

Plant symbol = ELGL

*Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California*



A.S. Hitchcock. 1950.
Manual of the grasses of the United States.

Key Web Sites

Extensive information about this species is linked to plants.usda.gov--PLANTS web site. To access this information, go to the PLANTS web site, select this plant, and utilize the links at the bottom of the Plants Profile for this species. Also, refer to the Calflora website at www.calflora.org.

Uses

Blue wildrye is good for streambank restoration, meadow and swale seeding. It is also excellent for reseeding burned or disturbed areas in oak woodland or forest. It is very tolerant of fire, burning quickly with little downward transfer of heat. Blue wildrye can also provide excellent wildlife habitat for mammals, birds, and waterfowl. It provides good forage early in the season, but later, may be too coarse and stemmy.

Ethnobotanic: Blue wildrye has similar uses as creeping wild rye, primarily as a cereal grain. It is less desirable for basketry as the nodes are thick, but this does not exclude its use in some baskets. Similar to creeping wildrye, there may be some ceremonial uses of blue wildrye.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Weediness

This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed. Please consult with your local NRCS Field Office, Cooperative Extension Service office, or state natural resource or agriculture department regarding its status and use. Weed information is also available from the PLANTS website.

Description

General: Blue wildrye is a large perennial bunchgrass. It is very tall, with an upright growth habit and just a few stems per plant. It is similar in stature and growth habit to slender wheatgrass. The leaf blades are thin and flat, ranging from 4-12mm (.2-.5 inch) wide. Leaf color changes from green to blue green, with a white waxy coating. If it is given water it will stay green all year. Frosts induce dormancy.

Distribution

Blue wildrye is found throughout California in the foothills and lower mountain slopes, where it is associated with chaparral, as well as open stands of oak and conifers. At lower elevations, it grows in valley grasslands, open areas, alluvial channel banks and swales. It is often found with other native perennial grasses. It's adapted to 25-100 cm (10-40 inches) annual rainfall.

Blue wildrye is also found from California to Alaska and also the Great Plains and northern Mexico.

Habitat

Open areas, chaparral, woodland and forest.

Adaptation

Blue wildrye grows well in both disturbed and undisturbed areas and is a good competitor. It tolerates wide variations in soil and weather conditions, though grows best in good soils. It prefers moisture but tolerates drought and is usually more drought-tolerant than meadow barley and California brome. Some ecotypes are adapted to sunny grassland habitats.

Establishment

Seeds mature in late spring to summer; can be collected for 2-7 weeks depending on ecotype and growing conditions. Seed is up to 6mm long (1/4 in.), germinates easily, and has good seedling vigor. There are approximately 109,000 seeds/lb., and if planted at a rate of 1 lb./acre, there would be approximately 2.6 seeds/square feet.

Management

Forage quality can be excellent when cut before dormancy. It will not survive if grazed to heavily. Likewise, it is generally tolerant of mowing if not cut too short.

Pests and Potential Problems

Rust can be a problem and treating the seed prior to planting with an approved fungicide is recommended.

Seeds and Plant Production

Flowering occurs in the late spring typically April to May. Adequate moisture will promote good seed set, but even under adverse conditions of low moisture, seed will be produced in most years. Seed is ripe 6 to 9 weeks after flowering. There are 311,000 seeds per pound. The planting rate for most vegetative practices is 5 pounds pure live seed per acre drilled and 7 pounds pure live seed per acre broadcast.

Cultivars, Improved, and Selected Materials (and area of origin)

'Mariposa' (CA) - Collected from a native stand near Mariposa, California at an elevation of 600 feet above sea level. 'Mariposa' has shown a preference for loam to clay loam soils. It can persist on moderately deep road cut slopes. It is best grown for seed on well to moderately well drained, moist, medium textured soils. It does not tolerate poor drainage or prolonged flooding.

'Arlington' (WA)- Collected from a native stand two miles north of the city of Arlington in Snohomish County, Washington at an elevation of 200 ft. (61 m) above sea level. 'Arlington' blue wildrye is a native, cool season, perennial bunchgrass. It establishes rapidly from seed but is short-lived. Field evaluations in western Oregon and Washington indicate that 'Arlington' is suitable for erosion control and quick, self-perpetuating cover on logging roads, cut-over timberland, burned areas and steep hillsides. The species may also be less competitive with recently planted forest tree seedlings compared to certain introduced grasses. However, the specific forage value of 'Arlington' and its compatibility with tree plantations is not fully established.

'Elkton' (OR) - Collected from a native stand 11.5 miles northwest of the city of Sutherlin in Douglas County, Oregon at an elevation of 400 ft. (121 m) above sea level. 'Elkton' blue wildrye is a native, cool season, perennial bunchgrass. It establishes rapidly from seed but is relatively short-lived. Evaluations in western Oregon and Washington indicate that 'Elkton' is suitable for erosion control and quick, self-perpetuating cover on logging roads, cutover timber and burned areas and steep hillsides. The species may also be less competitive with recently planted forest tree seedlings compared to *certain* introduced grasses. However, the specific forage value of 'Elkton' and its compatibility with tree plantations not fully established.

Control

Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

References

Hankins, D. Email to the author. 19 July 2005.

Hickman, J.C. *The Jepson manual. Higher plants of California*. University of California Press. Berkeley and Los Angeles.

Hitchcock, A.S. (rev. A. Chase). 1950. *Manual of the grasses of the United States*. USDA Misc. Publ. No. 200. Washington, DC.

USDA-NRCS. *Notice of release of 'Arlington' blue wildrye*. Oregon State University Agricultural Experiment Station and Washington State University Agriculture Research Center, Corvallis.

USDA-NRCS. *Notice of release of 'Elkton' blue wildrye*. Oregon State University Agricultural Experiment Station, Corvallis.

USDA-NRCS. *Notice of release of 'Mariposa' blue wildrye*. Lockeford Plant Materials Center, Lockeford.

