

## Growing Desert Plants at Home

Please read the included species-specific information in the four included documents.

Follow these guidelines as a general rule:

- Select a soil that is well drained- this is important. Cactus mix at a garden/hardware store works great.
- Pre-soak soil by submerging container in a tub of water then let water drain out
- Compact the soil mix but not too much, apply 5-10.lbs of pressure.
- Leave about 1" space from the soil to the top of the container.
- Sprinkle seeds on top of the soil. Apply 5-20 seeds to each container. Germination rates for many native plants are low and you will thin seedlings later
- After seeds are sprinkled on surface sprinkle ¼" of soil on top of seeds and apply some pressure to lightly compact soil.
- Spray water over the final layer of soil that covers the seeds.
- Place planted containers in an area where soil temperatures can reach to above 70F.
- Spray water daily. If it looks like the lower part of the container is dry consider soaking entire container again in water.
- Seeds will germinate in 1-2 weeks. Place them in protected area under partial sun, eventually moving them to full sun.
- When seedlings are 2" tall, thin, leave 1-2 plants in each container. Continue watering throughout the summer.
- When tall enough allow the seedlings to receive some wind to strengthen main stem
- Transplant the seedlings when 6" or taller into a soil type described in the handouts.
- Continue watering throughout the growing season.

## CALIFORNIA BUCKWHEAT

*Eriogonum fasciculatum*

**Benth.**

Plant Symbol = ERFA2

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



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### Common Names

Eastern Mojave buckwheat, wild buckwheat,  
buckwheat, flat-top buckwheat

### 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.

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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>>

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# FOURWING SALTBUUSH

## *Atriplex canescens* (Pursh) Nutt.

Plant Symbol = ATCA2

**Common Names:** chamise, chamize, chamiso, white greasewood, fourwing shadscale, bushy atriplex.

**Scientific Names** *Calligonium canescens* Pursh. (1813), *Obione canescens* (Pursh) Moq. (1840), *Atriplex berlandiera* Moq. (1840), *Obione tetraptera* Benth. (1844), *Pterochiton occidentate* Torr. & Frem. (1845), *Pterochiton canescens* (Pursh) Nutt. (1847), *Obione occidentalis* (Torr. & Frem) Moq. (1849), *Atriplex fruticosa* Nutt. Ex Moq. (1849), *Atriplex heterophylla* Nutt Ex Moq. (1949), *Atriplex occidentalis* (Torr & Frem.) D. Dietr. (1852), and *Atriplex tetraptera* (Benth.) Rydb. (1912) (The Plant List 2013):



**Figure 1** Fourwing saltbush. Photo by Steven Perkins @ USDA-NRCS PLANTS Database.

### Description

**General:** Goosefoot Family (Chenopodiaceae). 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 8 ft 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 reaching depths of up to 20 ft when soil depth allows (Kearney et al., 1960).

Fourwing saltbush is mostly dioecious, with male and female flowers on separate plants (Welsh et al., 2003); however, some monoecious plants may be found within a population. At higher ploidy levels fourwing saltbush can exhibit trioecy (three sexual states), with plants able to switch from female to male under environmental stress (McArthur and Monsen, 2004). Fourwing saltbush plants can also exhibit hermaphroditic characteristics (male and female parts in one flower). Male flowers are red to yellow and form dense spikes at the ends of the branches. The female flowers are axillary and nondescript. The seed is contained in a winged utricle that turns a dull yellow when ripe and may remain attached to the plant throughout winter.

Fourwing saltbush is a highly variable species. Introgression and changes in ploidy are common. There are six currently accepted varieties of fourwing saltbush: *angustifolia*, *canescens*, *gigantea*, *laciniata*, *linearis* and *macilenta*. Hybridization is also common among *Atriplex* species including between woody and herbaceous species (Stutz, 1984). Several hybrid forms involving fourwing saltbush have been documented including hybrids with *A. polycarpa*, *A. gardneri*, *A. obovata* and *A. falcata* (Stutz, 1984).

