

Species Survey of a Mexican Unfenced Range

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THROUGHOUT the history of Mexico, many of its better desert ranges have been subjected to continuous and disorganized overgrazing and exploitation by bands of horses, donkeys and cattle. Often, transitory grazing by milk goats has been very frequent, especially in close proximity to cities. Milk goats

are highly valued by cattlemen with few resources as only a small capital outlay is entailed, and they may be penned at night in temporary corrals after herding during the day.

Opportunity was provided for a study of a typical desert range near the Agricultural College "Antonio

Narro", located 15 kilometers from the City of Saltillo, Coahuila, at an altitude of approximately 5,000 ft. Studies were conducted within a narrow valley which extends southwest from the outskirts of the city and leads onto the upper plateau, widening out into flat desert lands about 30 kilometers from Saltillo. The valley is bordered by steep mountain ranges (Fig. 1).

Little or no fencing had been constructed in the entire area except as needed for the protection of cropland or irrigated orchards. A cursory examination revealed the presence of many valuable grass species, par-

ticularly in small areas where the topography discouraged grazing.

It seemed desirable for the College to evaluate the potentialities of the land for possible organization of a ranching enterprise. A survey was needed to make logical pasture divisions and differential management based on composition, density and condition of the vegetation.

Methods

A survey of percent cover and species composition was made on an area of 1,330 hectares by the line interception method (Canfield, 1942). The area was divided into four blocks, designated A, B, C and D. Three blocks (A, B and C), each comprising approximately 400 hectares, spread fanwise toward the high sierra to the south. The fourth block, D, comprising 116 hectares, occupied the valley bottom.

The three blocks of equal area were each subdivided into four strata or belts of increasing elevation up the slope. Three randomly-located lines were evaluated in each stratum or a total of 12 lines per block. For the smaller area at the bottom of the valley, only three lines were run.

Differences in vegetation and soil between the blocks on the slope and the one in the valley bottom were so great that no analysis was deemed necessary to determine that it should be handled as a separate unit. Observations were also made on vigor of grass vegetation, evi-

dences of erosion and the amount of vegetative residue or litter.

Results

The percentage of grass cover ranged from 3.05 to 57.30 percent on the various lines. It is interesting to note that both extremes occurred in lines at the highest portion of the blocks. Minimum cover was recorded on an old goat bedding ground in which cacti had almost completely obliterated the grasses. The maximum value was obtained on a patch of buffalo grass (*Buchloe dactyloides*) on a goat bedding ground of more recent origin. Average data on percentage of grass cover of the altitudinal belts or strata are given in Table 1.

Analysis of variance of the data

Table 1. Average percentage of grass cover on four altitudinal belts of blocks A, B and C on the mountain slope

Altitudinal Belt	Block		
	A	B	C
I	12.8	11.2	11.8
II	10.3	13.4	13.3
III	19.3	16.1	11.2
IV	12.6	26.5	13.3

summarized in Table 1 showed no significant differences between blocks or between altitudes. Readings taken on Block D, at the bottom of the valley where overgrazing was more pronounced, showed total grass cover of 2.0, 4.9 and 14.1 percent, respectively.

Data on the average percentage composition of grass cover on the mountain slope and in the valley bottom are presented in Table 2. Dominants on the slope include: side-oats grama (*Bouteloua curtipendula*), aristida, curly mesquite (*Hilaria belangeri*), buffalo grass, hairy tridens (*Tridens pilosus*), blue grama (*B. gracilis*), hairy grama (*B. hirsuta*), and slender grama (*B. filiformis*). In the valley bottom, conspicuous species are Bermuda grass (*Cynodon dactylon*), hairy

Table 2. Percentage composition of grass cover on mountain slope and valley bottom areas

Species	Percent
Mountain slope	
Side-oats grama.....	33.1
Aristida.....	11.0
Curly mesquite.....	10.0
Buffalo grass.....	9.4
Hairy tridens.....	8.2
Blue grama.....	8.0
Hairy grama.....	6.0
Slender grama.....	4.0
Agrostis.....	3.0
Wolftail.....	2.0
Setaria.....	0.4
Sprangletop.....	0.4
Little bluestem.....	0.2
Creeping muhly.....	0.2
Vine mesquite grass.....	0.2
Fluff grass.....	0.1
Cane bluestem.....	0.1
Miscellaneous.....	3.7
Total.....	100.0
Valley bottom	
Bermuda grass.....	67.0
Hairy grama.....	11.7
Hairy tridens.....	5.6
Side-oats grama.....	3.6
Fluff grass.....	3.3
Aristida.....	2.7
Stipa.....	2.6
Slim tridens.....	1.8
Slender grama.....	1.7
Total.....	100.0

grama, hairy tridens, side-oats grama, fluff grass (*Tridens pulchellus*), aristida and stipa.

Species were classified as desirable and undesirable grasses for additional analyses of the line interception data. Desirable species included: little bluestem (*Andropogon scoparius*), cane bluestem (*A. barbinodis*), side-oats grama, blue grama, hairy grama, buffalo grass, curly mesquite, sprangletop (*Leptochloa dubia*), and vine mesquite grass (*Panicum obtusum*). Undesirable grasses were: wolftail (*Lycurus phleoides*), hairy tridens, fluffgrass, creeping muhly (*Muhlenbergia repens*) and bentgrass (*Agrostis* spp.).

