MP-331 FEBRUARY 1959

Response of Curly Mesquite to Height and Frequency of Clipping

TEXAS AGRICULTURAL EXPERIMENT STATION
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Summary

Since curly mesquite supplies much of the forage produced on the Edwards Plateau, studies were conducted during 1949-51 at Substation No. 14, Sonora, Texas, relative to rates of utilization, chemical composition, productivity and longevity of this grass.

Three sites were established in a large pasture on Substation No. 14, Sonora, Texas, which is located on the Edwards Plateau. These sites were set up on different soil phases where curly mesquite was the predominant grass. Plots 1 by 2 feet in size were established on each site to determine the effect of clipping frequencies and heights on curly mesquite in relation to forage production, longevity and soil disturbance. The grass plots were clipped at intervals of 2 weeks, 4 weeks, twice yearly and once yearly at heights of ground level, 1 inch, 2 inches and 3 inches for each frequency. Three replicate plots were established for each treatment, making a total of 48 plots on each site.

Clipping at the ground level every 2 weeks weakened curly mesquite to the extent that it almost stopped growth by the end of the second growing season.

Clipping curly mesquite at the ground level every 4 weeks allowed some vegetative production throughout the second growing season, but the grass was so weakened that it would have been destroyed by any adverse condition.

Clipping curly mesquite at ground level twice yearly produced the maximum vegetative yields for all treatments in 1949-50, but the rather heavy reduction in vegetative yields for 1950 indicated that there eventually might be a loss of producing ability over a period of years.

Clipping curly mesquite to a height of 1 inch twice yearly produced the second highest forage yields of any of the clipping treatments. These yields might be expected to be maintained on a sustained basis.

Clipping curly mesquite at a height of 2 inches or above greatly reduced its potential forage-producing ability at all frequencies of clipping.

Clipping curly mesquite at twice-yearly and 4-week frequency intervals produced higher forage yields than other frequencies of clipping.

The percentages of nitrogen and phosphoric acid in the forage were greater in curly mesquite forage clipped at the more frequent intervals.

The maximum amounts of nitrogen and phosphoric acid per plot were obtained at the 4-week clipping interval, with the exception of plots clipped at the ground level. At this height the maximum amount for the 2 years was obtained from clipping twice yearly.

From the standpoint of forage production, chemical composition and sustained yields necessary for sound range management, the most desirable method of utilizing curly mesquite is to clip or graze it to a height of 1 inch, in the shortest possible time, then allow a rest interval of not less than 4 weeks and not more than 4 months during the growing season.

Clipping or grazing curly mesquite at the height of 1 inch twice yearly exceeded all other practices considered in this study. It produced the second highest amount of forage, increased vegetative litter and decreased soil erosion.

Response of Curly Mesquite to Height and Frequency of Clipping

L. B. MERRILL and VERNON A. YOUNG*

SINCE THE INTRODUCTION OF LIVESTOCK on the Edwards Plateau, little or no attention has been given to the degree of utilization which should be applied to desirable range plants to obtain sustained forage yields or to maintain a proper ecological balance. As a result, curly mesquite and other species of the short grasses have increased, while the more productive bunch grasses have decreased. Curly mesquite is the dominant grass over large areas of the Edwards Plateau. It occupies from 50 to 90 percent of the basal ground cover and is a major source of livestock forage on the Edwards Plateau. Since curly mesquite supplies much of the forage produced in this area, there is need for information relative to rates of utilization on chemical composition, productivity and longevity of this grass. Studies to obtain this information were conducted at Substation No. 14, Sonora, Texas, in 1949-51; however, the rainfall was so light and so poorly distributed in 1951 that there was essentially no forage production obtained from any of the treatments.

Growth Characteristics and Distribution

Curly mesquite was first named *Anthephora belangeri* by Steudel in 1854. In 1912 Nash changed the name to *Hilaria belangeri*. According to Hitchcook (1950), the type collected in Southwest Texas is *Berlandier* 1428.

According to Hitchcock (1950), curly mesquite grows in tufts, sending out slender stolons which produce new tufts. The internodes of the stolens are wiry and 5 to 20 centimeters long. The culms are erect, slender, 10 to 30 centimeters tall and villous at the nodes. The blades are flat, 1 to 2 millimeters wide, scabrous, more or less pilose, usually short, crowded at the base, often forming a curly tuft but sometimes long and erect. The spike is usually 2 to 3 centimeters long with four to eight clusters of spikelets.

According to Hoover (1939), curly mesquite reproduces both by seed and slender stolens. It is the tufted, stoloniferous habit which makes the grass excellent in soil building and erosion control. According to the USDA Range Plant Handbook (1937), curly mesquite is sometimes called Southwestern buffalograss because of its similarity of growth to the true buffalograss. Curly mesquite produces two seed crops each year, but depends chiefly on its stolons for reproduction.