**Distribution:** Fourwing saltbush 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. It can be found from the Pacific Coast to the Missouri River, and from Mexico to southern Alberta (Welsh et al., 2003). For current distribution, please consult the Plant Profile page for this species on the PLANTS web site (<http://plants.usda.gov/>).

### Habitat Adaptation

Fourwing saltbush occurs most commonly in salt-desert scrub communities in the Great Basin, Mojave and Sonora Desert areas of western North America (Kearney et al., 1960; Welsh et al., 2003). In the Great Basin region it is often associated with black greasewood (*Sarcobatus vermiculatus*), black brush (*Coleogyne ramosissima*), big sagebrush (*Artemisia tridentata*), creosote bush (*Larrea tridentata*), rabbitbrush (*Chrysothamnus* spp.) and shadscale (*Atriplex confertifolia*) (Welsh et al., 2003). In the Mojave and Sonoran deserts it is found in alkali bottoms with iodinebush (*Allenrolfea occidentalis*) and shadscale. It can also be found in association with sand dune communities as well as Joshua tree (*Yucca brevifolia*) and pinyon-juniper (*Pinus-Juniperus* spp.) communities (Kearney et al., 1960). In the Great Plains it can be found with blue grama (*Bouteloua gracilis*), prickly-pear cactus (*Opuntia polyacantha*) and galleta (*Pleuraphis jamesii*).



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 (Ogle and St. John, 2010). Under saline conditions plants take up salts and accumulate it in the plant's 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 especially 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 200 to 360 mm (8 to 14 in) of annual precipitation (Ogle et al., 2012). It can be found from sea level in Texas to over 2,400 m (8,000 ft) in Wyoming (Mozingo, 1987; Powell, 1988).

### Uses

**Rangeland/Grazing:** Fourwing saltbush is highly palatable browse for most livestock and big game (Peterson et al., 1987). Protein, fat and carbohydrate levels of fourwing saltbush have been compared to those of alfalfa (Catlin, 1925). It is utilized primarily in the winter at which time it is high in carotene and digestible protein averages near 8 percent (Otsyina et al., 1982).

**Wildlife:** Fourwing saltbush provides excellent season long browse for deer (Ogle and Brazee, 2009). 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 (Howard, 2003).

**Erosion Control:** Fourwing saltbush makes excellent screens, hedges, and barriers. It is especially useful on saline-sodic soils (Ogle and St. John, 2008). It has excellent drought tolerance and 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 fourwing saltbush 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.

### Ethnobotany

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 (Felger and Moser, 1974). 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.

### Status

Global rank is G5 (Secure). California state rank is S5 (secure- common, widespread, and abundant in the state).

No special federal legal status.

*Atriplex canescens* var. *gigantea* is on BLM's sensitive plant species list for Utah (BLM 2002). Populations are located on the Little Sahara National Recreation Area and are threatened by recreational vehicle use on the sand dunes (BLM 1999).

Wetland Indicator Status: None.

Ranking and status values may change over time. Please consult the PLANTS Web site (<http://plants.usda.gov/>) and your state's Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

### Planting Guidelines

Fourwing saltbush begins growth in mid to late spring. Seed matures 3 to 4 months after flowering. It typically spreads via seed distribution, and may also root sprout following wildfire or layer if covered with sand. Stands typically take three to four years



Figure 2 Male fourwing saltbush flowers. Photo by Derek Tilley, USDA-NRCS.

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 PLS (pure live seed) pounds per acre is recommended for rangeland seeding mixtures (3 to 7 percent of the seeding mix) to provide approximately 400 plants per acre (Ogle et al., 2011). Dewinged seed is preferred because seed flow through a drill and planting depth can be controlled more easily. There is no pre-chilling 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 46 cm (18 in) by the end of the first growing season.



