***Dasylirion wheeleri* S. Wats.** Wheeler sotol
AGAVACEAE

Synonyms: None.

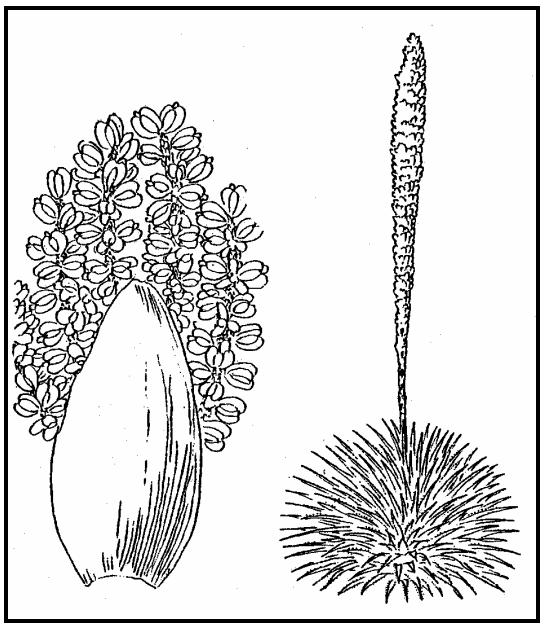

Illustration credit: Robert De Witt Ivey

General Description.—The common names for *Dasylirion wheeleri* are Wheeler sotol, sotol, desert spoon, spoonplant and spoonleaf. The latter names refer to the enlarged, spoon-like bases of the long serrated leaves. *Dasylirion wheeleri* grows from a thick, woody, mostly subterranean caudex with a large rosette of rigid leaves that are armed with sharp curved spines, or teeth, around the margins (Kearney and others 1960). The long flowering stalk arises out of the center of the rosette and is topped by a slender compound panicle. The genus name, *Dasylirion,* means thick, or hairy, white lily from "dasy-" and "lirio" (Gledhill 1992). *Dasylirion wheeleri* is distinguished from *Dasylirion leiophyllum* Engelm. ex Trel. by having the leaf margin spines directed apically rather than basally (Carter 1997). There are two recognized varieties of *Dasylirion wheeleri*, var. *wheeleri* and var. *wislizenii* (Vines 1960).

Range.—Wheeler sotol grows on well-drained rocky and gravelly hillsides or slopes in Western Texas, southern to central New Mexico, southern Arizona in the U.S.A. and in Chihuahua in northern Mexico (Kearney and others 1960, Powell 1998, Tesky 1993, Vines 1960).

Ecology.—Wheeler sotol occurs in chaparral, southwestern oak (*Quercus*) woodland, desert and semi-desert grasslands communities at 914 to 1,830 m in elevation (Carter 1997). It occurs in seral, climax, and postclimax communities. In the desert plains grasslands it is often sub-dominate in the beargrass-scrub oak postclimax community and the curly mesquite (*Hilaria belangeri*)-blue grama climax community. It has been described as a diagnostic climax member of desert grasslands (Dick-Peddie 1993). In Trans-Pecos, Texas, it is commonly found growing on limestone and granite (Powell 1998, Schmutz and others 1992). Wheeler sotol usually grows on rocky soils in desert grasslands that are often described as too moist for open desert scrub but too dry for oak or juniper woodland (Burgess 1995, Dick-Peddie 1993, Schmutz and others 1992). These are areas where subsurface water is generally not available. Wheeler sotol can store relatively large amounts of water internally that act as a buffer against the rapid onset of drought stress. It is classed as a water storer, or "succulent" plant (Burgess 1995, Thomas 1991). The species can also tolerate several degrees of frost (Vines 1960).

Reproduction.—The flowering stalks elongate to up to 5 m in late spring and bloom from May to August (Bowers 1993). Wheeler sotol is dioecious, the male and female flowers being borne on separate plants. Female flowers frequently flower later than the male plants (Warnock 1974). The female flowers are wind pollinated, and wind also disperses the seed that are contained within a papery, one-celled, three-winged capsule. Wheeler sotol grows readily from seed.

Growth and Management.—Wheeler sotol occurs in desert grasslands that are being increasingly managed with fire (Thomas and Goodson 1992). In these areas, fire is primarily used to stimulate grass production and reverse dense scrub invasion. The apical meristem of sotol is usually protected from fire by a cluster of green leaves, and this species can also resprout from the caudex that is the region at the base of the stem (McPherson 1995, Thomas 1991). However, frequent fires and stable soil moisture regimes tend to exclude wheeler sotol (Burgess 1995). The

response of sotol to fire tends to vary depending upon conditions. Kittams (1973) observed that mature sotol (in this case *Dasylirion leiophyllum*) were usually killed by fire. White (1969) randomly selected 50 individuals after a fire in desert grassland in Arizona and classified them with respect to the level of the damage (severe, moderate, or light) experienced. All of the lightly or moderately damaged plants survived, but only 3 percent of the severely damaged plants survived. Sprouting did not occur except as refoliation from the terminal bud (White 1969). Ahlstrand (1982) investigated the response of *Dasylirion leiophyllum* to fire at sites in New Mexico and western Texas. He reported losses of 50 percent or more on burned sites, but surviving top-killed plants regained much of their pre-burn coverage after three growing seasons. This was similar to the observations after a semidesert grassland fire in southern Arizona where 47 percent of the Wheeler sotol plants burned to death (Thomas and Goodson 1992). Of the 71 Wheeler sotol plants that survived, all had apical regrowth, but despite the fact that sotol may occasionally produce new shoots from below ground, no offsets or seedlings were found 11 months after the fire (Thomas and Goodson 1992). In this study no individuals evaded the fire in refugia.