Hitchcock (1950) states that curly mesquite inhabits mesas and plains from Texas to Arizona and northern Mexico. It is the dominant short grass of the Texas plains and resists grazing. The USDA Range Plant Handbook (1937) states, "Curly mesquite is highly esteemed for forage wherever it occurs. It is among the first to start spring growth and responds readily to summer rains. It is palatable to all classes of livestock for both summer and winter use. The plant should be protected during its growth period for

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best results." Hoover (1939) states, "Curly mesquite grows generally throughout New Mexico, Texas and Arizona and in scattered stands over wider areas. It is very resistant to drought and very aggressive under heavy grazing."

Experimental Area

LOCATION

Texas Substation No. 14 is located in Southwest Texas in approximately the central portion of a large area designated as the Edwards Plateau. The station is confined mainly to the northwestern part of Edwards county, but the northern part, or roughly 640 acres, is in the southern part of Sutton county. The entire area comprises 3,463 acres. The study area was located approximately in the center of the area.

SOILS

The soils of the Sonora station, according to Oakes and Crozier (1948), "are representative of the central and eastern parts of the Edwards Plateau, or approximately 10 million acres. The soils of the uplands are mainly shallow and stony (lithosols) and unsuitable for cultivation. Narrow areas of alluvial soils occur along the small streams in the area. Tarrant stony clay and Tarrant silty clay are the most extensive soils on the substation and are closely associated."

The three sites of the study area were located on the Tarrant silty clay group. The several phases of this soil group are similar in physical and chemical properties. The surface soils in the Tarrant group, according to Oakes and Crozier (1948), comprise 5 to 8 inches of grayish brown, calcareous silty clay, containing fragments of indurated caliche. The surface soil rests on a bed of soft or indurated caliche. The phases of the Tarrant silty soil group support representative stands of grass of which curly mesquite is the dominant species.

CLIMATE

The average annual rainfall for the area is approximately 22 inches, but it varies widely from year to year. Table 1 shows the wide variation in monthly and yearly precipitations that occurred during the 3-year period (1949-51) of the study. The rainfall was so light and so poorly distributed in 1951 that there was essentially no forage production obtained from any of the treatments.

TABLE 1. MONTHLY RAINFALL IN INCHES, 1949-51

Month	1949	1950	1951
		Inches	
January	2.49	0.55	0.00
February	3.11	0.60	0.20
March	0.31	0.00	1.40
April	4.15	2.20	0.73
May	5.34	2.08	0.46
June	5.47	2.35	1.73
July	1.91	3.35	0.85
August	4.35	1.18	0.27
September	3.52	5.53	0.07
October	3.59	0.03	0.20
November	0.00	0.00	0.04
December	2.48	0.00	0.18
Total	36.72	17.87	6.13

The lowest annual precipitation recorded during the 33 years that records were taken was 6.13 inches in 1951 and the highest was 41.51 inches in 1935. The highest monthly precipitation recorded for the area was 13.8 inches in September 1932.

The temperatures recorded for the Sonora station during the past 33 years vary from a maximum of 107° F. in July 1944 to a minimum of 0° F. in December 1929. The most damaging effect of the high temperatures on the vegetation generally occurs in July and August.

VEGETATION

The native vegetation found on Tarrant silty clay consists mainly of curly mesquite, hairy tridens, red grama, sideoats grama, hairy grama, threeawn and some silver bluestem, little bluestem, Texas wintergrass and fall witchgrass. A recent study showed the following average percentage composition of the grasses on the station: curly mesquite, 77 percent; hairy tridens and red grama, 13 percent; threeawn, 6 percent; and the more desirable bunch grasses, such as sideoats grama, hairy grama, silver bluestem, little bluestem and Texas wintergrass, 4 percent.

Methods of Study

PLOT ARRANGEMENT

Three sites were selected on representative soils on which curly mesquite occurred in practically pure stands. Each site was fenced to exclude livestock. Forty-eight plots were established on each site. These plots were laid off in three series of blocks with 16 treatments to a series. The treatment applied to any given plot was randomly selected. The manner in which the plots were laid out on the three sites is illustrated in Figure 1.

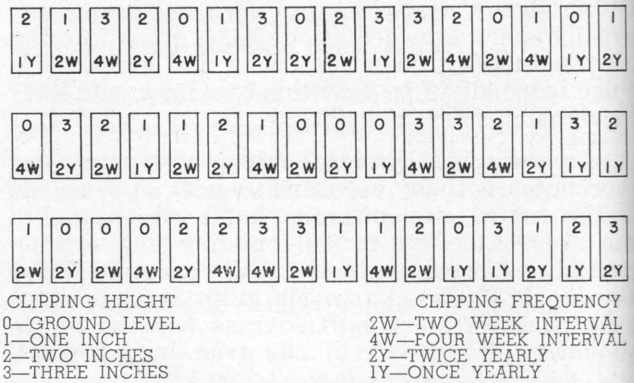

Figure 1. Diagram of a typical plot arrangement within sites illustrating randomization of height and frequency of clipping of curly mesquite grass. All plots are 1 foot wide and 2 feet long. The interval between plots is 6 inches.