**Figure 3** Fourwing saltbush seed processed to remove the wings to facilitate flow through seeding equipment. Photo Derek Tilley.



**Figure 4** Unprocessed seed with wings intact. Photo by Steve Hurst @ USDA-NRCS PLANTS Database.

### 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 to 50 percent of the 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.

### Pests and Potential Problems

The Atriplex case-bearing moth (*Coleophora atriplicivora*) can damage leaves and reduce seed production on fourwing saltbush (Moore and Stevens, 1984).

## 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.

## Control

Fourwing saltbush can be successfully controlled by mowing, grubbing, or fire. The species is also susceptible to herbicidal control using herbicides with known activity on woody species.

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.

## Seeds and Plant Production

Establishing plants in a greenhouse and transplanting to the field will result in the most satisfactory stands for seed production.

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. Fourwing saltbush is wind pollinated and seed production stands should be designed with the majority of the male plants on the windward side of the field. Transplanting into weed barrier fabric can also improve plant establishment,



**Figure 5 Four-wing saltbush, male plant left, female plant right.**  
**Photo Derek Tilley, USDA-NRCS**

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 (PLS) 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. The plants should be thinned to the 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 plants. 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 or vacuuming the seed from the plant. Mechanized harvesting has been used on 'Wytana', but seed requires additional conditioning to properly dry and clean out excessive trash (leaves, stems, and other inert matter). Seed is grown from second year or older wood and cutting will remove the following years' crop. 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 while also removing empty seed.



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. Seed weights conducted by the authors averaged 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. Common wildland collected seed is also available from commercial sources.

**'Marana'** fourwing saltbush was released in 1979 by the NRCS Plant Materials Center in Lockeford, 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.

**'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 (*Atriplex* × *aptera*). It is a short, herbaceous type that is best adapted to the Great Plains and mountain foothills of Idaho, Montana and Wyoming.

Cultivars should be selected based on the local climate, resistance to local pests, and intended use. Consult with your local land grant university, local extension or local USDA NRCS office for recommendations on adapted cultivars for use in your area.

