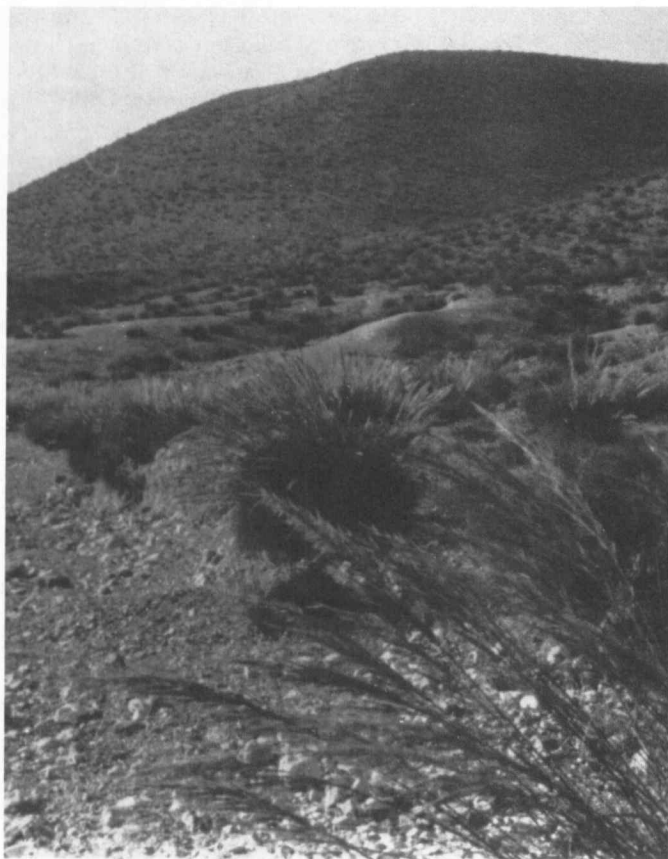


Hollow Crown in Semidesert Needle Grasses

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The following comments and observations are in response to Rose Strickland's article "Hollow Crowns: Overgrazing, Undergrazing, or Old Age?" published in *Rangelands* 5(1), February 1983.

The hollow crown and ringed growth form phenomena prevalent in several bunch grass species of the arid American West are not confined to this region but also occur in other semideserts of the world. In the United States, hollow crown and complete or partial ringed growth forms are particularly well developed in the needle grasses and their close relative, Indian rice grass; however, these phenomena are by no means confined to these species. While hollow crown and ringed growth forms develop under conditions with and without grazing, stress caused by grazing seems to speed up their development.



Esparto grassland of the coastal uplands of Tripolitania. Only the plants along the drainage channel have sufficient vigor to produce flowers.

Hollow crowns and ringed growth forms in grasses are particularly common in semidesert regions with an annual precipitation between five and ten inches and their formation is possibly a genetic adaptation to periodic fires and frequent droughts. During times of drought there is little or no opportunity for seed production and successful seedling establishment. The formation of a ringed or partially ringed growth pattern is the result of a predominance of shoot formation along the outer perimeter of the plant, enabling it to colonize and occupy new ground and abandon the depleted soil in the area of original establishment. This survival strategy can lead to a clonal plant of considerable age. The strategy is used, not only by certain semidesert grasses, but also by several desert shrubs—notably Mohave yucca and creosote bush. For the latter, a ringed growth form estimated to be 11,700 years old was discovered in the Mohave Desert (Vasek 1980).

Three years ago I had the interesting experience of spending 14 months in the region of Tripolitania located in northwestern Libya. Several perennial species of needle grass are native to these semidesert rangelands and dominate extensive areas between the coastal plains and interior Saharan deserts. Esparto grass (*Stipa tenacissima*) is by far the most abundant and was important throughout the western Mediterranean region for the production of quality paper. It is a coarse and robust bunch grass, three to five feet tall, and occupies upland limestone deposits within the five to ten-inch rainfall zone. Esparto grass is not palatable to sheep and goats, the predominant livestock in the region; is no longer cut for use in paper production; and is rarely burned. Plants are extremely flammable throughout the year because the dead leaves and stems produced over many years accumulate throughout the plant and are frequently draped down the sides. Flowering and seed production are mostly confined to vigorous plants along drainage channels (wadis) and in other favorable locations such as depressions and deep soil deposits. The nearly perfect ring and great size of the esparto plant shown in the second photo are unusual as most ringed plants are either much smaller or have formed only partial rings. Incomplete ring development or the death of a ring segment is most common on shallow sites with nonuniform soil conditions.

The two other common needle grasses of Tripolitania are much smaller and resemble the size and appearance of needle-and-thread on the rangelands in the American West. Both grasses are moderately palatable and develop dead centers and ringed growth forms, whether protected from grazing (7-year grazing exclusion) or grazed abusively. Overgrazing appears to speed up ring formation and makes it more evident since no dead material is able to accumulate on the plants.

Rose Strickland reports similar observations for needle



Ringed growth form of esparto grass: the shrub in the center of this large ring is *Hamada scoparia* in the chenopod family. The inside diameter of the ring is 8 feet.

grasses, Indian rice grass, and Idaho fescue. Of the three possible explanations given for the development of the hollow crown phenomenon, her third explanation, "...hollow crowns are a natural phenomenon, a normal developmental stage of bunch grass plant" and "grazing is incidental as the process will occur naturally", agrees entirely with my obser-

ventions on the semidesert needle grasses of Tripolitania.

Literature Cited

- Strickland, Rose.** 1983. Hollow crowns: Overgrazing, or old age? *Rangelands* 5(1):13-14.
Vasek, Frank C. 1980. Creosote bush: Long-lived clones in the Mojave desert. *Amer. J. Bot.* 67:246-255.

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