CLIPPING PROCEDURE

Several clipping treatments were made to determine the reaction of curly mesquite to various heights and frequencies of grazing. Clippings were made at four heights: ground level, 1 inch, 2 inches and 3 inches above the ground. For each height, clippings were made at four frequency intervals: 2 weeks, 4 weeks, twice yearly and once yearly. The twice-yearly clippings were made when the curly mesquite plants were in full head, while the once-yearly clippings were made in December when all plants were dormant.

All vegetation on a given plot was clipped at a designated height and fequency; however, only the curly mesquite foliage from each plot was collected in paper bags. These clippings were air dried for 3 weeks and weighed separately to the nearest one-half gram. After the weights of the individual clippings were determined for the various clippings treatments, the total annual forage production was composited for each of the 16 treatments on each of the three sites, making a total of 48 composited forage samples. Each of these composite samples was sent to the Texas Agricultural Experiment Station chemistry laboratory, where the percentages of nitrogen, phosphorus, calcium and crude fiber were determined.

Effects of Heights and Frequencies of Clipping

The forage yields obtained from curly mesquite in this study were found to correlate closely with both height and frequency of clipping or grazing.

HEIGHTS OF CLIPPING, 1949-50

Table 2 shows that for 1949, the forage yields of curly mesquite in pounds per acre for the various heights of clipping were 3,080 at ground level; 2,713 at 1 inch; 1,864 at 2 inches and 854 at 3 inches when all frequencies of clipping were averaged. The highest yields for 1949 were obtained by clipping at ground level and the lowest yields were obtained by clipping 3 inches above the ground.

All forage yields were lower in 1950 as a result of less rainfall, Table 2. The plots clipped at the ground level declined sharply in forage production as compared with those of the other three clipping heights. Average forage yields for various clipping heights in pounds per acre for 1950 were 1,322 at ground level; 1,711 at 1 inch; 1,356 at 2 inches and 939 at 3 inches. The sharp reduction in forage yields from clipping at the ground level reveals damage to the plants under such treatments. The plots clipped at the 3-inch level did not decline in forage production the second year, notwithstanding the lower rainfall conditions; however, the forage yields for the 3-inch level of clipping were lower than those obtained from the other three heights.

FREQUENCIES OF CLIPPING, 1949-50

Table 2 shows that in 1949 the average yields in pounds per acre were 1,669 at 2 weeks, 2,174 at 4 weeks, 2,596 at twice-yearly and 2,339 at once-yearly clipping intervals. The highest yields were thus obtained from clipping twice yearly and the lowest yields from clipping every 2 weeks.

All forage yields were lower in 1950 than in 1949 but the 1950 yields were similar to 1949 in relative amounts obtained from different frequencies of clipping. The twice-yearly frequency gave highest yields and the two-week intervals the lowest. The 1950 forage yields for the different clipping frequencies, when all heights were averaged, were 992, 1,198, 1,845 and 1,293 pounds per acre, respectively, for the 2-week, 4-week, twice-yearly and once-yearly frequencies.

HEIGHTS AND FREQUENCIES OF CLIPPING, 1949

Figure 2 shows the average forage yields of curly mesquite in pounds per acre for different heights and frequencies of clipping. Forage yields from plots on three sites are averaged.

There is a considerable variation from these average values on the three different sites. However, the values in Figure 2 are fairly representative of all sites. The forage production from the various clipping heights was highest at the ground level, second highest at 1 inch, third highest at 2 inches and lowest at 3 inches. The forage production from the various clipping frequencies on these sites was highest at the twice-yearly interval, second highest at the once-yearly interval, third highest at the 4-week interval and lowest at the 2-week interval.

When curly mesquite was clipped at the ground level and at 1-inch heights, average forage production increased greatly as the frequency of clipping decreased from a 2-week to a twice-yearly clipping interval. Yearly clipping at these heights gave noticeably less production than the twice-yearly clipping. At the 2-inch and 3-inch clipping heights, little variation occurred in forage yields due to different frequencies of clipping. There was, however, a slightly higher forage yield for the 4-week clipping interval than for any other frequency for these two clipping

TABLE 2. CLIPPING HEIGHTS FROM CURLY MESQUITE, 1949-50[1]

Year	Height of clipping				Frequency of clipping			
	Ground level	One inch	Two inches	Three inches	Two weeks	Four weeks	Twice yearly	Once yearly
	Pounds per acre							
	All frequencies combined				All heights combined			
1949	3080	2713	1864	854	1669	2174	2596	2339
1950	1322	1711	1356	939	992	1198	1845	1293

[1]Each weight represents an average of 36 plots. The weights for heights of clipping include four frequencies of clipping with nine plots for each frequency, while the weights for frequency of clipping include four heights with nine plots for each height.

