

Gutierrezia Lag.

snakeweed

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Growth habit, occurrence, and use. The genus *Gutierrezia* commonly called snakeweed or broomweed includes 16 annual or perennial species of low-growing woody and herbaceous plants native to the arid regions of North and South America. Shinnars (1950, 1951) placed *Gutierrezia* in the genus *Xanthocephalum*, based mainly on morphological characteristics. Since that time, the generic alignment has vacillated between the 2 genera, and publications using either name can be found between 1950 and 1985. Lane (1985) authoritatively resolved the issue when she provided evidence that the name *Gutierrezia* was taxonomically more appropriate. The genus in general and broom snakeweed (*G. sarothrae* (Pursh) Britt. & Rusby) in particular is regarded as undesirable on grazing land in the western United States because it interferes with forage growth and is toxic to livestock (McDaniel and others 1982).

Threadleaf snakeweed (*G. microcephala* (DC.) Gray) is closely allied to broom snakeweed and collectively these 2 species are commonly referred to as perennial snakeweed or simply, snakeweed. Other common names often used to describe these species include turpentine weed, rubberweed, rockweed, stinkweed, yellowtop, matchweed, and perennial broomweed. Snakeweeds are widespread on rangeland in the southwestern United States and are rarely included in seeding mixtures.

Flowering and fruiting. Flowering heads of broom snakeweed are numerous and small (about 3.75 mm high and 1.75 mm wide) and are borne in clusters of 2 or 3 in panicles or short spikes (Lane 1985; Ruffin 1974; Solbrig 1960, 1964). The heads usually contain 2 to 7 ray flowers with yellow corollas and from 0 to 9 disk flowers. Viable achenes are produced mainly by ray flowers and only occasionally by disk flowers. Threadleaf snakeweed usually has 2 or less flowers per capitulum, but only ray flowers produce viable seeds (Lane 1985). Flowering in southwestern deserts usually begins in August and continues until a freeze in early November. In northern latitudes, flowering begins earlier, often in June or July. Under greenhouse conditions, flowering can occur any time of the year. Snakeweed plants may bear a few seeds the first year, but they become more productive in later years. Good crops may occur every year on some sites, but climatic factors, plant age, and insects generally cause wide fluctuations in seed production from year to year.

The achenes from ray florets are brown, roughly cylindrical (about 0.9 to 1.6 mm long and 0.2 to 0.7 mm wide), and weigh about 0.15 mg (figures 1 and 2). The often-infertile disk achenes are smaller than the ray achenes. The achenes are pubescent, with rows of white trichomes appressed to the seedcoat in the direction of the pappus. Upon imbibition, the trichomes radiate outward to draw and retain water next to the pericarp. The trichomes act to anchor the achene and enhance soil

penetration (Mayeux 1983, 1989). The pappus consists of small white or yellowish erose scales (<1 mm length) aligned with the axis of the achene. This highly reduced pappus is unlike many members of the tribe *Astereae*, which usually have a well-developed pappus for wind dispersal (Solbrig 1960). Thus, snakeweed achenes are absent of any specialized structures to facilitate long-range dispersal and most fall directly below the parent on the leeward side (Oshman and others 1987; Wood and others 1997). Dispersal is highest in the autumn (about 60%) and may continue into the following summer or as long as flower bracts remain on the plant. About 91% of the achenes are independently dispersed, with the remainder falling within a portion of the capitula (Wood and others 1997).

Seed collection and cleaning. A mature plant in autumn can be clipped or pulled from the soil, placed in a paper bag, and shaken to remove most achenes from the capitula. Oven-drying a plant for 48 hours at 50 °C facilitates achene removal and reduces the afterripening period (Mayeux 1989). Contents after hand-threshing should be pulsed twice in a seed scarifier to further loosen the achenes. A pneumatic seed cleaner with 2 sieves (about 3 and 5 mm round holes) can be used to separate achenes from other flower parts by setting the air blower at 8.0 mm and turning it on twice for about 10 sec/plant (Wood and others 1997). A medium-sized snakeweed plant produces about 4,000 achenes, but this number can vary greatly by year and plant age (Ragsdale 1969).

Seed storage. Snakeweed achenes can be stored in paper or cloth bags under dry laboratory conditions for 3 or more years (Mayeux 1989). They are reportedly dormant at maturity and require a 4- to 6-month after-ripening period unless they are dried soon after collection (Mayeux and Leotta 1981). Under field storage, achenes contained within nylon packets and placed on the soil surface in fall were mostly inviable by the next summer (Wood and others 1997). Similarly, achenes retained in flower bracts and collected biweekly from October to May were tested as more than 50% viable; however, after May viability declined below 10%.

Germination. The after-ripening requirements of freshly collected snakeweed achenes were reduced by exposing them to a continuous temperature of 50 °C for at least 48 hours before laboratory or greenhouse germination trials (Mayeux and Leotta 1981). Dormancy-breaking treatments such as scarification, stratification, and leaching have been reported not to enhance germination (Kruse 1970). Stirring in dichloromethane for 10 minutes increased germination of newly harvested threadleaf snakeweed seeds and stirring in large volumes of distilled water for 24 hours before incubation on filter paper had the same effect (Mayeux and Leotta 1981). Tests show that optimal germination in greenhouse pots occurs when achenes are sown on the surface or pressed lightly onto the soil and maintained at a 15 to 25 °C alternate temperature regime, a minimum of 8 hours of light, and soil saturated and subsequently maintained at a soil water potential above – 300 kPa for at least 5 days (Kruse 1970; Mayeux 1981; Wood and others 1997).

Field practice. Because snakeweed is toxic to livestock and sometimes to wildlife, competes with more desirable forage, and offers limited soil erosion protection, it is usually not considered a beneficial species for seeding rangelands. It might be considered for use on land under reclamation. Although we found no studies to confirm this, we anticipate that sowing seed extensively on an exposed soil surface in early spring when daytime temperatures are near 20 °C offers the best potential for propagation.

References

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Figure 1C *Gutierrezia sarothrae*, broom snakeweed: flowering head (center), $\times 20$; ray (left) and disk (right) flower with attached achene (reproduced from Ruffin 1974), $\times 20$.

Figure 2C *Gutierrezia sarothrae*, broom snakeweed: exterior view of the achene (left); longitudinal section through an achene (right), $\times 30$.