Yolo County Resource Conservation District. 2000. *Know your natives: a pictorial guide to California native grasses*. Yolo County Resource Conservation District, Woodland.

Prepared By:

Dave Dyer.

USDA NRCS Plant Materials Center
Lockeford, California

Reina O'Beck

USDA NRCS California State Office
Davis, California

Species Coordinator:

Dave Dyer.

USDA NRCS Plant Materials Center
Lockeford, California

Edited: 11Jul2005 ro; 29Jul2005 rln; 1Aug2005 rln

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

CALIFORNIA BUCKWHEAT

Eriogonum fasciculatum

Plant symbol = ERFA2

*Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California*



© Gary A. Monroe. 2003.

Common Names

Eastern Mojave buckwheat, Wild buckwheat, buckwheat, flat-top buckwheat and California buckwheat.

Key Web Sites

Extensive information about this species is linked to plants.usda.gov--PLANTS web site. To access this information, go to the PLANTS web site, select this plant, and utilize the links at the bottom of the Plants Profile for this species. Also, refer to the Calflora website at www.calflora.org.

Uses

California buckwheat has shown excellent performance as a conservation plant on critical areas and problem soils, such as Serpentine, decomposed granites, and high pH soils. Its showy white flowers also make it ideal for environmental enhancement uses. Due to its long flowering period, California buckwheat is also an excellent insectary plant that

provides nectar sources for beneficial insects when planted next to crops as part of an (IPM) Integrated Pest Management program.

Ethnobotanic Uses: The Cahuilla drank leaf tea for headache and stomach pain. Hot root tea drunk for colds and laryngitis. Root poultice was applied to wounds. A tea of dried flowers or dried roots was taken to prevent heart problems. Studies have identified leucoanthocyanidins beneficial to the heart in other *Eriogonum* species.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Weediness

This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed. Please consult with your local NRCS Field Office, Cooperative Extension Service office, or state natural resource or agriculture department regarding its status and use. Weed information is also available from the PLANTS Web site.

Description

General: California buckwheat is a native evergreen shrub about 12 to 39 inches high and 28 to 51 inches wide. Branches are numerous, slender and flexible. Leaves are egg-shaped, 1.5 to 3.8 inches long and less than half an inch wide, smooth or fuzzy above and fuzzy beneath. Flowers are white or pink. Flowering period is from May through October. Seeds are light brown, angled and very small.

Distribution

California buckwheat grows naturally on dry slopes and canyons near the coast from San Diego County north to Marin County. It is also found in Utah, Arizona and northwestern Mexico.

Habitat

Dry slopes, washes and canyons in scrub.

Adaptation

California buckwheat can be used as a conservation plant on critically eroded areas and for environmental enhancement on sandy to clay loam, moderately to well-drained soils. This species occurs abundantly in southern California but is also adapted to parts of California within the Mediterranean climate up to

2700 feet elevation where the mean annual precipitation ranges from 7-20 inches.

Establishment

California buckwheat is a good seed producer. Seed matures in the early fall. Annual production is about 300 pounds per acre. The seed dries on the plant, which allows some leeway in harvesting. Fruits can be stripped to dry clusters and then cleaned by machine. Without the calyx removed from the seed, there are about 334,000 seeds per pound. Seed germination is about 25 percent.

Plants can be propagated by seeding directly into containers in the greenhouse. Plants grow rapidly and should be moved into larger containers or the field as growth progresses. California buckwheat also can be seeded directly into the field. Seeding rates are 9 pounds per acre drilled and 14 pounds per acre broadcast.

Management

On wildfire burned areas, use 1-2 pounds per acre as part of a mixture. Seed germination is quite variable, so buying good quality seed is important. If germination is less than 25 percent, double the seeding rate.

Homeowners may need to buy this seed directly from specialty seed suppliers. Use 4 to 8 ounces of seed for a 10,000 square foot area. When using container plants, set plants three feet apart.

Pests and Potential Problems

No known pest problems. California buckwheat provides an excellent insectaries habitat which primarily supports beneficial insects. Before placing it next to a crop, check with local IPM Integrated Pest Management specialists to ensure that it is compatible with targeted insect populations.

Seeds and Plant Production

California buckwheat produces about 145kg/ha (300 lbs/ac) of seed. Achenes with calyx attached are handled as seed. The calyx can be separated by rubbing the achenes through a number 6 screen. Without the calyx removed there are about 735,000 seeds per kilogram (334,000 seeds/lb.). Seed germination is approximately 25 percent.

Plants are propagated by seeding directly into containers in the greenhouse. Seedlings in the early stages of growth are somewhat susceptible to “damp-off” and quite sensitive to cold. Only “hardened” material should be used in plantings.

Cultivars, Improved, and Selected Materials (and area of origin)

‘Duro’ (CA) - is a blend of six accessions of California buckwheat. In 1964, seed was collected from six native stands in Kern, San Luis Obispo, and Modoc counties. Container plants of these accessions were planted together in three rows at the Pleasanton PMC and all subsequent plantings of ‘Duro’ were made with blended seed collected from these rows. ‘Duro’ California buckwheat was performed better than most other native California shrubs in both container plantings and direct seedlings on critically eroded areas.

Control

Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

References

Foster, S. and C. Hobbs. 2002. *Western medicinal plants and herbs*. Houghton Mifflin Company, New York.

Hickman, J.C. 1993. *The Jepson manual of higher plants of California*. University of California Press, Los Angeles and Berkeley.

Monroe, G. 2003. *Eriogonum fasciculatum*. San Luis Obispo County, California.

USDA-NRCS. *Notice of release of ‘Duro’ California buckwheat*. California Agricultural Experiment Station, Davis.

Prepared By:

Dave Dyer
USDA NRCS Plant Materials Center
Lockeford, California

Reina O’Beck
USDA NRCS California State Office
Davis, California

Species Coordinator:

Dave Dyer
USDA NRCS Plant Materials Center
Lockeford, California

Edited: 11Jul2005 ro; 29Jul2005 rln; 8Aug2005 rln

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

SULFUR FLOWER BUCKWHEAT

Eriogonum umbellatum Torr.