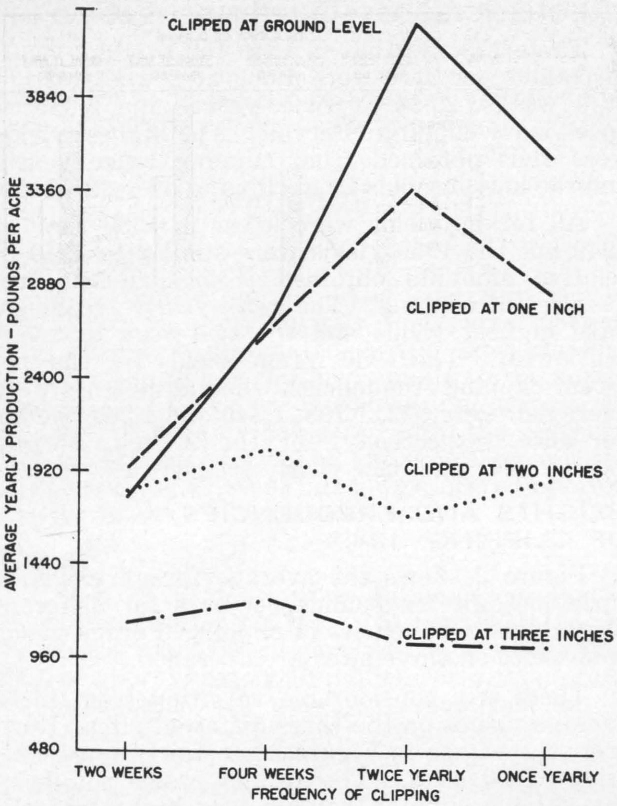

Figure 2. Forage production of curly mesquite clipped at four heights and four frequencies on three sites (1949). Each point on the graph represents the average weight of forage for nine plots.

heights. Forage yields decreased slightly when the plots were clipped twice yearly and once yearly at the 3-inch clipping height.

Figure 3. Forage production of curly mesquite clipped at four heights and four frequencies on three sites (1950). Each point on the graph represents the average weight of forage for nine plots.

Canfield (1939) reported that clipping at 2 inches or less injured black grama at all frequencies, while tobosagrass was injured only when clipped at 1 or 2-week intervals. Tobosagrass was stimulated by frequent clipping at a height of 4 inches. Lang and Barnes (1942) found during a 2-year period that clipping at ground levels at 3-week intervals produced more forage than harvesting at the end of the growing season only.

HEIGHTS AND FREQUENCIES OF CLIPPING, 1950

The average forage yields of curly mesquite in pounds per acre for the various heights and frequencies of clipping, with the forage yields from plots of all three sites averaged together, are shown in Figure 3. When all frequencies were averaged, the forage production from the various clipping sites was highest at 1 inch, second highest at 2 inches, third highest at the ground level and lowest at three inches. The forage production from the various clipping frequencies on these sites was highest at the twice-yearly interval, second highest at the once-yearly interval, third highest at the 4-week interval and lowest at the 2-week interval.

When curly mesquite was clipped at the ground level and at 1-inch heights, the average forage production from these treatments on plots on all sites showed a marked increase as the frequency of clipping was decreased from a 2-week period to a twice-yearly period. There was then a sharp decline in the forage production of curly mesquite when the clipping frequency was decreased from a twice-yearly period to a once-yearly period.

The lowest and second lowest forage production for all sites for 1950 was obtained by clipping at the ground level at 2-week and 4-week intervals, when forage production was 86 and 519 pounds per acre, respectively. The greatest forage production in 1950 was 2,555 pounds per acre, which was obtained by clipping curly mesquite at the ground level at twice-yearly intervals. The second greatest forage production of 2,271 pounds per acre was obtained by clipping at 1-inch at twice-yearly intervals. Only small differences were obtained in forage production between frequencies of clipping when heights of clipping were at 2 and 3 inches. Clipping at the 2-inch height produced the highest yield at the twice-yearly interval and the lowest at the once-yearly interval. At the 3-inch clipping height, a slight but constant decline in forage production was obtained when the clipping frequency was decreased from a 2-week interval to a once-yearly interval.

HEIGHTS AND FREQUENCIES OF CLIPPING, 1949-50

Figure 4 shows graphically the average forage yields of curly mesquite in pounds per acre for the various heights and frequencies of clipping. The forage yields from plots of all three sites were averaged together for 1949-50.

When curly mesquite was clipped at the ground level, clipping at the 2-week interval resulted in the greatest reduction in forage yield from 1949 to 1950. Clipping at the 4-week interval produced the second lowest forage yields and also showed the second greatest reduction in forage yields from 1949 to 1950.

