

PLANT MATERIALS TECHNICAL NOTE

FOURWING SALTBUSH *Atriplex canescens*: A Native Shrub for Conservation Use in Montana and Wyoming

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Figure 1. Fourwing saltbush.

General Description

Fourwing saltbush is a native, long-lived, warm-season shrub with an extensive root system and a deep taproot that may extend to 30 feet. It has an assortment of growth forms and ranges in height from 1 to 6 feet tall, depending on site condition and ecotype. Plants are normally dioecious (female and male flowers on separate plants) with some individuals monoecious (both floral structures on the same plant). Plants may also have male and female parts in the same flower (hermaphroditic). These three gender systems are referred to as trioecy. Furthermore, fourwing saltbush plants may change sex back and forth (sexual lability) from one season to the next. Some plants switch from being primarily female to male in response to unusually cold winters, drought, severe browsing, and prior heavy seed set.

Vegetative characteristics, such as branching, leaves, and fruit (utricle), are specific to the plant's sex. In general, the woody stalks are brittle with much branching and the narrow leaves are grayish-green, alternate, and covered in fine whitish hairs. These "salt" hairs serve as salt sinks, increasing tolerance to saline soils. Male flowers are reddish-yellow and clustered in dense spikes at the end of the branch. Female flowers are small, whitish, and may lie in the leaf axis or in a whirl formation around the stem. The seed-bearing structure is called a utricle. It is bur-like in shape and is ½-inch in diameter with four, distinct, papery wings – thus the common name, fourwing saltbush.

Fourwing saltbush initiates growth in early spring, becoming dormant in winter even though the leaves are usually retained. It is highly valued as a productive, nutritious, all-season browse plant for livestock and provides excellent food and cover for wildlife. Fourwing saltbush is considered to be an important revegetation species in controlling erosion on disturbed sites in desert and foothill environments of the western United States.

Adaptation or Range

Fourwing saltbush has an extensive geographic range, from Alberta to North Dakota and south to California, Texas, and Mexico. In Montana, it is mostly found east of the Continental Divide, but is also present in at least two counties on the west side of the state. In Wyoming, fourwing saltbush is present on 23 ecological sites and a co-dominant shrub on three of those sites in Major Land Resource Areas (MLRAs) 32, 34A, 58B, and 67AA. Fourwing saltbush is adapted to a variety of soil types and is commonly found on well-drained sandy loam, loam, and clay loam soils in areas receiving 6 to 15 inches of annual precipitation at elevations up to 8,500 feet. It seems to prefer calcareous (limy) soils. It is moderately tolerant to soil salinity (electrical conductivity 8 to 15 millimhos per centimeter (mmhos/cm) and weakly to strongly tolerant of alkalinity (pH 7.4 to 9.0). Fourwing saltbush is tolerant of drought and extreme cold temperatures. It does not tolerate continuous inundation for more than 48 hours or the presence of a water table.

Fourwing saltbush grows in association with other halophytic shrubs such as shadscale saltbush *Atriplex confertifolia*, Gardner's saltbush *Atriplex gardneri*, and greasewood *Sarcobatus vermiculatus*. It naturally hybridizes with Gardner's saltbush *Atriplex gardneri* in a cross recognized as moundscale *Atriplex X aptera*.

Conservation Uses

Fourwing saltbush was one of the first native shrubs used for mine reclamation and range revegetation in arid and semi-arid environments. It is ideally used in seed mixtures for conservation and wildlife plantings. In a native seed mixture, fourwing saltbush should constitute no more than one to two percent of the composition in the mix.

The palatable foliage is rated as good browse for sheep, goats, pronghorn antelope, deer and elk; fair browse for cattle; fair to good browse for horses in winter and poor browse for horses in other seasons. It is a primary food source in winter when carotene content is high, digestible protein averages about four percent, and leaves are as high as 18 percent in total protein.



Figure 2. Fourwing saltbush in late summer.

The upright growth form and evergreen habit provides very good food and cover for a wide variety of birds such as sage-grouse, sharp-tailed grouse, Hungarian partridge, ring-necked pheasant, and many species of granivorous songbirds. The leaves and seed are eaten by mice, ground squirrels, and prairie dogs. It is preferential cover for larger mammals such as coyote, porcupine, cottontails, hares, and jack rabbits.

Fourwing saltbush typically begins flowering in late June for a period of three to four weeks and sheds a high number of pollen grains until mid-July. Nectar and pollen are readily available food sources for pollinating insects.

Fourwing saltbush may be a candidate for use in greenstrip plantings to act as a natural firebreak. The mature plants are semi-evergreen and do not easily ignite. They resist burning and are characterized as moderately to highly fire resistant relative to other shrub species. Fourwing saltbush typically recovers after lower-severity fires and may sprout after top-kill in higher-severity fires. It establishes readily from seed and is recommended for use as an early successional species in recovery of burned areas.

Ease of Establishment

Fourwing saltbush can be established by direct seeding or by transplants. It reproduces by seed and vegetatively by root sprouting. Intact, winged utricles number about 38,000 per pound, whereas clean, de-winged seed numbers approximately 78,000 per pound. The naturally occurring hybrid species has 24,500 winged or 49,000 de-winged seeds per pound. Utricle seed fill is variable and germination is good – de-winged seed tends to germinate faster than winged seed.

Planting Rates [All recommended amounts are based on pure live seed (PLS) for *Atriplex canescens*.]

As a guideline, at a seeding rate of 1 pound per acre, there are approximately 0.9 (winged) or 1.8 (de-winged) seeds per square foot. A full seeding rate is based on 25 seeds per row-foot. For example, a full seeding rate in 24-inch wide rows is 14.3 or 7.0 pounds per acre, winged or de-winged, respectively.