### **Literature Cited**

- BLM (U.S. Department of the Interior, Bureau of Land Management, Utah State Office). 2002. Sensitive plant species list for Utah. Salt Lake City, UT: Utah State Office. 3 p. [45787]
- BLM (U.S. Department of the Interior, Bureau of Land Management). 1999. Rockwell Wilderness Study Area, [Online]. In: Utah Wilderness Inventory. Available: <http://w3.access.gpo.gov/blm/utah/pdf/nw10.pdf> [2003, November 24]. [45786]
- Catlin, C.N. 1925. Composition of Arizona forages, with comparative data. Bull. 113. Tucson, AZ: University of Arizona, Agricultural Experiment Station: 155-171.
- Fegler, R.S. and M.B. Moser. 1974. Seri Indian pharmacopoeia. Economic Botany. 28: 414-436.
- Howard, J. 2003. *Atriplex canescens*. In: Fire Effects Information System, [Online]. USDA-Forest Service, Rocky Mountain Research Station, Fire Sciences laboratory. Available: <http://www.fs.fed.us/database/feis/> (accessed 28Aug2012).
- Kearney, T.H., Peebles, R.H., Howell, J.T and E. McClintock. 1960. Arizona flora. 2<sup>nd</sup> ed. University of California Press. Berkeley, CA. 1085p.
- McArthur, E.D. and S.B. Monsen. 2004. Chenopod Shrubs. In: S.B. Monsen, R. Stevens, and N.L. Shaw [compilers]. Restoring western ranges and wildlands. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. General Technical Report RMRS-GTR-136-vol-2. p. 467-491.
- Moore, T.B. and R. Stevens. 1984. Distribution and importance of the *Atriplex* case-bearing moth, *Coleophora atriplicivora* cockerel, on some chenopod shrubs, especially *Atriplex canescens*. In: Tiedemann, Arthur R.; McArthur, E. Durant; Stutz, Howard C.; [and others], compilers. Proceedings--symposium on the biology of *Atriplex* and related chenopods; 1983 May 2-6; Provo, UT. Gen. Tech. Rep. INT-172. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station: 220-225.
- Mozingo, H.N. 1987. Shrubs of the Great Basin: A natural history. Reno, NV: University of Nevada Press. 342p.
- Ogle, D. and B. Brazee. 2009. Estimating initial stocking rates. Range Tec.l Note No. 3. USDA-NRCS. Boise, Idaho. 39p.
- Ogle, D. and L. St. John. 2008. Plants for saline to sodic soil conditions. Plant Materials Technical Note No. 9. USDA-NRCS. Boise, Idaho. 12p.
- Ogle, D.G., St. John, L., Stannard, M. and L. Holzworth. 2011. Conservation plant species for the Intermountain West. Plant Materials Technical Note No. 24. USDA-NRCS. Boise, Idaho. 57p.
- Otsyina, R., McKell, C.M and G. Van Epps. 1982. Use of range shrubs to meet nutrient requirements of sheep grazing on crested wheatgrass during fall and early winter. Journal of Range Management. 35(6): 751-753.
- Peterson, J.L., Ueckert, D.N., Potter, R.L. and J.E. Huston. 1987. Ecotypic variation in selected fourwing saltbush populations in western Texas. Journal of Range Management. 40: 361-366
- Powell, A.M. 1988. Trees and Shrubs of Trans-Pecos Texas including Big Bend and Guadalupe Mountains National Parks. Big Bend National Park, TX: Big Bend Natural History Association. 536p.
- Stutz, Howard C. 1984. *Atriplex* hybridization in western North America. In: Tiedemann, Arthur R.; McArthur, E. Durant; Stutz, Howard C.; [and others], compilers. Proceedings--symposium on the biology of *Atriplex* and related chenopods;

1983 May 2-6; Provo, UT. Gen. Tech. Rep. INT-172. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station: 25-27.

The Plant List. 2013. Version 1.1. Published on the Internet; <http://www.theplantlist.org/> (accessed 07 Apr 2020).

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. A Utah Flora. Brigham Young University. Provo, UT. 912p.

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## INDIAN RICEGRASS

*Achnatherum hymenoides*

(Roemer & J.A. Schultes)

**Barkworth**

Plant Symbol = ACHY

Contributed By: USDA NRCS Idaho State Office



@ Grass Images  
 Bioinformatics Working Group  
 Texas A&M University

### Alternate Names

*Oryzopsis hymenoides*, *Stipa hymenoides*

### Uses

**Ethnobotanic:** The nutritious seed of Indian ricegrass was one of the staple foods of American Indians.

**Grazing/rangeland/hayland:** Indian ricegrass is highly palatable to livestock and wildlife. It is a preferred feed for cattle, horses and elk in all seasons. It is considered a preferred feed for sheep, deer and antelope in spring and a desirable feed for sheep, deer, and antelope in late fall and winter. It reaches its peak production from mid-June through mid-July. It holds its nutrient value well at maturity. It is not considered valuable as a hay species.

**Erosion control/reclamation:** One of Indian ricegrass' greatest values is for stabilizing sites susceptible to wind erosion. It is well adapted to stabilization of disturbed sandy soils in mixes with other species. It is naturally an early invader onto disturbed sandy sites (after and in concert with needle and thread grass). It is also one of the first to establish on cut and fill slopes. It does not compete well with aggressive introduced grasses during the establishment period, but is very compatible with slower developing natives, such as Snake River wheatgrass (*Elymus wawawaiensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), thickspike wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*), streambank wheatgrass (*Elymus lanceolatus* ssp. *psammophila*), western wheatgrass (*Pascopyrum smithii*), and needlegrass species (*Stipa* spp. and *Ptilagrostis* spp.). Drought tolerance combined with fibrous root system and fair to good seedling vigor, make Indian ricegrass desirable for reclamation in areas receiving 8 to 14 inches annual precipitation.

