

***ALLENROLFEA OCCIDENTALIS* (S. WATSON)
KUNTZE**

COMMON NAME: IODINEBUSH

**FAMILY: AMARANTHACEAE (FORMERLY
CHENOPODIACEAE)**

GROWTH FORM: SHRUB



A. occidentalis at the Alkali Sink Ecological Reserve (managed by the California Department of Fish and Game).

PLANTING

During January 2003, seeds were hand-sown onto mounded planting beds, and a thin layer of soil was then raked over them. The species was seeded heavily¹ and germination was dense enough that re-seeding in consecutive years was not necessary. The first seed harvest from the plants was made during December 2004. The Tranquillity area has a semi-arid climate with low mean annual precipitation. However, the 2002-03 growing season was a favorable year for shrub establishment at the nursery. Total precipitation received during the 2002-03 hydrologic year (1 August 2002 through 31 July 2003), 17.6 cm, was 80.2% of the 30-year mean², and precipitation received during April and May of 2003 was at least 25% above average (California Irrigation Management Information System, Station #105). If *A. occidentalis* seeds had been sown in a year with precipitation that was far below average, plant establishment would not likely have been as successful. We provided the plants with supplemental water during their first year of growth, via flood irrigation, but did not water them in following years.

PHENOLOGY

In various years, we observed *A. occidentalis* germinating in March, April, and May, but we are not sure which month is the most typical. When growing in the San Joaquin Valley, *A. occidentalis* flowers during August or September. Seed

¹ Two large handfuls of seed (approximately 40% purity) per 0.5-meter length of a planting bed. Viability of the seed lot was unknown.

² The annual and monthly means were calculated using 30 years of precipitation data (1976-2006) from four weather stations (Cooperative Station ID #'s 43083, 45118, 45119, 45120) located in the western San Joaquin Valley.

can typically be harvested from November through mid-December. During winter, the plants go dormant and the fleshy stems and leaves become dry and turn a rust-brown color. Plants typically begin to display new growth during March.

SEED DORMANCY

We have viewed the results of professional germination tests performed on six seed lots³ of *A. occidentalis*. Tetrazolium chloride (TZ) tests indicated that for two of the seed lots, a significant proportion (80% and 44%) of the seeds were in a dormant state. However, the dormancy mechanism is unknown. Both of the seed lots were tested within a year from when they were harvested.

SEED HARVESTING

Fruits are ready for collection when the jointed stems at the ends of the branches have turned brown and have a crumbly texture. To harvest plant material, we would: 1) strip fruits off by hand; 2) shake fruits off branches into a collecting bag; or 3) clip off the ends of branches. Because the seed collection window occurs during the winter monsoonal period, rainfall can potentially disperse a portion of the fruits before they can be harvested. If plant material is wet when collected, it must be allowed to dry before seed processing can begin. We would transport the harvested plant material to a warehouse and spread it out on tarpaulins to air dry. We would set up a few electric fans to facilitate drying and turn the plant material at least once a day.

SEED PROCESSING METHODS

A. occidentalis seeds are very small (less than 1 mm in length) and are each contained within a utricle. During seed cleaning, some utricles will be removed but many typically remain intact. We would begin by rubbing the harvested plant material over a large screen with small mesh size (minimum size 1.5 mm). Stems, branches, and large debris remain on top of the screen while seeds, utricles, and fine chaff pass through the screen and into a bin placed below. This method results in a coarse level of cleaning. To further separate seed from chaff, we would run the screened plant material through an air screen cleaner such as a Clipper Office Tester or Clipper Eclipse (both made by the A.T. Ferrell Company). However, many of the chaff particles will be of a similar size and weight as the seed and it is virtually impossible to completely separate the two portions.

CULTIVATION OVERVIEW

Numerous *A. occidentalis* individuals derived from four wild source populations have been established in the nursery since 2003, and they have reliably produced seed every year. *A. occidentalis* establishment would not likely have been successful without substantial manual weed control efforts (hand pulling) during the plants' first few years of growth.

³ Three of the seed lots were produced at our native plant nursery, one seed lot was collected from a wild population, and for the other two seed lots, two wholesale seed companies shared their seed testing results with us.

A. occidentalis seems to tolerate growing at high density in the nursery, though we have observed that individuals growing in isolation are much larger (3.5 meters in diameter) than individuals that are surrounded by other shrubs (2 meters in diameter). Though many other planted natives would spread throughout the nursery via seed dispersal, we never observed an *A. occidentalis* individual growing at the nursery outside of the area where the species was already established. This observation implies that seed dispersal was limited or that conditions were not suitable for recruitment. We observed seedlings growing near adult plants on a few occasions, but they did not survive to maturity.

A. occidentalis is halophytic and the species would likely tolerate the elevated soil salinity that is characteristic of the retired agricultural lands in the western San Joaquin Valley.

ADDITIONAL INFORMATION ABOUT ALLENROLFEA OCCIDENTALIS:

Internet Resources

Species profile from the Ladybird Johnson Wildflower Center at the University of Texas:
http://www.wildflower.org/plants/result.php?id_plant=ALOC2

Species profile from Northern Arizona University:
<http://jan.ucc.nau.edu/~plants-c/bio414/species%20pages/Allenrolfea%20occidentalis.htm>

Species profile from the Ransom Seed Laboratory:
http://www.ransomseedlab.com/genus/a/allenrolfea_occidentalis.htm

Literature

Blank, R.R., J.A. Young, E. Martens, and D.E. Palmquist. 1994. Influence of temperature and osmotic potential on germination of *Allenrolfea occidentalis* seeds. *Journal of Arid Environments* 26: 339-347.

Gul, B., and D.J. Weber. 1998. Effect of dormancy relieving compounds on seed germination of non-dormant *Allenrolfea occidentalis* under salinity stress. *Annals of Botany* 82: 555-560.

Gul, B., D.J. Weber, and M. A. Khan. 2001. Growth, ionic and osmotic relations of an *Allenrolfea occidentalis* population in an inland salt playa of the Great Basin Desert. *Journal of Arid Environments* 48: 445-460.

James, L.E., and D.W. Kyhos. 1961. The nature of the fleshy shoot of *Allenrolfea* and allied genera. *American Journal of Botany* 48: 101-108.

Weber, D.J., B. Gul, and M.A. Khan. 2002. Halophytic characteristics and potential uses of *Allenrolfea occidentalis*. Pages 333-352 in *Prospects for Saline Agriculture* (R. Ahmad and K.A. Malik, editors). Kluwer Academic Publishers.

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PHOTOS



A. occidentalis growing at the native plant nursery during April 2004. Seeds had been planted during January 2003.



A. occidentalis in flower at the native plant nursery during October 2008.





A. occidentalis fruits are ready for collection when the jointed stems at the ends of the branches have turned brown and have a crumbly texture. We would typically wait until all of the stems have turned brown. Therefore, it would be a little early to collect fruits from the branch shown here.



False chinch bug infestations (*Nysius raphanus*) were a recurring problem at the native plant nursery and on surrounding retired lands. During some years, the insect caused damage to *A. occidentalis* plants.



When *A. occidentalis* seeds are dispersed from the plant, they are each contained within a utricle. Scale shown is millimeters.



A. occidentalis seeds, separated from the utricles. During seed processing, some utricles will be removed but many typically remain intact. Scale shown is millimeters.