Plant Symbol = ERUM

Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California



Brother Alfred Brousseau
© St. Mary's College of California
@ plants.usda.gov

Alternate Names

Buckwheat bush, sulfur buckwheat, slender buckwheat, sulphur-flower buckwheat

Uses

Wildlife: The seeds are an important food source for many species of birds and small mammals. Quail, grouse, deer and mountain sheep eat the leaves.

Landscaping: It can be used for environmental enhancement, erosion control and foundation plantings around mountain homes. It is an excellent dry flower for arrangements as it holds its color and structure for many months. Sulfur flower buckwheat plants withstand sun, heat, drought, and wind, making them ideal plants for dry sunny slopes. The showy flowers and seed heads, and compact growth habit make this plant a good choice for rock gardens. Bees produce a strong, dark honey from sulfur flower nectar.

Ethnobotanic Uses: Modern knowledge of the ethnobotanical uses of *Eriogonum* is entirely attributed to Mexican and Native American herbal traditions. The Cahuilla used an infusion of the flowers as an eyewash, as well as for cleaning out the intestines, and made an infusion of the whole plant to

shrink the uterus and reduce dysmenorrhea. Several California tribes used the tea to wash newborn babies. The Hopi used *Eriogonum* for hip and back pain, especially during pregnancy, and it was known to expedite birthing. Due to its water solubility and its lack of toxicity, *Eriogonum* can be taken as often as needed, and is safe to use in the last trimester of pregnancy as a diuretic to aid water retention.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Buckwheat Family (Polygonaceae). Sulfur flower buckwheat is a native, low-growing woody perennial commonly found on hot dry sunny exposures on rocky slopes and ridges throughout the west. It is native to western mountainous regions at elevations of 2,500 to 10,000 feet. Sulfur flower buckwheat requires well-drained sandy or gravelly soils with low fertility and will not tolerate saturated soils.

The plant forms low, broad mats with individual clumps reaching one foot high to two feet across. Leaves are one inch long, shiny green on top and woolly underneath. Flower stems 3 inches to 16 inches tall, are topped by clusters of tiny sulfur-yellow flower heads. Flowers range from yellow to orange or reddish, both in bloom and in mature seed heads. Flower displays can color entire slopes starting in June at lower elevations and continue into August at higher elevations.

Distribution

Sulfur flower buckwheat is found in dry, open and often rocky places. It is found in California to western Canada and also Colorado and New Mexico. This species has about thirty subspecies distributed across the western United States. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

Sulfur flower buckwheat grows well in medium to coarse textured and well-drained soils.

Establishment

Sulfur flower buckwheat can be raised from seed or purchased as container grown plants at local nurseries. Collect the sharply angled small black

seeds from dried flower heads by rubbing the papery dried flower heads between your fingers. They generally germinate without pretreatment and can be sown in spring or fall. However, the rate of germination is improved if they are first cold stratified.

Cold stratify seeds by placing them in a plastic bag with moist peat moss or sand in a refrigerator three months. Plant out in the early spring. Seeds are naturally cold stratified by fall planting. Select a hot, sunny, well-drained planting site and broadcast the seeds directly on the ground where they are to grow permanently.

Sulfur flower buckwheat seeds will germinate better if the seedbed has been cleared of weeds, and/or rototilled, or spaded to a depth of eight to ten inches, and mixed with additional compost. Scatter seeds evenly over the seedbed and rake and water lightly. Cover seeds with sand or weed-free compost to a depth equal to one or two times the seed diameter (about one eighth inch).

Keep the seedbed moist by sprinkling two to three times daily until seeds germinate. After the seeds germinate, continue to water once every two to three days for the next few weeks; then once a week for another month. Continue to water a few times a month through the fall. Plants are drought tolerant when established and will need only occasional watering.

Sulfur flower buckwheat blooms the second year from seed. It can be pruned back after flowering to promote a denser, more compact plant.

Sulfur flower buckwheat has a long taproot and thus mature plants are difficult to transplant. When container-grown plants are ready to plant, dig a hole two to three times the diameter of the root ball and at least six inches deeper. Backfill the hole with six inches of native soil. Make a few one-eighth inch deep vertical cuts in the rootball, or carefully loosen roots away from the rootball with your hands to encourage roots to grow into the new soil. Set the plant into the hole and fill in around the roots with planting mix, firming the soil with your hands as you fill, until the hole is half full. Fill the hole with water and allow it to settle. This will settle the soil and eliminate air pockets around the roots. Backfill with enough soil so that the plant will set at the same level at which it was growing in the container. Water it to allow the soil to settle, then add more soil if necessary. Build a berm of soil to form a watering

basin around the outer edge of the hole. Break the basin down after two or three years.

Management

Control of weeds and irrigation is necessary in the first year of establishment.

Seeds and Plant Production

Sulfur flower buckwheat is grown at the Lockeford Plant Materials Center for foundation seed production. The field was established with transplants and has produced an average of 150 pounds of seed per acre. Seed has been vacuumed or hand harvested in June-July and does not shatter easily. Germination has averaged about 35 percent with varying amounts of seed and seed rapidly loses viability within a few years. There are about 140,500 seeds per pound.

Cultivars, Improved, and Selected Materials (and area of origin)

‘Sierra’ Cultivar: Sierra was collected from native plants on August 23, 1972 at South Lake Tahoe, California. The original collection was increased at Lockeford through seed and plants. It is a low growing shrub found on dry slopes and ridges, 1,200 to 10,000 feet. The gray-green leaves are ovate, smooth above and finely hairy beneath. Plants are 8 to 12 inches high, spreading up to 2 feet in diameter. Yellow flowers in umbels erect or ascending from a woody base, turn orange red at maturity. Flowers are used in dry flower arrangements.