Stand Establishment

For best results, plant de-winged seeds into a firm, weed-free seedbed. When drill-seeded in a pure stand in 6- or 12-inch row spacing, the rate is 3.5 pounds per acre – a broadcast seeding rate is double the drill rate. If planted in a mixture, adjust the seeding rate to the desired percentage in the mix, in general, ½ to 1 pound per acre. A seeding depth of ½- to ¾-inch is recommended. It can be planted in late fall, winter, or early spring. The seedlings are vigorous and survive well, but resistance to insects and disease (damping off) is poor, and tolerance to shading is only fair.



Figure 3. Fourwing saltbush growing in a direct-seeded field trial near Pinedale, Wyoming.

Fully dormant, bare-root or container-grown stock, should be transplanted in the spring after the last killing frost, when soil moisture and chance of rainfall is high and temperatures are low. Expect a higher percentage of establishment when proper planting techniques are employed, such as: keeping containerized material cool and roots moist at all times; planting when climatic conditions are favorable (calm, cool, overcast, humid); planting when soils are moist and will not dry out excessively fast; placing rooted seedlings properly in the hole at the correct depth; and firmly tamping the soil and removing competing vegetation from around the transplants.

Fourwing saltbush seedlings grow rapidly during the first three months and moderately fast within four to six months. Predation by rabbits and rodents can be extremely detrimental to the survival of young plants. Plants become seed-bearing as early as 18 months and reach maturity within three to five years. Fourwing saltbush is tolerant to cattle browsing, but continual use increases plant mortality. Long-term productivity is highest when plants are periodically rested. Domestic livestock may experience bloat and scours if forced to consume large quantities of fourwing saltbush. Studies have shown cattle prefer browsing the more palatable female plants and male plants were more common on grazed sites, resulting in low rates of sexual reproduction and an overall decline in the population of fourwing saltbush.

Fourwing saltbush has been tested in several field planting trials in Montana and Wyoming since the early 1970s. In Montana, it performed moderately well on ecological sites in MLRAs 43B, 46, and 58A. Establishment was poor on a saline upland site near Baker. In Wyoming, performance was fair on ecological sites in MLRAs 34A and 58B, poor in MLRA 62, and very poor on bentonite mine spoils in MLRA 32.

Seed of fourwing saltbush is relatively easy to produce. Seed production fields can be established from transplanted stock or from direct seeding. A wide spacing between plants (32 to 50 square-feet) is required in an orchard design containing approximately one male to five females, with rows oriented to promote wind pollination for optimum seed production. Planting into weed barrier is recommended to maximize seed yield, minimize weed competition, and conserve soil moisture. Fourwing saltbush is very drought tolerant and requires only 10 to 14 inches of annual precipitation for seed production. Supplemental irrigation is advisable at the time of establishment and during drought years. Fourwing saltbush is a cross pollinator.



Figure 4. Fourwing saltbush seed stalk.

Mature plants are tall and not suited to mechanical seed harvest. Hand stripping or vacuuming maximizes seed yield. Seed fields of 'Wytana' fourwing saltbush, because of its low growth form, can be either swathed or direct-combined generally after October 1. Harvest when leaves and stems have lower moisture content, seeds are in a firm to hard dough stage, dry, and a dull yellow in color. Seed combined out of cured windrows does not require additional drying prior to storage, whereas direct combined seed requires drying prior to storage. Direct cutting at a time when the utricles are very dry may result in a greater yield with better seed fill. Seed production ranges from 200 to 600 pounds per acre at 95% purity. Seeds continue to ripen for up to six months following harvest.

Limitations

Plant taxonomists have identified several regional ecotypes of fourwing saltbush so it is important to consider using an adapted source. There are numerous ploidy levels with a base chromosome number of $x = 9$. The fourwing saltbush common in the Intermountain Region is tetraploid.

Fourwing saltbush is not classified as a weed, but may persist due to self-seeding. It is a facultative selenium absorber making it mildly poisonous to browsing animals in selenium-rich soils. The leaves and stems contain saponin, which is somewhat poisonous when consumed in large quantities. Plants in the wild and in seed production orchards may suffer from infestations of grasshoppers, mealybugs (selected genera in the family Pseudococcidae), aphids (selected families in the superfamily Aphidoidea), *Orthezia* scales, several Chrysomelid beetles, seed chalcids (tiny, wasp-like insects), and the Atriplex case-bearing moth *Coleophora atriplicivora*, resulting in defoliation and seed damage.

Releases

Wytana was released in 1976 from the Bridger Plant Materials Center in cooperation with the Agricultural Experiment Stations in Montana and Wyoming. It was primarily released for mine reclamation and range revegetation. Wytana is a naturally occurring hybrid of true fourwing saltbush and Gardner's (Nuttall's) saltbush, originally collected in Musselshell County, Montana. It is adapted to salt-affected sites in Idaho, Montana, and Wyoming.

'Marana' was released in 1979 from the Lockeford Plant Materials Center in California. It was originally collected near El Cajon, and was primarily released for ease of establishment and drought resistance. It is adapted to the southern areas of California, New Mexico, and Arizona.

'Rincon' was released in 1983 from the Forest Service Shrub Lab in Provo, Utah, in cooperation with the Upper Colorado Environmental Plant Center in Meeker, Colorado. It was originally collected in Rio Arriba County, New Mexico. It is best adapted to the Four Corners Region in the southwestern U.S.

'Santa Rita' was released in 1987 from the Tucson Plant Materials Center in cooperation with the University of Arizona. It is adapted to the southern areas of Arizona, California, and New Mexico.

Additional Information

Fourwing Saltbush Plant Fact Sheet and Plant Guide available at <http://plants.usda.gov>

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