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A mountain *Cercocarpus* population—revisited

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A MOUNTAIN CERCOCARPUS POPULATION—REVISITED[1]

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ABSTRACT.— A mountain cercocarpus (*Cercocarpus montanus* Raf.) population was analyzed first in 1965 and again in 1975 to gain insight into the growth and reproduction of this species. The basis for comparison was plant height and number of basal stems. Growth (measured by height) was slow during the 10-year period, with plants on the northeast-facing slope having an average increase of 37 cm and those on the southwest-facing slope maintaining relatively the same average height. There was an overall decrease in average number of base stems for plants positioned on both slopes.

Located about six miles south of Chadron, Nebraska, near its eastern distributional boundary, is a rather small population of mountain cercocarpus (*Cercocarpus montanus* Raf.). During the summer of 1965, this entire population was analyzed by measuring the height and counting the number of basal stems on each shrub. This analysis was to provide a basis for future comparative studies. The objective of this study, therefore, was to reanalyze the population 10 years after the initial study to better understand the growth and reproduction of this shrub.

Although mountain cercocarpus provides shelter and browse for big game and is effective in erosion control (Richens 1967, U.S. Department of Agriculture 1974), little research in regard to its ecology had been done prior to 1960. Medin (1960) accomplished a rather detailed study of this species in relation to physical site factors and found that soil depth and moisture were the most significant factors affecting mountain cercocarpus production. Additional information is needed, however, to better understand the population dynamics of this species.

The mountain cercocarpus population in northwestern Nebraska was located on a hill that extended into a valley in a southeast to northwest direction. The vegetation of the valley was mainly mixed-grass prairie. The geographic position of the hill resulted in northeast- and southwest-facing slopes that ranged between 25 and 35 degrees. Mountain cercocarpus plants occupied both slopes.

The northeast-facing slope, which appeared to be more mesic, contained a fairly uniform canopy of ponderosa pine (*Pinus ponderosa* Dougl.) and a shrub layer consisting chiefly of wax currant (*Ribes cereum* Dougl.), prickly rose (*Rosa acicularis* Lindl.), western snowberry (*Symphoricarpus occidentalis* Hook.), poison ivy (*Rhus radicans* L.), common chokecherry (*Prunus virginiana* L.), and skunkbush (*Rhus trilobata* Nutt.). The dry southwest-facing slope exhibited a more open ponderosa pine canopy and a greater exposure of bare ground. The shrub layer consisted mostly of skunkbush and Great Plains yucca (*Yucca glauca* Nutt.). Grasses, sedges, and forbs were variously distributed on both slopes.

METHODS AND PROCEDURES

Soils were analyzed at the Soil Testing Laboratory at Stephen F. Austin State University, Nacogdoches, Texas. Analyses included pH, Ca, P, K, Mg, soluble salts, and particle size. Surface samples were taken from the northeast- and southwest-facing slopes and from the ridge top.

Using the ridge top as the dividing line, mountain cercocarpus plants were divided into two groups, one associated with the

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northeast-facing slope and the other with the southwest-facing slope. Height and number of stems were recorded for each plant. Height measurements were taken from the soil surface to the tip of the tallest stem. Stem counts included those stems originating at the base of the plant.

RESULTS

Soils

Soils of the study site, regardless of slope exposure, were generally similar. Texturally, they ranged from sandy-loam to loam. Nutrient concentrations, with the exception of P, appeared adequate for sustaining plant life (to 2275 ppm of Ca, to 31 ppm of P, to 300 ppm of K, and to 150 ppm of Mg). Soil pH ranged from 6.5 to 7.5, and soluble salt content was generally low.

Height Comparisons

Northeast-facing slope: Interestingly, the number of plants on the northeast-facing slope after 10 years was almost identical (425 plants in 1965 and 426 in 1975), resulting in a general shift in height of already existing plants (Fig. 1). In 1965 the greatest number of plants was in the 51–75 cm size class, whereas in 1975 the paramount size class was 176–200 cm. This is further substantiated by the occurrence of 98 fewer plants with heights between 1 and 150 cm as compared to 99 additional plants with heights between 150 and >300 cm. The average stem height in 1975 was 154 cm, a noticeable increase over the 1965 average of 117 cm.

Southwest-facing slope: Height growth trends were not as discernable on the southwest-facing slope (Fig. 1). There was a shifting of plants from the 51–75 cm size class to the 126–150 cm size class, indicating increased growth. A shift associated with the 201-225 cm size class peak in 1965 is barely observable, although, with the exception of the >300 cm size class, plants were generally taller. The average height of mountain cercocarpus plants in 1965 was 149 cm; in 1975 it was 144 cm.