Benefits.—The head-like trunks and leaf bases of Wheeler sotol are edible and American Indians roasted and ate the young flower stalks (Moerman 1998, Powell 1998). The basal trunks contain starch and are also roasted, fermented and distilled to make alcohol (Powell 1998). Currently an alcoholic beverage, generally known as sotol, is made in parts of Mexico (Bowers 1993). Bighorn sheep and javelinas browse sotols (Epple 1995, Kearney and others 1960, Starr 1999). In times of stress Wheeler sotol has been used as feed for livestock in a variety of ways. The trunks and leaf bases have been used during drought, and the plants have also been machine-cut and shredded for emergency feed (Dayton 1931, Powell 1998). In addition, ranchers have burned off the leaves and split the heads (trunks) for livestock (Vines 1960). The leaves have been used to make mats, baskets, thatch, and paper (Moerman 1998, Powell 1998). The long flowering stalks have been used extensively within its range for corral, porch and house roofs, and other structures (Powell 1998). They have also been used for ceremonial purposes by Native Americans (Moerman 1998). Wheeler sotol plants are commercially used as ornamentals and described as "one of the most striking accent plants available" (Starr 1999). The leaves were once sold for use in floral arrangements, but this practice has been discouraged due to conservation considerations (Epple 1995).

References

Ahlstrand, G.M. 1982. Response of Chihuahuan Desert Mountain Shrub Vegetation to Burning. Journal of Range Management 35 (1): 62-65.

Bowers, J.E. 1993. Shrubs and trees of the southwest deserts. Southwest Parks and Monumens Association, Tucson, AZ. 140 p.

Burgess, T.L. 1995. The dilemma of coexisting growth forms. In: The desert grassland. M.P. McClaran and T.R. Van Devender, eds. The University of Arizona Press, Tucson, AZ. p. 31-67.

Carter, J.L. 1997. Trees and shrubs of New Mexico. Johnson Books, Boulder, CO. 533 p.

Dayton, W. A. 1931. Important western browse plants. Miscellaneous Publication 101. U.S. Department of Agriculture, Washington, DC. 214 p.

Dick-Peddie, W.A. 1993. New Mexico vegetation: past, present, and future. University of New Mexico press, Albuquerque NM. 244 p.

Epple, A.O. 1995. A field guide to the plants of Arizona. Falcon Press Publishing Co., Helena, Montana. 347 p.

Gledhill, D. 1992. The names of plants. 2nd ed. Cambridge University Press, Cambridge, England. 202 p.

Ivey, R.D. 1995. Flowering plants of New Mexico. 3rd ed. Rio Rancho Printing, Albuquerque, NM. 504 p.

Kearney, T.H., R.H. Peebles, J.T. Howell, and E. McClintock. 1960. Arizona flora. 2d ed. University of California Press. Berkeley, CA. 1,085 p.

Kittams, W.H. 1972. Effect of fire on vegetation of the Chihuahuan Desert region. Proc. Tall Timbers Fire Ecology Conference 12: 427-444

McPherson, G.R. 1995. The role of fire in desert grasslands. In: The desert grassland. M.P. McClaran and T.R. Van Devender, eds. The

University of Arizona Press, Tucson, AZ. p. 130-151.

Moerman, D.E. 1998. Native American ethnobotany. Timber Press, Portland, OR. 927 p.

Powell, A. M. 1998. Trees & shrubs of Trans-Pecos and adjacent areas. University of Texas University Press, Austin, TX . 498 p.

Schmutz, E.M., E.L. Smith, P.R. Ogden, M.L. Cox, J.O. Klemmedson, J.J. Norris, and L.C. Fierro. 1992. Desert grassland. In: R.T. Coupland, ed. Natural grasslands: Introduction and Western Hemisphere. Elsevier, New York. p. 337-362.

Starr, G. 1999. *Dasylirion* – The shaggy lilies. Desert Plants 15(1): 29-31.

Tesky, J.L. 1993. *Dasylirion wheeleri*. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Fire Effects Information System. http://www.fs.fed.us/database/feis/. 8 p.

Thomas, P.A. 1991. Response of succulents to fire: A review. International Journal of Wildland Fire 1(1): 11-22.

Thomas, P.A. and P. Goodson. 1992. Conservation of succulents in desert grasslands managed by fire. Biological Conservation. 60(2): 91-100.

Vines, R.A. 1960. Trees, shrubs, and woody vines of the Southwest. Sixth printing 1986. University of Texas Press. Austin, TX. 1,104 p.

Warnock, B.H. 1974. Wildflowers of the Guadalupe Mountains and the Sand Dune Country, Texas. Sul Ross State University, Alpine, TX. 176 p.

White, L.D. 1969. Effects of a wildfire on several desert grassland shrub species. Journal of Range Management 22: 284-285.

Juanita A. R. Ladyman, Botanist, *JnJ Associates,* 6760 S. Kit Carson Cir. E., Centennial, CO 80122