Weaver and Hansen (1941) found that during the first year frequent clippings of prairie dropseed and Junegrass yielded more forage than the once-yearly clipping but during the second year frequent clippings greatly decreased the plant vigor and forage production. Newell and Kiem (1947) found clipping short grasses three to five times yearly increased forage yields over a 3-year period, while clipping once yearly resulted in a loss of stand.

At the ground level, clipping at the twice-yearly interval in 1949 produced the greatest forage yield of any of the clipping frequencies. Clipping at the once-yearly interval in 1949 produced the second highest forage yield. The overall reduction in yield from 1949 to 1950 may be partially accounted for by the decreased rainfall of the second year.

The lowest forage yields for the 1-inch clipping height were obtained from the 2-week interval in 1949-50. The second lowest forage yields for the 1-inch clipping height were obtained at the 4-week interval in 1949 but at the once-yearly interval in 1950. The highest forage yields were obtained at the twice-yearly frequency interval in 1949-50, while the next highest yields were obtained at the once-yearly interval in 1949 and at the 4-week interval in 1950. At the 1-inch clipping height, there was no marked reduction in the forage yields between 1949 and 1950 for any of the clipping frequencies. There was, however, a consistent reduction in yield for 1950, but this probably was caused by the lower rainfall in 1950, Table 1.

At the 2-inch clipping height, there was little variation in forage production due to frequencies of clipping for 1949-50. In 1949 at this height, the largest forage yield was obtained at the 4-week clipping interval, while the lowest yield was obtained at the twice-yearly clipping interval. The largest forage yield in 1950 was obtained at the twice-yearly clipping interval, and the lowest yield was obtained at the once-yearly clipping interval. There was much less variation between yields for the 2 years at the 2-inch clipping height than at either the 1 inch or the ground level heights.

When curly mesquite was clipped at 3 inches, there was slight difference in forage yield due to frequency of clipping. The 3-inch height of clipping produced less variation in forage yields between 1949 and 1950 than any of the other three clipping heights.

Effects of Clipping on Chemical Composition

Table 3 shows that the nitrogen and phosphoric acid contents of curly mesquite forage were greatly affected by both height and frequency of clipping.

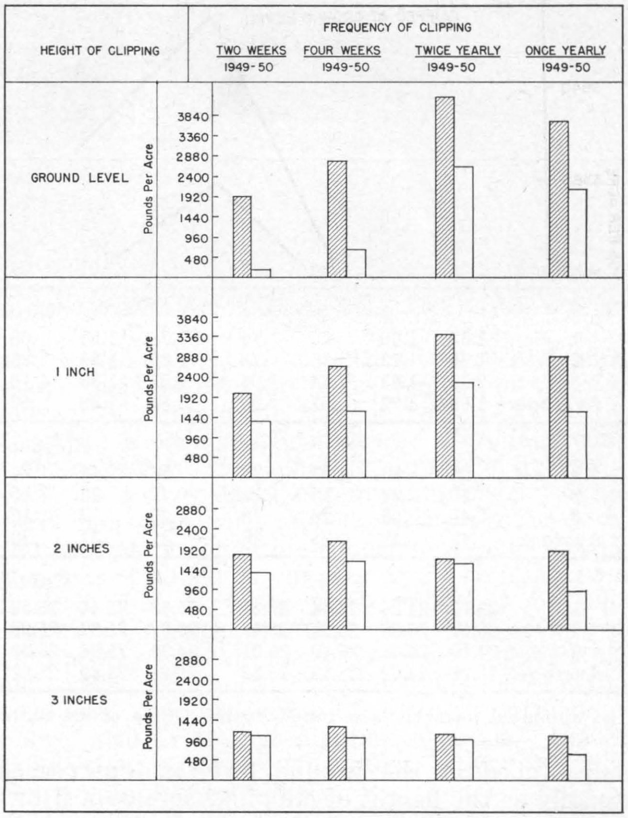

Figure 4. Average yearly forage production of curly mesquite clipped at various heights and frequencies during 1949-50. Each bar on the graph represents the average forage yield for nine plots.

NITROGEN CONTENT

The nitrogen content of the forage as affected by treatment varied somewhat between clipping sites, but since there were no great variations, the values for all sites have been averaged in Table 4. The nitrogen content of curly mesquite forage was found to be highest at the 2-week clipping interval and lowest at the once-yearly interval. The nitrogen content of the forage decreased in direct proportion as the clipping frequency decreased from a 2-week to a once-yearly interval. This was primarily because the more frequent clippings were from green forage. Similar results were reported by Fraps and Cory (1940) who reported 15.04 percent protein from fresh green forage and 5.15 percent from cured forage. Stanley and Hodgson (1938) also showed that moisture, crude protein and phosphorus were much higher in green than in mature forage.