The number of mountain cercocarpus plants on the southwest-facing slope increased from 360 to 397, an increase resulting from the establishment of a group of seedlings (Fig. 1). There were 36 more plants in the 1–150 cm category in 1975. The number in the 151->300 cm range, on the other hand, remained essentially the same (170 in 1965 and 171 in 1975).

Stem Comparisons

Northeast-facing slope: There was a reduction in the number of stems per plant during the 10-year period on this slope (an average of 10.9 in 1965 and 8.8 in 1975). Size class information indicated that in 1975 there were an additional 28 plants with 20 stems or less, and 27 fewer plants with more than 20 stems (Fig. 2). In 1965, 83 percent of the plants had less than 20 stems; in 1975, 89 percent had less than 20 stems. The reduction in number of stems for all mountain cercocarpus on this slope was from 4648 (1965) to 3755 (1975). Results were accentuated on the northeast-facing

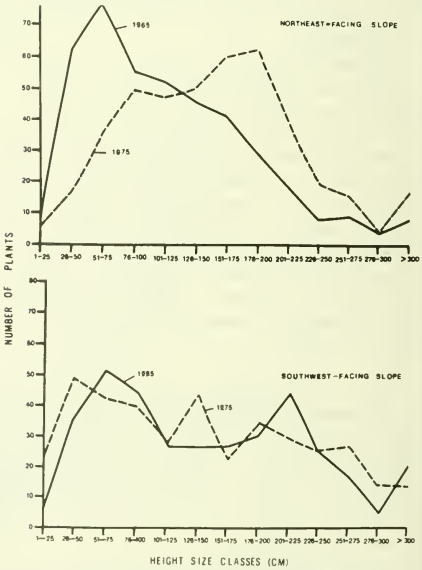

Fig. 1. Height comparisons of a mountain cercocarpus population sampled in 1965 and 1975.

slope because it appears that the same plants were present in 1965 and 1975.

Southwest-facing slope: The 10-year trend on this slope also indicated a general reduction in number of stems (11.5 stems per plant in 1965 as compared to 8.7 in 1975). Plants with 15 stems or more decreased in number by 32 plants. Those with less than 15 stems increased by 69 plants, but it should be remembered that much of this increase is attributed to reproduction. There were at least 37 new seedlings recorded in 1975. The overall reduction in number of stems on this slope was from 4139 to 3471.

Discussion

Reproduction of mountain cercocarpus during the 10-year period from 1965 to 1975 was essentially non-existent on the northeast-facing slope, but had occurred in one particular location on the southwest-facing slope. If dependent on natural reproduction, seedling establishment appears to be very sporadic. This general lack of reproduction appears to be characteristic of this species, and seems to be due in part to seedling susceptibility to drought and frost (Plummer et al. 1968). Consequently, one- or two-year-old nursery-grown transplants with proper management are reported to have better chances of survival, and thus have been used in some instances to maintain or extend populations (Springfield 1972).

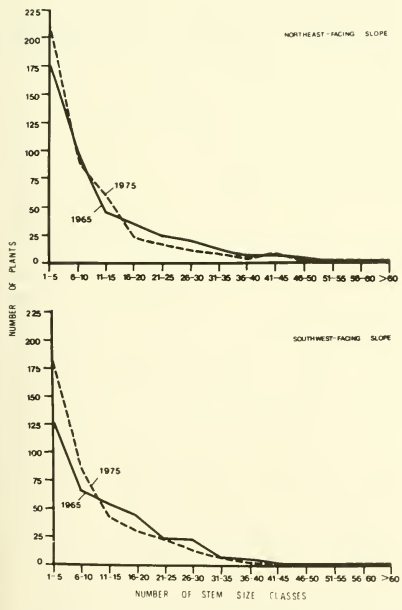

Fig. 2. Stem (number) comparisons of a mountain cercocarpus population sampled in 1965 and 1975.

Population dynamics over 10 years showed a general increase in height accompanied by a decrease in number of stems. Because of this reciprocal effect, it's doubtful that overall production was increased. The population appeared to be only lightly grazed by deer, so the consequence of grazing was minimal. Growth on the northeast-facing slope was more pronounced than that on the southwest-facing slope, due in part to seedling establishment on the southwest-facing slope and the fact that the seedling establishment lowered the average height. Medin (1960) found that soil depth, clay content of the A horizon, soil moisture, and surface stoniness (negatively) were site factors that contributed significantly to mountain cercocarpus production. This correlated very closely with results concerning the Nebraska population. The northeast-facing slope contained deeper soils, had a higher clay content in the A horizon, appeared more mesic, and was less stony than the southwest-facing slope.

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