**Wildlife:** Forage value is mentioned in the grazing/rangeland/hayland section above. Due to the abundance of plump, nutritious seed produced by Indian ricegrass, it is considered an excellent food source for birds, such as morning doves, pheasants, and songbirds. Rodents collect the seed for winter food supplies. It is considered good cover habitat for small animals and birds.

**Beautification:** Due to its attractive seed heads, Indian ricegrass is recommended for roadside, campground, and other low rainfall locations for beautification.

### 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.

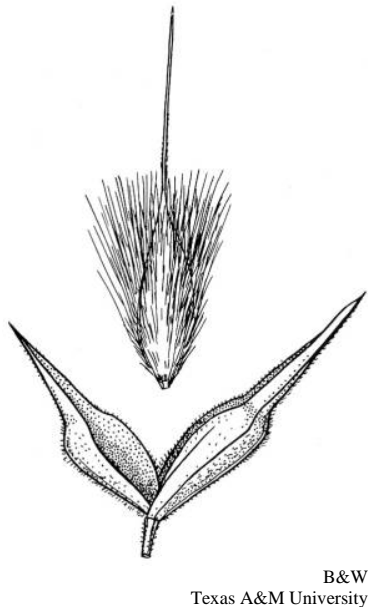
### Description

**General:** Grass Family (Poaceae). Indian ricegrass is 8 to 30 inches tall. It has many tightly rolled, slender leaves, growing from the base of the bunch giving it a slightly wiry appearance. The ligule is about 6 mm long and acute. It has a wide spreading panicle inflorescence with a single flower at the end of each hair-like branch. Seeds are round to elongated, black or brown, and generally covered with a fringe of

short, dense, white callus hairs. Indian ricegrass has fair to good seedling vigor. Seed of most accessions are very slow to germinate due a thick hull and embryo dormancy.

### Distribution

Indian ricegrass is a widely distributed, short to medium lived, native, cool-season bunchgrass generally found in the plains, foothills, mountains, and intermountain basins of the western United States on dry and primarily loamy-sandy-gravelly sites. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.



### Establishment

**Adaptation:** Indian ricegrass is very winter hardy and has a broad climatic adaptation. It can be found at elevations from 2,000 up to 10,000 feet. It grows best in areas with average annual precipitation of 8 inches to above 14 inches. It has been seeded in areas with as low as 6 inches of rainfall and reproduced. It is also found on sites with precipitation well above 14 inches. It prefers sandy course textured soils in its southern areas of adaptation and can be found on sands, fine sandy loams, silt loams, clay loams, gravelly, rocky, to shale areas in the mid-northern areas of its adaptation. It does well on hot, dry southern exposures. In Colorado, Utah, Nevada, and locations to the south, 'Nezpar' does best above 6500 feet elevation and 'Paloma' does best below 6500 feet elevation.

Indian ricegrass is often an early seral or pioneer species establishing seedlings in open or disturbed

sites and on sandy soils. It is relatively short-lived for a perennial grass and reproduces by seed.

It does not tolerate poorly drained soils, extended periods of inundation, winter flooding or shading. It is tolerant of weakly saline and sodic conditions, but prefers neutral soils. It can also tolerate fire later in the growing season and when the plant is dormant without serious damage.

Species often associated with Indian ricegrass include the big sagebrush (*Artemisia tridentata*) complex, saltbush species (*Atriplex* spp.), winterfat (*Krascheninnikovia lanata*), juniper species (*Juniperus* spp.), needle and thread (*Stipa comata*) and other needlegrasses, bluebunch wheatgrass, Snake River wheatgrass, thickspike wheatgrass, streambank wheatgrass, western wheatgrass, and blue grama (*Bouteloua gracilis*).