The effect of the height and frequency of clipping were found to be closely related with respect to the nitrogen content of the forage. At the 2-week clipping interval, the nitrogen content of the forage was highest at the 1-inch and ground-level clipping heights and lowest at the 3-inch height. At the 4-week clipping frequency the nitrogen content was highest when the grass

TABLE 3. CHEMICAL COMPOSITION OF CURLY MESQUITE AS AFFECTED BY VARIOUS HEIGHTS AND FREQUENCIES OF CLIPPING ON THREE SITES, 1949[1]

Site	Clipped at ground				Clipped at 1 inch				Clipped at 2 inches				Clipped at 3 inches			
	Two wks.	Four wks.	Twi. yrly.	Once yrly.	Two wks.	Four wks.	Twi. yrly.	Once yrly.	Two wks.	Four wks.	Twi. yrly.	Once yrly.	Two wks.	Four wks.	Twi. yrly.	Once yrly.
	Calcium, percent															
1	.98	.98	.87	.65	.63	.72	.66	.60	.66	.70	.71	.72	.71	.56	.71	.77
2	1.67	2.08	.80	.92	.72	.78	.73	.66	.64	.72	.70	.66	.56	.67	.81	.59
3	1.90	1.85	1.14	1.03	.90	.94	.74	.71	.73	.79	.78	.64	.76	.85	.80	.49
Average	1.52	1.84	.94	.87	.75	.81	.71	.66	.68	.74	.73	.67	.68	.69	.77	.62
	Nitrogen, percent															
1	1.67	1.60	.90	.74	1.78	1.58	.86	.75	1.53	1.35	.91	.71	1.28	1.41	.84	.67
2	1.91	1.72	.86	.72	1.80	1.59	.85	.72	1.56	1.25	.84	.72	1.32	1.28	.76	.70
3	2.00	1.83	1.14	1.05	2.02	1.88	1.16	.92	1.89	1.63	1.19	.98	1.76	1.57	1.11	1.09
Average	1.86	1.72	.97	.84	1.87	1.68	.96	.80	1.66	1.41	.98	.80	1.45	1.42	.90	.82
	Phosphoric acid, percent															
1	.50	.50	.33	.25	.52	.44	.24	.23	.44	.39	.29	.19	.38	.35	.35	.21
2	.38	.34	.16	.15	.32	.30	.15	.14	.32	.25	.16	.14	.25	.25	.14	.12
3	.41	.35	.20	.19	.39	.37	.19	.17	.32	.26	.20	.18	.33	.29	.19	.18
Average	.43	.40	.23	.20	.41	.37	.19	.18	.36	.30	.22	.17	.32	.30	.20	.17
	Crude fiber, percent															
1	23.70	24.25	25.44	25.31	25.63	25.44	25.58	25.15	27.81	25.33	24.56	24.62	26.78	26.61	25.07	25.46
2	23.57	23.55	25.01	25.47	25.07	25.97	25.20	25.51	26.26	26.46	24.11	25.74	25.25	26.11	27.17	25.82
3	24.10	24.48	26.10	26.01	24.93	25.66	26.07	26.48	25.30	25.59	22.91	26.99	25.29	26.42	26.07	26.11
Average	23.79	24.09	25.52	25.60	25.21	25.69	25.62	25.71	26.46	25.79	23.86	25.45	25.44	26.38	26.10	25.46

[1]The chemical analysis was made by the Office of the State Chemist of the Texas Agricultural Experiment Station.

was clipped at the ground level and decreased steadily as the height of clipping increased. However, the nitrogen content of the forage was almost identical from clipping heights of 2 and 3 inches. At the twice yearly and once-yearly clipping intervals, the nitrogen content of the forage was affected little by the height of clipping.

PHOSPHORIC ACID CONTENT

The phosphoric acid content of the curly mesquite forage, like the nitrogen content, varied rather sharply between different heights and frequencies of clipping. When an average for three clipping sites was taken, the phosphoric acid content was found to be highest at the 2-week clipping interval and lowest at the once-yearly interval. There was a constant decline in the phosphoric acid content of forage obtained as the length of time between clipping increased from a 2-week interval to a once-yearly interval.

The effect of the height of clipping on the prosphoric acid content of the curly mesquite forage was found to be closely related to the frequency of clipping. At both the 2-week and 4-week clipping intervals, the phosphoric acid content of the forage was highest at the ground level of clipping and lowest at the 3-inch level. There was a steady decrease in the phosphoric acid content of the grass as the height of clipping increased from the ground level to a 3-inch

TABLE 4. TOTAL PRODUCTION OF FORAGE, NITROGEN AND PHOSPHORIC ACID IN POUNDS PER ACRE, 1949-50[1]

