United States Department of Agriculture

Natural Resources Conservation Service

Plant Guide

# SHADSCALE SALTBUSH

## *Atriplex confertifolia* (Torr. & Frém.) S. Watson

Plant Symbol = ATCO


**Shadscale saltbush. Gary Monroe @ USDA-NRCS PLANTS Database.**

### Alternate Names

*Common Names:* shadscale, spiny saltbush

*Scientific Names: Atriplex jonesii* Standl, *A. subconferta* Rydb., A. *collina* Woot. & Standl.

### Uses

*Wildlife*: Shadscale saltbush provides forage and cover for wildlife in arid environments. A small number of leaves are shed in the fall, but the majority of leaves remain during the winter providing a valuable source of food when little else is available (Holmgren et al. 2012). The fruit and leaves are browsed by deer, pronghorn, bighorn sheep, rodents, jackrabbits and birds. Small mammals and reptiles use the spiny shrubs for cover from predators and the sun.

*Livestock*: The palatability of the leaves and fruit of shadscale saltbush has been rated as fair to good for cattle and sheep making shadscale an important part of winter diets on desert rangelands. However, the spiny branches limit utilization of shadscale saltbush.

*Restoration/reclamation*: Attempts to establish shadscale saltbush in restoration plantings have been largely unsuccessful. Arid conditions common to shadscale saltbush habitat make seeding efforts highly unpredictable. Establishment from containerized stock has shown the greatest success.

*Ethnobotanical*: The Gosiute and Hopi used the leaves of shadscale saltbush to be eaten as greens or to be cooked with meal to make a pudding (Chamberlin, 1911; Whiting 1939).

### 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

Shadscale saltbush is a low growing shrub (1-3 ft) with spine tipped branches. The gray-green leaves are alternate, 1/4 to 1 inch long and orbicular to ovate in outline with entire margins. Shadscale saltbush is dioecious (separate male and female plants). The staminate (male) flowers are yellow and gathered in clusters or spikes. Female flowers are arranged in a 1 to 6 inch long panicle. Each flower is enclosed in 2 fruiting bracteoles fused at the base.

There is considerable variation in ploidy races of shadscale saltbush. 2n=18, 36, 54, 72, 90 (Holmgren et al. 2012).

*Distribution*: Shadscale saltbush occurs throughout western North America from California and Oregon east to North Dakota and south to Arizona and Texas. The greatest concentrations of shadscale saltbush are found in the Great Basin and Colorado Plateau (Simonin 2001).

Shadscale saltbush can be found in warm and cold desert shrub-steppe environments. Populations occur in low valleys, foothills and mesas from 2,500 to 7,500 ft elevation (Simonin 2001). It often grows in association with other halophytes including mat-atriplex, glasswort and greasewood, but can also be found in sagebrush and pinyon-juniper communities (McArthur and Monsen 2004; Welsh et al. 2003).

### Adaptation

Shadscale saltbush is highly drought tolerant and is adapted to sites receiving 6 to 12 inches annual precipitation. This species is tolerant of high saline conditions (pH 7.5-9.0) and is classified as a facultative halophyte (Branson et al. 1973). It prefers well drained soils but may inhabit a wide range of soil textures from fine to gravelly.

Differences can be seen between communities of diploid and polyploid shadscale saltbush. Diploid plants are widely spaced and mixed with many other species. Polyploid stands are dense and uniform with few other species intermingled (Tiedemann et al. 1983). Diploids also have more genetic flexibility and tend to occupy a broader variety of sites. Within the Great Basin diploid shadscale saltbush populations are most commonly found above the levels of Pleistocene lakes. As the water receded following the ice age, polyploid populations expanded into the newly available sites (Tiedemann et al. 1983).

**Establishment**
Shadscale saltbush seed is highly dormant, largely due to the inhibitive role of the pericarp (hard tissue surrounding the seed). Warren and Kay (1983) tested germination following various methods of pericarp removal. Zero seeds germinated with intact pericarps. Germination increased to 21% with the pericarps mechanically removed.


**Shadscale saltbush seed (utricles). Steve Hurst @ USDA-NRCS PLANTS Database.**

Baskin and Baskin (2002) placed seeds in cold stratification and saw germination at 12° C and 16/12° C temperature cycles. Germination was equal in light and dark; however they did not report whether or not the pericarp had been removed, the length of the stratification period, or the total percent germination.

Pericarp removal is difficult and feasible methods for use in large scale seed processing are lacking. Fall seeding for natural breakdown of the pericarp is recommended, however germination from outdoor stratification is erratic (Tiedemann 1984).

Seed should be drill seeded to a depth of 1/4 to 1/2 inch in a firm, weed-free seed bed. Due to the nature of the soils common in shadscale saltbush habitat, soil crusting is common and may prevent seedlings from emerging. Shadscale saltbush is slow to develop and not competitive in the first years of establishment. It should be planted in solid stands or in alternate rows from grasses and other more competitive species (McArthur and Monsen 2004).