**Planting:** This species should be seeded with a deep furrow drill at a depth of 1/2 to 1 inch on medium to fine textured soils and 1 to 3 inches on coarse textured soils. A deeper planting depth puts the seed in contact with moist soil conditions, which aids in the stratification process and makes the seed less likely to be dug up by rodents. Use of older seed up to 4 to 6 years of age may improve germination and should be planted at 1/2 to 1-inch depth. Seed may require acid washing to scarify the seed and improve germination. Single species seeding rate recommended for Indian ricegrass is 8 pounds Pure Live Seed (PLS) per acre or 24 PLS per square foot or 24 PLS seeds per linear row foot at 12 inch row spacing. If used as a component of a mix, adjust to percent of mix desired. For rangeland mixtures, approximately 30 to 50 percent of the mix or 2.5 to 4 pounds PLS/acre should be considered. For mined lands and other harsh critical areas, the seeding rate should be doubled. Two separate seeding operations may be necessary when planting seed mixes, because most species should be planted at shallower depths than those recommended for Indian ricegrass. This means that Indian ricegrass should be planted first, followed by the seeding operation for the rest of the mix.

The best seeding results are obtained from seeding in very early spring on heavy to medium textured soils and in late fall on medium to light textured soils. Dormant fall seeding may improve germination of dormant seeds. Summer and late summer (June - September) seedings are not recommended. Seedling vigor is fair to good, but the seed may have a high percentage of hard seed, and stands may take 2 to 5



years to fully establish. Indian ricegrass stands respond well to light irrigation and light fertilization.

Stands may require weed control measures during establishment. Bromoxynil may be applied at the 3-4 leaf stage for early suppression of young broadleaf weeds and application of 2,4-D should not be made until plants have reached the 4-6 leaf stage or later. Mow when weeds are beginning to bloom to reduce weed seed development. Grasshoppers may damage new stands and other insects and use of pesticides may be required. All herbicides and pesticides should be applied according to the label.

### **Management**

Indian ricegrass establishes slowly and new seedlings should not be grazed until at least late summer or fall of the second growing season. It makes its initial growth in early spring and matures seed by mid summer.

New stands should not be grazed until the plants are reproducing by seed. Indian ricegrass benefits from grazing use if it is moderately grazed in winter and early spring. Livestock should be removed while there is still enough growing season moisture to allow recovery, growth, and production of seed. Stands will deteriorate under heavy spring grazing systems.

The third and fourth years following establishment may be critical to stand survival. Reproduction is dependent on seed production and quality seed in the soil bank must be available as mature plants begin to go out of the stand. Grazing management with rest or deferment schedules that allow plants to produce seed every 2 to 3 years is recommended. By the eighth or ninth year following establishment, the seed bank should be adequate, with a wide variation of low dormancy to hard seed to ensure long term stand survival with proper grazing management.

*Environmental Concerns:* Indian ricegrass is relatively short-lived and spreads via seed distribution. It is not considered "weedy" or an invasive species, but can spread into adjoining vegetative communities under the proper management, climatic, and environmental conditions. Most seedlings do not spread from original plantings, or if they do spread, the rate of spread is not alarming. Indian ricegrass is self-pollinated, but may occasionally be pollinated by native needlegrass species. These natural crosses generally produce sterile hybrids.

### **Seed Production**

Seed production of Indian ricegrass has been very successful under cultivated conditions. Row spacing of 24 inches under irrigation or high precipitation (4.0 pounds PLS per acre) to 36 inches on dryland (3.0 pounds PLS per acre) is recommended. Cultivation will be needed for weed control and to maintain row culture.

