Fabaceae—Pea family

Senna armata (S. Watson) Irwin & Barneby

senna

Jane E. Rodgers

Ms. Rodgers is a vegetation specialist at the USDI National Park Service's Joshua Tree National Park, Twentynine Palms, California.

Synonyms. *Cassia armata* S. Watson

Other common names. spiny senna, armed senna, bladder senna, partridge pea.

Growth habit, occurrence and use. The genus *Senna* can be found in herb, shrub, or tree form with even-pinnate leaves; although generally unarmed, it may have weak spines. This large genus is found in the American tropics, temperate zones, and occasionally, the desert (Jepson 1993). This discussion will focus on the Mojave and Colorado species of senna—*Senna armata* (S. Wats.) Irwin & Barneby—which has grooved prominent branches with inconspicuous leaves (Benson and Darrow 1954). The inflated tubular hairs that cover the stem slow air movement, providing some protection against the hot drying air (Bainbridge and Virginia 1989). Senna is common on road berms and edges, preferring a well-drained, gravelly soil (CALR 1995). Senna is an attractive shrub that should be given greater attention in landscaping (Perry 1987).

Flowering and fruiting. Flowers are yellow to salmon in color with a pleasant fragrance, occurring solitary or several in the axils of the upper leaves (Kay and others 1977). Blooms appear in May to July. The linear, light tan pods are 2.5 to 4 cm long and may be somewhat constricted between seeds (Kay and others 1977). Seeds have a thick, grayish membrane covering a brown surface, and are irregularly obovoid, 7 to 9 mm long (Kay and others 1977).

Collection, extraction, and storage. Seeds may be hand-picked, usually beginning in June and July when seeds are ripe. They should collected from the bushes, not the ground, to avoid insect infestations. Seed collection must be timed to gather the ripe seeds before they attract small rodents and are eaten by them. Seeds should be dried, then cleaned; freezing may be used to kill pests (Bainbridge and Virginia 1989). Kay (1975) used a belt harvester and fanning mill with a #14 top screen and #18 bottom screen to extract and clean seeds. Yields were 38,800 seeds/kg (17,600 seeds/lb), 94% undamaged.

The seeds are orthodox in storage behavior. In long-term storage trials by Kay (1988), seeds were stored at room temperature, 4 EC, !15 EC, and in warehouse conditions, with germination rates tested annually over a 14-year period. The results indicated that, as is common with many legumes stored under low moisture conditions, the already high percentage of hard seeds can increase in cooler temperatures. Bainbridge and Virginia (1989) observed that storage was best in mesh bags stored in a warehouse. In Kay's experiments, decreases in germination rates in sealed containers may reflect some need for after-ripening.

Pregermination treatments. According to Stark (1966), no seed treatment is required for senna, and planting done under optimal conditions produces germination in 2 to 5 days. At

Joshua Tree National Park (JTNP), seeds have been germinated using a 1-hour soak in water or a 1:1 bleach–water solution, followed by leaching for 12 to 24 hours. This method has produced an average germination rate of 50%.

Germination tests. Germination tests at JTNP include direct sowing to blotter paper, soaking overnight in cold water, and soaking initially in cold water followed by overnight leaching. All 3 methods had moderate success, indicating that no treatment is necessary when seeds are placed directly onto moist toweling; average germination 50% (CALR 1995). Other trials by Kay and others (1988) refer to initial germination of seeds using 4 replications of 100 seeds in damp paper toweling placed in a growth chamber at 15 EC. Test conditions were maintained for 28 days, with germination percentages recorded every 7 days; initial germination rate for senna was 75%. Germination tests, conducted annually to test the effects of storage, were then averaged to a "best germination" of 92%. These annual tests consisted of 4 replications of 50 seeds using the same initial testing methods. The effects of temperature on germination rates were also tested, with the following results (Kay and others 1988):

Temperature (EC)	2	5	10	15	20	25	30	40
Germination (%)	0	0	19	41	46	20	28	0

Nursery practice and seedling care. In direct seeding trials, germination in Nevada seedlots was best at 15 to 20 EC, but seeds collected at lower elevations may need higher temperatures; no germination was observed at 5 or 40 EC (Bainbridge and Virginia 1989). Nursery stock has been outplanted at JTNP using 3.8-liter (1-gal) and 6.8-liter (1.8-gal) containers that were 35 to 37 cm (14 to 15 in) deep. The plants monitored after 10 months (before late winter precipitation) had respective survival rates of 7 and 14% (CALR 1995). Monitoring continues at the site, and figures may be different after the winter and spring rains. Senna seedlings were noted to be susceptible to rot and should be planted into a well-drained soil with conservative watering (CALR 1995).

References

Bainbridge DA, Virginia RA. 1989. Restoration in the Colorado Desert: Species notes. [Unpublished manuscript prepared for the California Department of Transportation].

Benson L, Darrow RA. 1954. The trees and shrubs of the southwestern deserts. Tuscon: University of Arizona Press. 437 p.

CALR [Center for Arid Lands Management]. 1989–1995. Twentynine Palms, CA: National Park Service, Joshua Tree National Park.

Jepson WL. 1993. The Jepson manual: Higher plants of California. Hickman JC, ed. Berkeley: University of California Press. 1400 p.

Kay BL. 1975. Tests of seeds of Mojave Desert shrubs. Prog. Rep. BLM Contract 53500 CT4-2(N). 24 p. [Unpublished manuscript prepared for the California Department of Transportation].

Kay BL, Graves WL, Young JA. 1988. Long-term storage of desert shrub seed. Mojave Revegetation Notes 23. Davis: University of California Department of Agronomy and Range Science.

Kay BL, Ross CM, Graves WL. 1977. Armed senna. Mojave Reveg. Notes 2. Davis:

University of California Department of Agronomy and Range Science.
Perry B. 1987. Trees and shrubs for dry California landscapes. San Dimas, CA: Land Design Publishing. 184 p.
Stark N. 1966. Review of highway planting information appropriate to Nevada. Bull. B-7. Reno: University of Nevada, College of Agriculture, Desert Research Institute. 71 p.