Transplanting greenhouse grown stock (containerized or bareroot) is the most successful method of establishing shadscale saltbush. Transplants are not competitive, and a 30 inch diameter clearing is recommended to reduce seedling competition (McArthur and Monsen 2004).

**Management**
Overgrazing the plant is largely prevented by the presence of spiny branches. Typically only 15 to 20% of fresh growth is browsed by domestic sheep (Holmgren and Hutchings 1972). Extensive late spring and summer grazing however can cause reduction in stands.

Shadscale saltbush is killed by fire; however the lack of continuous fine fuels in shadscale saltbush communities has historically prevented major losses. The introduction of invasive annuals such as cheatgrass has altered the plant communities and increased the risk of wild fire. Slow establishment and development of shrubs like shadscale saltbush following fires allows invasive annuals to thrive and inhibit shrub reestablishment.

**Pests and Potential Problems**
Surveys of commercial seed lots have shown damage to shadscale saltbush by insects (Haws et al. 1984). Seed should be stored in cold conditions and treated with an insecticide (McArthur and Monsen 2004).

**Environmental Concerns**
Shadscale saltbush is native to western North America. It will spread under favorable conditions but does not pose any environmental concern to native plant communities.

**Seeds and Plant Production**
Seed is harvested by hand or vacuum from wild native stands. Seed is hammermilled to remove the bracteoles and pericarp, but care should be taken to not damage the seed. Inert matter can be removed with an air screen cleaner. There are approximately 60,500 seeds per pound (USDA 2014). Seed quality from native stands is variable depending on climatic conditions. Low seed fill in lots of shadscale saltbush is common (McArthur and Monsen 2004).

**Cultivars, Improved, and Selected Materials (and area of origin)**
There are no releases of shadscale saltbush. Common seed harvested from native stands is available commercially.

Ecotypes should be selected that are adapted to the site and conditions to be planted. Diploid shadscale saltbush typically shows better adaptive flexibility and competitive ability and should be chosen for upland sites. Polyploids are typically more drought tolerant and adapted to lower elevation arid sites, but are less competitive with other species.

## References


Baskin, C. C., Baskin, J. M. 2002. Propagation protocol for production of container *Atriplex confertifolia* plants. University of Kentucky, Lexington, Kentucky. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 22 January 2014). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Branson, F.A., Miller, R.F and I.S. McQueen. 1976. Moisture relationships in twelve northern desert shrub communities near Grand Junction, Colorado. Ecology. 57(6): 1104-1124.

Chamberlin, R. V. 1911. The Ethno-Botany of the Gosiute Indians of Utah. Memoirs of the American Anthropological Association 2(5):331-405. (p. 363).

Haws, B.A., Bohart, G.E., Meadows, R.W., Coombs, E.M and A.H. Roe. 1984. Status of information concerning insects associated with selected species of *Atriplex*. In: Tiedemann, A.R., McArthur, E.D., Stutz, H.C., Stevens, R., and K.L. Johnson, comps. Proceedings-Symposium on the biology of *Atriplex* and related chenopods. Gen Tech Rep. INT-172. Intermountain forest and Range Experiment Station. Ogden, UT.

Holmgren, N.H., Holmgren, P.K., Reveal, J.L. and collaborators. 2012. Intermountain Flora. Vascular Plants of the Intermountain West, U.S.A. Vol. 2, part A, subclasses magnoliidae-caryophyllidae. The New York Botanical Garden Press. New York, NY. 730p.

Holmgren, R.C and S.S. Hutchings. 1972. Salt desert shrub response to grazing use. In: McKell, Cyrus, M., Blaisdell, J.P, Goodin, J.R., eds. Wildland shrubs-their biology and utilization. Symposium Proceedings. Gen. Tech. Rep. INT-1. USDA Forest Service, Intemountain Forest and Range Experiment Station.

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.

Simonin, K.A. 2001. *Atriplex confertifolia*. In: Fire Effects Information System, [Online]. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: http://www.fs.fed.us/database/feis/

Tiedemann, A.R. McArthur, E.D., Stutz, H.C., Stevens, R., and K.L. Johnson. 1983. Proceedings-Symposium on the biology of *Atriplex* and related chenopods. General Technical Report INT-172. Intermountain forest and Range Experiment Station. Ogden, UT. 309p.

[USDA NRCS] USDA Natural Resources Conservation Service. 2014. The PLANTS Database, version 3.5. URL: http://plants.usda.gov (accessed 21 Jan 2014). Baton Rouge (LA): National Plant Data Center.

Warren, D.C. and B.L. Kay. 1984. Pericarp inhibition of germination of *Atriplex confertifolia*. In: Tiedemann, A.R. McArthur, E.D., Stutz, H.C., Stevens, R., and K.L. Johnson. 1983. Proceedings-Symposium on the biology of *Atriplex* and related chenopods. General Technical Report INT-172. Intermountain forest and Range Experiment Station. Ogden, UT. 309p.

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

Whiting, A. F. 1939 Ethnobotany of the Hopi. Museum of Northern Arizona Bulletin #15 (p. 73).


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