Seed fields are productive for about five years. Fall moisture, soil fertility, and plant re-growth determine the succeeding years yield. Birds will feed on seed, and wind can shatter seed from inflorescence prior to harvest. Average production of 100 to 200 pounds per acre can be expected under dryland conditions in 14 inch plus rainfall areas. Average production of 300 to 400 pounds per acre can be expected under irrigated conditions. Harvesting can be completed by direct combining in the hard dough stage or by windrowing. Windrowing helps ensure a more complete threshing. Indian ricegrass is so indeterminate that windrowing allows final curing in the swath prior to combining. Windrowing also reduces the risk of wind damage. It is very difficult to thrash all the seed if direct combined, and it may be beneficial to re-thrash windrows after a few days for seed not threshed in the first operation. Seed heads have moderate to high rates of shatter and require close scrutiny of maturing stands. Seed is generally harvested in early July to early August. Seed must be dried immediately after combining (moisture content should be 12 percent in bins/15 percent in sacks).

### **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.

'Nezpar' Indian ricegrass was originally collected in 1935 from a site south of White Bird, Idaho by the Washington Plant Materials Center (PMC) staff. It was selected from 152 accessions for its vegetative characteristics and low seed dormancy by the Idaho PMC and released in 1978. It is adapted to the Northwest and Intermountain regions where precipitation averages 8 inches or above. It has survived in plantings with 6 inches annual rainfall. It prefers gravelly to loamy to sandy soils. It is noted for its large erect plant type, robust stems, abundant leaves, medium to small dark nearly hairless elongated seeds (< 50 percent dormant seeds), and good to excellent seedling vigor. Certified seed is available, and Aberdeen PMC maintains breeder seed.

'Paloma' Indian ricegrass was collected in 1957 west of Pueblo, Colorado at about 5000 feet elevation on medium soils. It was selected by New Mexico PMC and released cooperatively by the PMC and New Mexico Agricultural Extension Service in 1974. It is adapted to the Southwestern Regions of the Western United States. It is considered very drought tolerant, has good seedling vigor, forage, seed yields, and is long lived. Paloma has good regrowth and spring recovery. It is considered the best Indian ricegrass cultivar for the Southwestern Regions of the Western United States. Certified seed is available, and Los Lunas PMC maintains breeder seed.

'Rimrock' Indian ricegrass was collected in 1960 from a native site averaging 10 to 14 inches of precipitation, north of Billings, Montana, at about 3600 feet elevation on sandy soils. The Montana PMC; ARS, Logan, Utah; and the Montana and Wyoming Agricultural Experiment Stations released Rimrock in 1996, primarily because of its ability to retain mature seed better than Nezpar or Paloma. Its more acute angle of glumes helps retain seed longer and protects it from seed shatter caused by wind and/or rain. Certified seed is available, and Bridger PMC maintains breeder seed.

## References

Alderson, J. & W.C. Sharp 1994. *Grass varieties in the United States*. Agriculture Handbook No. 170. USDA, SCS, Washington, D.C.

Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. L. Reveal, & P. K. Holmgren 1977. *Intermountain flora*. Vol. 6. The New York Botanical Garden. Columbia University Press, New York, New York.

Hitchcock, A. S. 1950. *Manual of the grasses of the United States*. USDA, Washington, DC.

Jones, Thomas A. 1999. *Personal communication*. Geneticist, USDA, ARS, Forage and Range Research Laboratory, Logan, Utah.

Powell, A.M. 1994. *Grasses of the Trans-Pecos and adjacent areas*. University of Texas Press, Austin, Texas.

Texas A&M University 1997. *Grass images*. <<http://www.csdl.tamu.edu/FLORA/image/poacr2ba.htm>>. Version: 000417. Bioinformatics Working Group, College Station, Texas.

USDA, Forest Service 1996. *Fire effects information system*. Version: 000417. <<http://www.fs.fed.us/database/feis/>>. Rocky

Mountain Research Station, Fire Sciences Laboratory, Missoula, Montana.

USDA, NRCS 2000. *The PLANTS database*. Version: 000417. <<http://plants.usda.gov>>. National Plant Data Center, Baton Rouge, Louisiana.

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Edited: 30nov00 jsp;07feb03ahv; 30may06jsp

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**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



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## 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.

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