	Clipped at ground				Clipped at 1 inch				Clipped at 2 inches				Clipped at 3 inches			
	Two wks.	Four wks.	Twice yrly.	Once yrly.	Two wks.	Four wks.	Twice yrly.	Once yrly.	Two wks.	Four wks.	Twice yrly.	Once yrly.	Two wks.	Four wks.	Twice yrly.	Once yrly.
1949																
Forage Yield	1791	2723	4240	3563	1945	2656	3390	2862	1810	2050	1705	1892	1128	1269	1047	1037
Nitrogen Yield	33	47	41	30	36	45	33	23	30	29	17	15	16	18	9	8
P_2O_5 Yield	7.7	10.9	9.7	7.1	8.0	9.8	6.4	5.1	6.5	6.1	3.7	3.2	3.6	3.8	2.1	1.8
1950																
Forage Yield	86	591	2555	2060	1393	1604	2271	1570	1364	1565	1585	908	1124	1028	970	634
Nitrogen Yield	1	10	25	17	26	27	22	13	23	22	16	7	16	15	9	5
P_2O_5 Yield	0.4	2.4	5.9	4.1	5.7	6.0	4.3	2.8	4.9	4.7	3.5	1.5	3.6	3.1	1.9	1.1

[1]Chemical analyses of the clippings were made for 1949 only. These percentage composition values were applied to forage yields to obtain the amount of nitrogen and P_2O_5 produced per plot for both years. The production of nitrogen and P_2O_5 for 1950 are therefore speculative and are used primarily for comparative purposes.

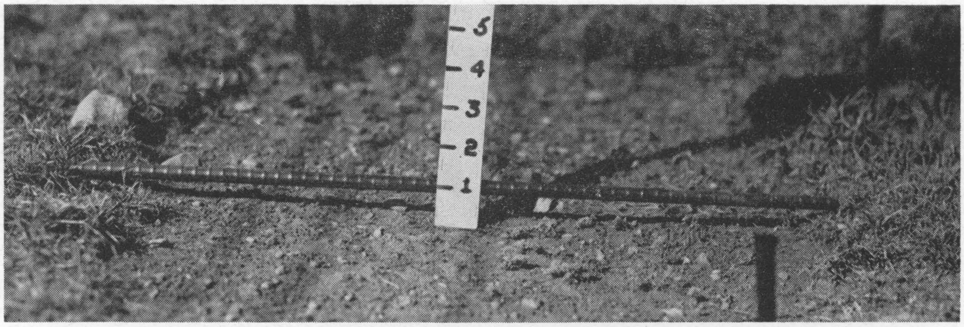

Figure 5. An average curly mesquite plot 1 by 2 feet in size, clipped at the ground level every 2 weeks.

height. There was little difference in phosphoric acid content of curly mesquite forage due to height of clipping at either the twice-yearly or the once-yearly clipping frequency. There was, however, a slight increase in phosphoric acid content when the grass was clipped at the ground level.

CALCIUM CONTENT

The data given in Table 3 show that there is a tendency for the calcium content of curly mesquite forage to increase as the length of time between clipping is increased from a 2-week to a twice-yearly interval. However, from the twice yearly interval to the once-yearly clipping interval there was a marked decrease in the calcium content of the curly mesquite forage. Therefore, the highest calcium contents generally were obtained when the grass was clipped twice yearly. The twice-yearly clippings were made as curly mesquite reached maturity, while the once-yearly clippings were made at a stage beyond maturity. This probably accounts for the decline in the calcium content of the forage.

Table 3 also shows a high calcium content of forage from curly mesquite which was clipped at the ground level. The calcium contents of the clippings were especially high in forage which was clipped at the ground level at 2-week and 4-week intervals. The higher calcium content for these treatments may be attributed to small pebbles of calcium carbonate which littered the ground on all sites. These may have been picked up when clipping curly mesquite so near the ground and thus analyzed with the sample.

CRUDE FIBER

Table 3 shows that there is little variation in the crude fiber content of curly mesquite due to variation in height and frequency of clipping. Clipping at the ground level at both the 2-week and the 4-week intervals resulted in lower crude fiber content in the forage. This would be expected, however, since the frequent clippings maintained the forage in a green stage for the greater part of the time.

RELATION OF CHEMICAL COMPOSITION AND YIELD

Total forage production is not always a reliable criterion of the best system of management, Table 4. When curly mesquite was clipped at 2 and 3-inch heights, both nitrogen and phosphoric acid production decreased when the frequency of clipping decreased from a 2-week interval to a once-yearly interval. Forage production, however, was generally greatest at the 4-week or twice-yearly clipping intervals. When curly mesquite was clipped at the ground level, the largest nitrogen and phosphoric acid production was obtained by clipping at a 4-week interval in 1949, but at twice-yearly intervals in 1950. Maximum forage production at this level was obtained by clipping at twice-yearly intervals and once-yearly intervals. Clippings at 1-inch heights produced the maximum of nitrogen and phosphoric acid at 4-week clipping intervals. Forage production, however, was greatest at the twice-yearly clipping intervals.

Physical Reaction of Soils to Various Heights and Frequencies of Clipping

Soil erosion is often very severe on pastures where curly mesquite is kept short. The various treatments in this study, corresponding to several intensities of grazing, offered an opportunity to study erosion.