Analysis of variance on the aver-

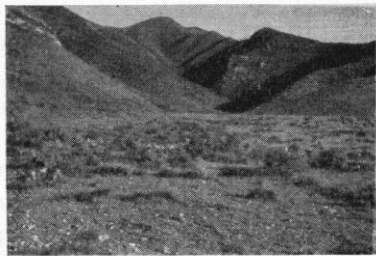


FIGURE 1. Typical portion of the slope range looking toward the southern limiting mountain.

age data for different altitudes in the three blocks on the mountain slope revealed no significant difference in area covered by desirable or undesirable species. The average percentage cover of desirable species was 10.64 and of undesirable species, 4.09 percent. In the valley bottom, desirable species had 6.0 percent cover and undesirables had 2.35 percent cover. Bermuda grass, a desirable species, occurred only in the valley bottom. An undesirable species of the valley, slim tridens (*Tridens mutica*), was not recorded on the slopes. Non-grass species (*Opuntia*, *Agave*, etc.) had an average cover of 9.1 percent.

On the basis of all vegetation intercepted on the slopes, the desirable species comprised 44.24 percent. The corresponding value for the valley bottom area was 58.7 percent.

Discussion

The relatively good condition of the range, as judged from the density of cover is rather surprising, considering the history of the area. A total density of 10 percent desirable as against 4 percent undesirable species would be considered promising to any scheme of range management. It is also amazing to find the great predominance of side-oats grama, a species which in other studies has been found to be a rather poor competitor under conditions of heavy grazing. Canfield (1948), for instance, gives evidence that on foothill ranges at the Santa Rita Experimental Range, side-oats grama decreased from 18 to 6 percent in comparisons of areas protected for 5 years against areas heavily grazed.

It was estimated that at the time of the survey, 140 animal units—goats, sheep, horses and cows—were being grazed in the area. In this connection, the severe drought for three years previous to the study should be noted.

Among the factors generally cited as indicative of range condition (Parker, 1954), the most revealing in our study was the absence of vigor of individual plants as compared with that of specimens in inaccessible areas (Fig. 2) and the general absence of litter and the evidences of erosion.

On the slopes, erosion had proceeded to the formation of an erosional pavement of loose rock, gravel and bare rock. At the bottom pasture active gully erosion was very dramatic (Fig. 3). In fact, considering the depth of soil and fertility that must have been present at one time, we believe that none of the original dominant perennial grasses remains today. Bermuda grass which formed the major portion of the surveyed vegetation, happened to be at the bottom of an active gully where water collected easily and deposited silt. Such a range in its original condition of deep soils is to be found in other parts of Coahuila with 100 percent grass cover consisting of blue grama, alkali sacaton (*Sporobolus airoides*) and black grama (*Bouteloua eriopoda*). The latter, though not intercepted, was found in the area. It is estimated that recovery of this bottom area would be exceedingly slow without reseeding, though ordinary rest and very moderate grazing would suffice on the slopes.

Comparing our observations with those of Humphrey (1950) for desert grassland in Arizona, we would estimate that the slopes were producing around 25% of its potential and that the area at the bottom of the valley was producing less than 20% of its potential.

In view of these findings it was recommended that immediate steps should be taken to fence the whole area, the slopes in one unit and the bottom area in another unit and that stocking be carried so moderately (30 hectares per animal unit) that increases in productivity should be



FIGURE 2. Vigorous stand of side-oats grama in an inaccessible area.

come evident and maintained for several years before permitting heavier grazing. It would also seem highly desirable and educational to fence a representative area for permanent protection to study the long range effect of complete rest on the possibilities of increasing surface cover, and the economic implications of trying to obtain such a goal. This area would be very valuable for teaching range management at the College. Cross fencing of the slope area was regarded as uneconomical both from the standpoint of the uniformity found in the blocks and from the low productivity expected per hectare.

Reseeding by artificial means does not appear justified in view of the high frequency of desirable species. Protection from grazing in one season of favorable rainfall would effect more reseeding than could be expected with artificial methods. The low productivity evidenced by the lack of vigor of individual plants would be corrected by less severe grazing and a system of



FIGURE 3. Valley bottom range showing active gully erosion.

management designed to leave ungrazed annually a greater part of the plant growth for erosion protection.

In general this survey discloses great potentialities attainable by proper protection of this range, and immense teaching possibilities due to the riches of species in an area so easily accessible to students.

Summary and Conclusions

An area of 1,330 hectares located near the Agricultural College "Antonio Narro" in Saltillo was surveyed by the line interception method for determination of density of cover and cover by species. Ocular estimates of vigor of plants, amount

of erosion and the amount of litter were also made.

The slopes of the valley were found to have a much higher grass cover with 10.64 percent desirable species and 4.09 percent undesirable species while the corresponding data for the bottom of the valley were 6 and 2.35 percent. Deferred grazing and moderate grazing would be expected to boost productivity of the slopes, estimated at 25 % of potential. At the bottom area where less than 20 % productivity was estimated, management would have to contemplate reseeding specially since the species expected to be dominant in such deep soils were practically absent.

Range management studies at the College would be greatly aided by fencing the slope area, moderate grazing and protecting permanently a small area for studies of changes in erosion, density of cover and vigor of plants.

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