References

University of California at Santa Cruz. 2005. *Arboretum: Buckwheat brush*. <http://ucsc.edu>. Accessed: 08 Aug2005
http://www2.ucsc.edu/arboretum/erigonum_umbellatum.html.

USDA NRCS. *Proposed release of ‘Sierra’ sulfur flower buckwheat, Eriogonum umbellatum Torr. For conservation and beautification use on critically eroded areas*. Plant Materials Center, Lockeford, California

USDA NRCS and Nevada Cooperative Extension. *Plants of the Lake Tahoe Basin*.

Prepared By:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, and Reina O’Beck, California State Office, Davis, California.

Species Coordinator:

Dave Dyer, USDA NRCS Plant Materials Center,
Lockeford, California.

Edited: 28Mar2005 ro; 23sep05 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

BEARDLESS WILDRYE

Leymus triticoides (Buckl.)

Pilger

Plant symbol = LETR5

*Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California*



Robert Mohlenbrock
@ USDA NRCS PLANTS Database

Other Common Names

Creeping wildrye

Key Web Sites

Extensive information about this species is linked to plants.usda.gov--PLANTS web site. To access this information, go to the PLANTS web site, select this plant, and utilize the links at the bottom of the Plant Profile for this species.

Uses

Beardless wildrye is used for soil stabilization on channel, stream and river slopes and restoration of roadside, riparian and rangeland areas. It is also used for forage or cover on wet or wet-saline-alkaline soils. This includes pastureland; saline-affected, irrigated cropland; and dryland, saline-seep discharge areas. In good soils, roots may go down 10 ft. It also lays flat during high water flow periods, thus

allowing full water flow while still protecting the streambank. It provides high quality waterfowl and upland game nesting habitat. This species' flood tolerance is excellent. It is found in flood plains that receive prolonged inundation

Ethnobotanic uses: Beardless wildrye seed was used by Native Americans for food.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

General: Grass Family (Poaceae). Beardless wildrye is a cool-season, perennial, sod-forming native grass. It is a long grass that is typically tall and strongly rhizomatous. The stems are often smooth, but can be hairy. Leaf blades are green to blue-green and 2.5-4 mm wide with a slightly rough upper surface.

Distribution

Beardless wildrye is distributed at low and medium elevations from Montana to Washington and south to west Texas and California. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

This grass grows on mostly heavy soils in riparian areas, bottomlands, valleys, foothills, mountain flats and meadows from coastal marshes to high elevations.

Establishment

Beardless wildrye can be established by seed, sod or rhizomes.

Management

If managed properly, it will develop into large patches or colonies, but cultivation restricts it. It can be valuable forage in certain areas, especially on meadows that become dry, where it is grazed through most of the summer. It resists trampling and recovers well from grazing. At lower elevations it is coarser for grazing than annuals. It will also tolerate mowing well, especially if mowed late in the growing season and if not mowed too short. It is also fire tolerant. After mowing or burning it begins green-up in the late summer if deep soil moisture is adequate. In spite of delayed germination of up to one month and

poor seedling vigor, it can compete sufficiently with weeds and annual grasses to dominate a site in the second year.

Pests and Potential Problems

None

Seeds and Plant Production

Beardless wildrye seed matures in late spring to early summer. Most wild ecotypes flower but do not produce seed. If viable seed is present, it can be collected for 4-20 weeks. The seed does not shatter as easily as many other species. There are between 110,000 and 130,000 seeds/lb. and if planted at a rate of 1 lb./acre there would be approximately 2.8 seeds/square foot.

Cultivars, Improved, and Selected Materials (and area of origin)

‘Rio’ Cultivar- This cultivar was selected at the NRCS Plant Materials Center, Lockeford, California. It was collected in 1973 from a native stand in Stratford, Kings County, CA. Seed and rhizomes were harvested from test plots at the Lockeford Plant Materials Center and used for testing throughout the Mediterranean climate in California. It demonstrated superior seed viability and initial sod establishment in comparison with about 12 other California native collections.

‘Shoshone’ Cultivar- This cultivar was collected in 1958 from a stand at Riverton, WY fairgrounds. The stand was possibly a seeded stand established in the 1940s from an unknown source. It is an exceptionally leafy, fine stemmed, high forage producer; rhizomes especially vigorous, extending 1.8 m in one season; leaves broad, lax, and dark green. Comparatively high seed production for this species; seed plump and heavy.

Shoshone is used primarily for forage, stabilization, or cover on wet or wet-saline-alkaline soils. This included pastureland; saline-affected, irrigated cropland; and dryland saline-seep discharge areas. Seed dormancy requires fall dormant planting in moist seedbed.

References

USDA-NRCS. November 1994. *Grass Varieties in the United States*. Washington, D.C.

USDA-NRCS. 1991. *Notice of release of ‘Rio’ beardless wildrye*. USDA-NRCS Ecological Sciences Division, Washington, D.C. and the California Agricultural Experiment Station, UC Davis, Davis, California..

Wrynski, Jeanette. 2000. *Know your natives: A pictorial guide to California native grasses, creeping wildrye*. Yolo County Resource Conservation District, Woodland, California.

Prepared By:

Dyer, Dave, USDA-NRCS Plant Materials Center, Lockeford, CA and Reina O’Beck, California State Office, Davis, CA.

Species Coordinator:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, California.

Edited: 14sep2005 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

PURPLE NEEDLEGRASS

Nassella pulchra (A.S. Hitch.)