Figue 5 shows an average plot which was clipped at the ground level every 2 weeks. The ends of the steel rod extending across the plot were resting on the original ground level. Practically all curly mesquite plants were killed, leaving the

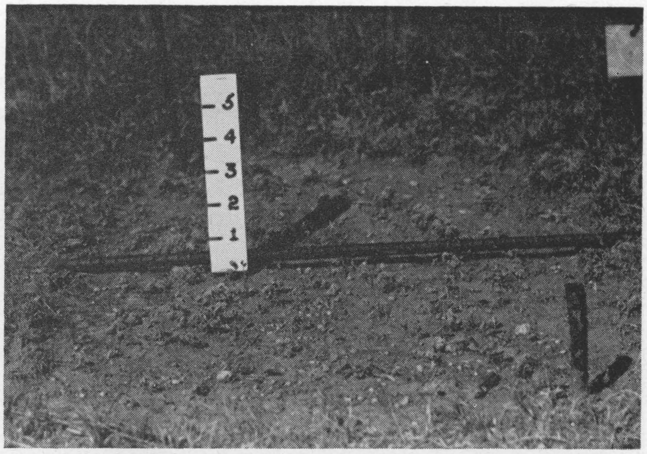

Figure 6. An average curly mesquite plot 1 by 2 feet in size, clipped at the ground level every 4 weeks.

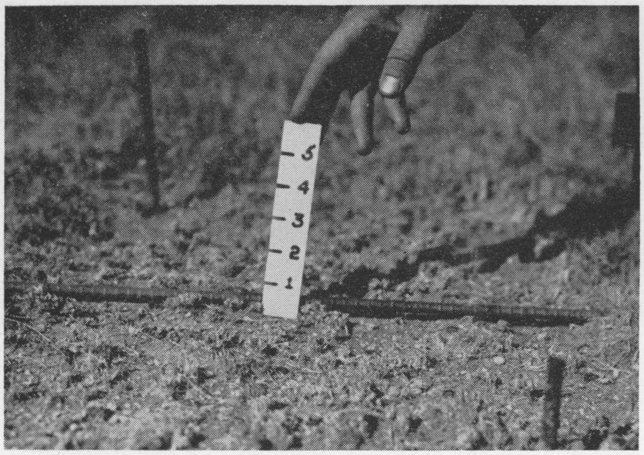

Figure 7. An average curly mesquite plot 1 by 2 feet in size, clipped at the ground level once yearly.

soil almost entirely exposed. The rule in the center of the plot was calibrated in inches and showed that approximately an inch of soil was lost due to wind and water erosion.

Figure 6 shows an average plot which was clipped at the ground level at intervals of 4 weeks. After 2 years the ground was practically bare and the curly mesquite was in a weakened condition. However, less than one-fourth inch of soil had eroded.

Figure 7 shows an average plot which was clipped at the ground level once yearly. The clipping was made in December. The curly mesquite, which had just been clipped when the picture was taken, was dormant but apparently in good condition. Little bare ground or erosion was evident.

Figure 8 shows an average plot which was clipped at a height of 1 inch every 2 weeks. The curly mesquite plants were somewhat pedestaled, which would indicate that some erosion had taken place, however, the steel rod, the ends of which are resting on the original ground level, showed that little soil loss had occured on the plot.

Figures 5 through 8 show the severe clipping treatments. When curly mesquite was clipped at heights above 1 inch, little or no soil erosion occurred regardless of the frequency of clipping. At the height of 1 inch little or no erosion was evident when frequency of clipping was at intervals of 4 weeks or greater. Some soil erosion was evident for all frequencies when curly mesquite was clipped at the ground, however, the erosion was pronounced only for the clipping intervals of 2 weeks and 4 weeks.

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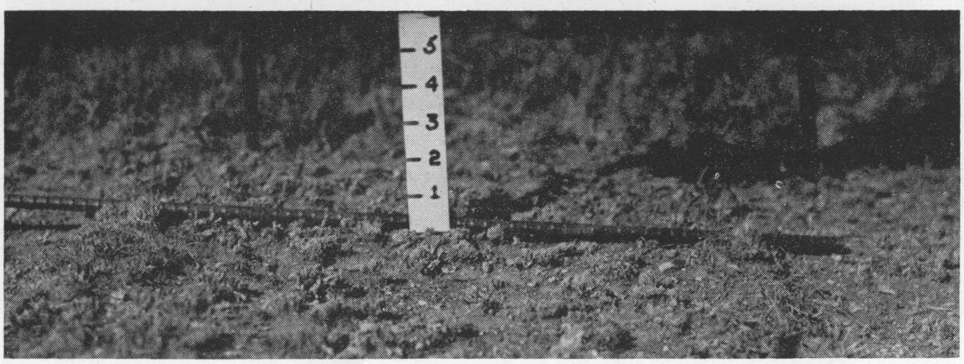

Figure 8. An average curly mesquite plot 1 by 2 feet in size, clipped at a height of 1 inch every 2 weeks.