Barkworth

Plant Symbol = NAPU4

Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California



Gary A. Monroe
@ plants.usda.gov

Alternate Names

Purple stipa, purple tussockgrass

Uses

This is a great plant for dry land restoration and range improvement, because it is very long-lived and tolerates poor soils. It is valuable for erosion control because of its strong root system and it will establish well on disturbed areas and thin soils. It seems to grow well on previously disturbed soils, because it is often seen sprouting on roadsides and on gopher mounds. It greens up early in the season and provides good quality early forage for grazing animals.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Grass Family (Poaceae). Purple needlegrass is a densely tufted, long-lived, upright perennial bunchgrass with conspicuous awns. It has numerous basal leaves and a distinct nodding habit. The leaf blades are smooth to finely hairy. Basal blades are long, flat and 2.4 - 6 mm (.9 - .24 inch). It becomes

dormant after seed production, but begins growth again with the first fall rains. *Nassella pulchra* is California's state grass.

Distribution

Purple needlegrass occurs on the west side of the Coast Ranges from northern Baja California north to the Oregon border. The species also occurs in the Central Valley and foothills of the Cascade Range and Sierra Nevada, and on the Channel Islands. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

Purple needlegrass grows in oak woodland, chaparral, and grassland in areas receiving between 20 - 76 cm (8 and 30 inches) of rainfall. It is usually not found in dense stands, though it can be, even though it is widespread. It is well adapted to droughty soils and clay soils and grows well in full sun as well as partial shade. It is tolerant of extreme summer heat and drought conditions as well as serpentine soils.

Establishment

Purple needlegrass does not like disturbance once it is established. It does not compete well with annual grassy or broadleaf weeds during its establishment phase because of its slow growth during the first year. It needs bare ground to re-seed, but re-seeds readily and increases its range once it is established. Stands are usually maintained by abundant seed production in non-grazed or slightly grazed areas.

Management

Purple needlegrass needs some protection from grazing during flowering to ensure formation of the seed and to allow food storage in the crown. The awns can cause livestock injury. After seeds are dropped, the sharp points are drilled into the soil by the twisting and untwisting of the long awns. It has a good tolerance for mowing, especially after seed maturity, but it can be mowed earlier. Purple needlegrass is generally fire tolerant and it may benefit from a burn. In fact, it has been noted that seeds are produced more abundantly the year after a fire. The season during which the fire occurs may determine the effects on the grass. It typically will re-sprout after spring or fall burns, but not as well after summer burns. Larger plants often do not recover as well, due to higher crown temperatures. Some ecotypes have partial flood tolerance.

Seeds and Plant Production

Seed matures mid- to late spring, and can be collected for 2 - 4 weeks. It shatters very quickly during hot, dry weather. There are between 51,500 and 100,000 seeds/lb., and if planted at a rate of 1 lb./acre, there will be approximately 1.7 seeds/square feet.

Cultivars, Improved, and Selected Materials (and area of origin)

'LK 315d Germplasm': Found in Alameda County, California; Mines Rd.; Boy Scout Camp (Rancho Los Mochos). Township 4S Range 4E Section 13. Elevation is approximately 2056 feet. Mean annual precipitation is 14-35 inches. Mean annual temperature is 58-63 degrees F.

'LK 215e Germplasm': Found in Colusa County, California; Walnut Valley Ranch; near Lodoga CA. Township 17N Range 6W Section 25. Elevation is approximately 1280 feet. Mean annual precipitation is 19.8 inches. Mean annual temperature 58.4 degrees F.

'LK 115d Germplasm': Found in Tehama County, California; along Highway 36 approximately 0.3 miles west of the intersection of Highway 36 and Bowman Road. Township 28N Range 6W Section 13. Elevation is approximately 2300 feet. Annual precipitation is approximately 25 inches.

References

USDA Forest Service. 2002. *Distribution and occurrence- species: Nassella pulchra*. Accessed: 01Sep2005.
http://www.fs.fed.us/database/feis/plants/graminoid/naspu/distribution_and_occurrence.html.

USDA NRCS. *Notice of release of purple needlegrass for major land resource area 15d selected class of natural germplasm LK 115d germplasm*. Plant Materials Center, Lockeford, California.

USDA NRCS. *Notice of release of purple needlegrass for major land resource area 15e selected class of natural germplasm LK 215e germplasm*. Plant Materials Center, Lockeford, California.

USDA NRCS. *Notice of release of purple needlegrass for major land resource area 15d selected class of natural germplasm LK 315d germplasm*. Plant Materials Center, Lockeford, California.

Wrynski, Jeanette. 2000. *Know your natives: A pictorial guide to California native grasses, creeping wildrye*. Yolo County Resource Conservation District, Woodland, California.

Prepared By:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, and Reina O'Beck, California State Office, Davis, California.

Species Coordinator:

Dave Dyer, USDA NRCS Lockeford Plant Materials Center, California.

Edited: 24Aug2005 ro; 23sep05 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

BITTERBRUSH

Purshia tridentata

Pursh (DC)

Plant symbol = PUTR2

Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California



© Gary A. Monroe
@ USDA NRCS PLANTS Database

Alternate Names

Antelope bitterbrush, antelope-brush, quinine brush, black sage, deer-brush, greasewood, buckbrush

Key Web Sites

Extensive information about this species is linked to plants.usda.gov--PLANTS web site. To access this information, go to the PLANTS web site, select this plant, and utilize the links at the bottom of the Plants Profile for this species.

Uses

Bitterbrush is recommended for restoring depleted rangelands, burned areas, mined lands, and other distributed sites in the Intermountain West. It is mainly valuable for improving forage production and quality for big game on fall and winter ranges. Material available commercially has been selected for seedling vigor, productivity, upright growth form, palatability, forage availability, seed production and retention of over-wintering leaves.

Historic Native American Uses: Western Indian groups used leaf poultice or wash for itches, rashes, insect bites, chickenpox, and measles. Leaf tea was used as a general tonic and for colds, pneumonia, liver disease, to expel worms, and as an emetic and laxative for stomach ache and constipation. Twigs, leaves, and berries were used as a laxative. Root teas

were used for coughs, lung and bronchial infections, fever, and to facilitate delivery of placenta.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

General: Rose Family (Rosaceae). Mature plants are large, leafy perennial shrubs with few basal stems. They have spreading crowns, heavy lateral spur production, and long ascending leaders. The average height is 8 feet with a 10-foot crown. Floral and vegetative morphology is typical for bitterbrush, with little introgression from Stansbury cliffrose (*Purshia stansburiana*), an unpalatable related species native to the Southwest.

Flowers are small, varying from white to yellow, and produced profusely along each leader. The seeds are large for the species—15,500 per pound. They are about one-fourth inch long and obovate. Seeds, stems, and leaves are nontoxic.

Individual bitterbrush plants exhibit considerable variation for growth form. Bitterbrush's growth forms vary from a uniform, erect growth habit to more decumbent, layering forms. Users are encouraged to consider the various forms of bitterbrush in choosing a strain best suited to their needs.

Distribution: Bitterbrush is found in the intermountain west including Arizona, British Columbia, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming. Bitterbrush does not occur west of the Cascade Mountains in the northwest United States. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

Bitterbrush is associated with big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus* sp.). It occurs naturally on dry lake beds, alluvial fans or terraces, and low foothills. It occurs in soils that are deep, gravelly, loamy coarse sands derived from granite, with pH ranging from 6.0 to 7.0.

Tests have shown that bitterbrush has high potential for use on deep, coarse, well-drained, neutral to slightly acidic soils in areas that have 12-24 inches of annual precipitation. It is not well-adapted to basic, fine-textured, or poorly drained soils. Bitterbrush has performed well at sites in eastern Oregon, central and southern Idaho, northern California, and western Nevada at elevations of 3,000 to 6,000 feet. It performs best on sites that support bitterbrush-grass, basin big sagebrush-grass, mountain brush, and ponderosa pine-bitterbrush plant communities.

Bitterbrush has also performed adequately in Utah. Another strain, however, is being developed for the eastern part of the area of adaptation and a layering form for very sandy sites that are subject to blowing.

Establishment

On rangeland sites, bitterbrush should be seeded in late fall or winter to permit field stratification. Pretreatment with hydrogen peroxide is required to break dormancy for spring seeding. Seedlings are susceptible to late frosts. Plants develop very slowly and must be protected from competition during the first two seasons. Recommended seeding rates are 1 to 3 pounds of pure live seed per acre. Bitterbrush seedlings are often transplanted on critical sites. In such cases, moisture must be adequate to ensure survival in the first year. One-year-old bare-root or containerized seedling stock, 6 to 24 inches tall, is recommended.

Several insects and diseases are known to damage the foliage, seed, and seedlings of bitterbrush, and are more or less susceptible than other species. High-density populations of grasshoppers can destroy seedlings.

Management

Bitterbrush is used by big game and livestock during all seasons and remains productive despite heavy browsing. Stand conditions generally deteriorate, however, when annual use exceeds 60 percent of the annual growth. Bitterbrush is not fire-tolerant and resprouts only infrequently following burning.

Pests and Potential Problems

A number of insects and diseases are known to damage the foliage, seed, and seedlings of bitterbrush. Individual plants growing in uniform garden plots of bitterbrush have not been observed to be more susceptible to damage by insects or diseases than other accessions of the species. Grasshoppers in high densities have damaged or destroyed seedlings.

A beneficial organism associated with antelope bitterbrush is the nitrogen-fixing endophyte *Frankia purshiae*.

Seeds and Plant Production

Mature seed must be harvested with 3 to 10 days of ripening because it shatters quickly after reaching maturity. Seed may be harvested into canvas hoppers or aluminum seed collection trays positioned under the shrubs prior to seed fall. Seed collection and orchard maintenance are simplified by the upright growth form.

A 3.6 to 3.6 m to 4.9 x 4.9 m (12 x 12 ft to 16 x 16 ft) spacing is recommended for antelope bitterbrush seed orchards. Plants in wildland stands reach full seed production in 8 to 20 years. With appropriate cultural practices, this period may be reduced to about 5 years for seed orchards. Nine-year old shrubs grown at 2.4 m (8 ft) spacings without irrigation or other cultural treatments at the Boise Shrub Garden, produced 118 g (0.26 lbs) of seed per shrub or 199 kg/ha (177 lbs/acre).

Seed is easily cleaned to a purity of 95 percent using a two-screen fanning mill and a barley debearder. Shriveled black seed is nonviable and should be separated with the chaff. Seeds of bitterbrush are relatively large, averaging 34,507 seeds/kg (15,685 seeds/lb) for cleaned seed, with germination averaging about 84 percent. Seeds of bitterbrush remain viable for 15 years or more in open storage.

On rangeland sites antelope bitterbrush is normally seeded in late fall or winter to permit field stratification of the seed. Pretreatment with hydrogen peroxide is required to break dormancy for spring seeding. Seedlings are susceptible to late frosts. Plants develop very slowly and must be protected from competition during the first two seasons. Recommended seeding rates are 1.2 to 3.3 kg/ha (1 to 3 lbs/acre). Bitterbrush may be established on critical sites by transplanting.

Cultivars, Improved, and Selected Materials (and area of origin)

'Lassen' Cultivar- Lassen originates from seed collected from native stands near Janesville in Lassen County, California. This is a representative ecotype derived from a geographic area that lies in a narrow, 50-mile strip at the base of the eastern side of the Sierra Nevada Mountains from Susanville to Doyle, California.

'Maybell Source'-Maybell is found in the Northwest

portion of Moffat County, Colorado.

References

USDA NRCS. September 1986. '*Lassen Antelope Bitterbrush*' brochure. Davis, California

Shaw, Nancy and Stephen B. Monsen. No date.
Notice of Release of 'Lassen' Antelope Bitterbrush.
USDA NRCS.

Block, Neil D. *Purshia tridentata*
<http://www.usask.ca/agriculture/plantsci/classes/range/purshia.html>. Accessed: May 2005.

Foster, Steven and Christopher Hobbs. 2002. *Western Medicinal Plants and Herbs*. Houghton Mifflin Company, New York, New York. 296-7 p.

Prepared By:

Dyer, Dave, USDA NRCS Plant Materials Center,
Lockeford, CA and Reina O'Beck, California State
Office, Davis, CA

Species Coordinator:

Dyer, Dave, USDA NRCS Plant Materials Center,
Lockeford, CA.

Edited: 14sep2005 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

WESTERN NEEDLEGRASS

Achnatherum occidentale
(Thurb. ex S.Wats.)
Barkworth

Plant symbol = ACOC3

Contributed by: USDA NRCS California State Office
and Lockeford Plant Materials Center, California



© 2002 Steve Matson
@ CalPhotos

Uses

Prior to maturity, Western needlegrass is considered good forage for cattle, horses, sheep and deer. Western needlegrass also provides good protection from soil erosion.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

General: Western needlegrass is an erect, native, perennial grass with blue-green foliage. Densely tufted; culms 25-45 cm tall; sheath glabrous to pubescent, blade commonly narrow, 1-2 mm. wide; panicles 10-20 cm. long; glumes 10-15 mm long; lemma 6-8 mm. long, uniformly appressed-hairy; awn twice bent, densely hairy on all three segments.

Distribution

Western needlegrass usually is found in the Plains, rocky hills and open woods in Wyoming, Washington, Arizona and California. For more information on this species current distribution, please consult the PLANTS Web site.

Adaptation

Western Needlegrass has shown a preference for loam to clay loam soils. It can persist on moderately deep road cut slopes. It is best grown for seed on well to moderately well-drained, moist, medium textured soils. It does not tolerate poor drainage or prolonged flooding.

Establishment

Western Needlegrass seed germinates with autumn rains and early growth is satisfactory as long as soil moisture and temperature is suitable. Minimum rainfall requirements vary from 10-12 inches depending on soil type, elevation and aspect.

Management

Needlegrasses should be grazed only moderately until the flowers begin to head and should then be protected from grazing until their main growing season has ended. If thus managed, under normal weather conditions and in the absence of fire, they develop enough seed to regain their old-time abundance. Such management also enables the needlegrasses to store enough plant food in their crowns and roots for vigorous early growth the next fall.

Needlegrasses should always be regulated enough to leave a stubble averaging at least four inches in height. This allows the plants to continue to make healthy root and top growth during the current growing season, and to produce new foliage early in the next growing season.

Pests and Potential Problems

Needlegrass populations have been known to be damaged by rodents, but less so than most other perennial species.

Seeds and Plant Production

Flowering occurs in the late spring typically April to May. Adequate moisture will promote good seed set, but even under adverse conditions of low moisture, seed will be produced in most years. Seed is ripe 6 to 9 weeks after flowering. There are 311,000 seeds per pound. The planting rate for most vegetative practices is 5 pounds pure live seed per acre drilled and 7 pounds pure live seed per acre broadcast.

Cultivars, Improved, and Selected Materials (and area of origin)

'LK621e' Cultivar- LK621e was collected from a native stand five miles southwest of Canby, California at an elevation of 4600 feet above sea level. Employees of the NRCS originally obtained the seed in 1997. It was evaluated in a common garden at Lockeford Plant Materials Center against 16 other *Achnatherum* populations assembled from California.

References

Crampton, B. 1974. *Grasses in California*. California Natural History Guides. University of California Press, Berkeley, California

Green, L.R. & J.R. Bentley. September 1957. *Seeding and Trials of Stipa on foothill ranges*. USDA Forest Service, Forest Research Notes, California Forest and Range Experiment Station, Berkeley, California.

Young, Vernon A. unknown date. *Two important needlegrasses in San Diego County*. Department Range Management, Texas A & M College, College Station, Texas.

Prepared By:

Dyer, Dave, USDA NRCS Plant Materials Center, Lockeford and Reina O'Beck, California State Office, Davis, California.

Species Coordinator:

Dave Dyer, USDA NRCS Plant Materials Center, Lockeford, California.

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

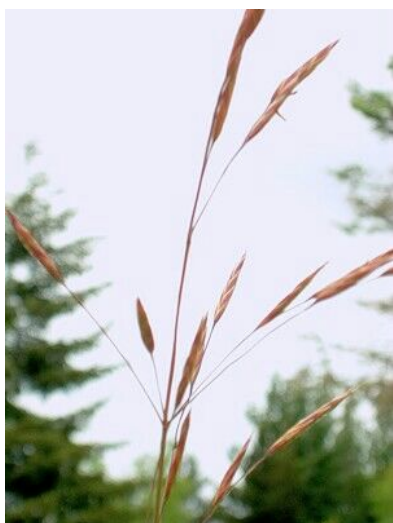
To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

CALIFORNIA BROME

Bromus carinatus Hook. & Arn.

Plant symbol = BRCA5

Contributed by: USDA NRCS National Plant Data Center



M. Wilson. 2004.
Oregon State University.

Alternate Names

Big brome, *Bromus carinatus* var. *californicus*, *Bromus carinatus* var. *hookerianus*, *Bromus laciniatus*, *Ceratochloa carinata*, keeled brome, mountain brome.

Uses

Ethnobotanic: The seeds of California brome were feared by the Native Americans to be poisonous if swallowed. However, they were often dried and ground into flour to make bread and other foods.

Livestock: California brome is an important forage species for livestock throughout its growing season. It is sometimes planted as pasture grass.

Restoration: California brome is a rapid establisher and has good soil stabilizing capabilities. For these reasons, it is useful for revegetation and erosion control in disturbed rangeland sites, spent oil shale, coalmine spoils, heavy metal mine tailings, and roadsides. It is best suited for sideslopes and backslopes because it can withstand periodic drought.

It is effective in improving water infiltration and has been used successfully on waterfront sites of the San Francisco Bay.

Wildlife: Elk, grizzly bear, geese, squirrels, pocket gophers, and other rodents consume California brome plants. Birds consume the seeds. California brome also provides good cover for small mammals, small non-game birds, and upland game birds.

Legal Status

The Western Society of Weed Science has listed California brome as an invasive weed. Please consult the PLANTS Web site (<http://plants.usda.gov>) and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Weediness

This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed. Please consult with your local NRCS Field Office, Cooperative Extension Service office, or state natural resource or agriculture department regarding its status and use. Weed information is also available from the PLANTS Web site at plants.usda.gov.

Description

General: Grass Family (Poaceae). California brome is a cool-season perennial bunchgrass that lives 3 to 5 years and grows to be 60 to 120 cm tall. The roots of California brome are fibrous, grow very quickly, and become deep and widespread. Young plants are erect, but older stems grow along the ground with only the apical tips remaining erect (decumbent). Stems are robust with hairy sheaths. Leaf blades are 0.5 to 1 cm wide and 15 to 30 cm long. They can be pubescent or glabrous. The inflorescence is a stiff, open panicle, 10 to 20 cm long and droops at maturity. The spikelets are 5 to 7 flowered, 2 to 4 cm long, 5 to 7 mm wide and flattened. Lemmas are 1 to 1.5 cm long, flattened, keeled and usually pubescent. The awns are 2 to 5 mm long. Seeds mature in May and June at low elevations and by late August at high elevations.

Distribution: California brome occurs from Alaska east to Ontario and south to Illinois, Texas, California, and northern Mexico. It is native from the Pacific Coast to the Rocky Mountains and is casually

introduced in the Great Plains. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site (<http://plants.usda.gov>).

Habitat: California brome grows in open woods and forests, shrublands, grasslands, meadows, and waste places. It is closely associated with pine dropseed, bracken fern, corn lily, dwarf purple monkey flower, mountain muhly, and Rocky Mountain iris and shares dominance in plant communities like coastal prairie and northern coastal scrub, sagebrush steppes, aspen, oak woodland, and Douglas-fir.

Adaptation

California brome grows well in a variety of soils including poorly drained types. It is most abundant in moderately moist, well-developed, deep, medium-textured soils. It tolerates soils in the pH range of 5.5 to 8.0. It occurs in bottomlands, mountain slopes, valleys, and ridge tops, up to elevations of 4,000 m. It requires nearly full to full sunlight.

Management

Although fair control of California brome by trifluralin and pronamide has been documented, it does not respond to most herbicides.

It is reduced by heavy grazing and favored in moderate to light grazing. Sheep are more likely to kill plants by trampling them rather than overgrazing. Cattle are more likely to overgraze than trample the plants.

California brome is top-killed by fire, but appears to recover within a few years. It can sprout from surviving root crowns as early as the next growing season. Coverage of California brome is slightly reduced from pre-fire levels for several years after fire, then returns to pre-fire levels. It is sometimes seeded in after fire to help stabilize soil.

Pests and Potential Problems

California brome is sometimes prone to stem rust, head smut, leaf rust, and leaf spot.

Seeds and Plant Production

Seeds are collected between May 1 and September 10, depending on rate of maturation. Mature inflorescences turn from green-purple to brown and mature seeds are light brown-gray. Cleaning is not required for germination. Seeds should be stored in a dry, refrigerated area.

Seeds are surface sown, 3 seeds per container, and planted 2 times the diameter of seed to depth. Sixty-five percent germination will occur within 30 days and seedlings are transplanted into individual containers.

Other sources state that 85% germination will occur in 13 days at 30°C, 83% in 13 days between 19° and 23°C, and 46% in 21 days at 14°C. Natural seed stock will have higher germination rates than commercial stock.

Cultivars, Improved, and Selected Materials (and area of origin)

The USDA NRCS Plant Materials Program has not released California brome cultivars for conservation use. However, California brome seed is readily available from commercial sources.

‘Bromar’ is recommended for revegetating high-elevation sites. It is resistant to stem rust, head smut, leaf rust, and leaf spot.

‘Cucamonga’ is recommended for erosion control and ground cover on droughty, low fertility grasslands. It is susceptible to head smut, which can be controlled with a mercuric fungicide.

‘Luval’ is a drought resistant cultivar.

Control

Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA, NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

References

Agricultural Research Center. 2004. *GRIN taxonomy* (<http://www.ars-grin.gov/cgi-bin/npgs/html/index>, 2 July 2004). USDA, Beltsville.

Harrison, S. 2000. *Rangeland ecosystems and plants* (<http://www.usask.ca/agriculture/plantsci/classes/range/index.html>, 2 July 2004). University of Saskatchewan, Saskatoon.

Howard, J.L. 1997. *Bromus carinatus*. (<http://www.fs.fed.us/database/feis/>, 2 July 2004). Rocky Mountain Research Station, USDA Forest Service, Missoula.

Moerman, D. 2003. *Native American ethnobotany database* (<http://herb.umd.umich.edu>, 2 July 2004). University of Michigan, Dearborn.

Pratt, M., J. Bowns, R. Banner, and A. Rasmussen. 2002. *Range plants of Utah* (<http://extension.usu.edu/rangeplants/index.htm>, 2 July 2004). Utah State University Extension, Logan.

Wilson, M. 2004. *Bromus carinatus* (<http://oregonstate.edu/~wilsomar/Species/Brca.htm>, 2 August 2004). Department of Botany and Plant Pathology, Oregon State University, Corvallis.

Young, B. 2001. *Propagation protocol for production of container Bromus carinatus Hook. & Arn. Plants*. (<http://www.nativeplantnetwork.org>, 2 July 2004). College of Natural Resources, University of Idaho, Moscow.

Prepared By:

Sarah Wennerberg
USDA NRCS National Plant Data Center
Baton Rouge, Louisiana

Species Coordinator:

Mark Skinner
USDA NRCS National Plant Data Center
Baton Rouge, Louisiana

Edited: 4Aug2004 sbw; 21Oct2004 rln

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.