

EFFECT OF 6 YEARS LIVESTOCK EXCLUSION ON PALATABLE RANGE VEGETATION OF BANDA DAUD SHAH, KOHAT

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ABSTRACT

A one hectare livestock enclosure was established at Banda Daud Shah in 1972, to study changes in vegetation and secondary succession. In May, 1978 vegetation in the exclosed and adjacent grazed areas was sampled to detect changes in vegetation. Average yield and species composition of grasses, forbs and trees/shrubs were not significantly different in the exclosed and adjacent grazed areas. The higher ($P \leq 0.05$) forage production and composition of *Aristida depressa* in the grazed area showed that this species increased under continued grazing. Frequency of grasses, forbs and trees/shrubs was not affected by the exclusion of livestock. The data indicate that direct manipulations in semi-arid environment are essential for rapid improvement of overgrazed rangelands and secondary succession.

INTRODUCTION

Secondary succession usually follows the exclusion of livestock from grazed rangelands and leads to a stable vegetation community in the absence of disturbance. Forage production and species composition in the exclosed and adjacent grazed areas are generally compared to detect changes in vegetation and study secondary succession. Literature shows that a minimum of 25 years are needed to detect vegetation changes on semi-arid rangelands after the exclusion of livestock.

Hull (1976); Sneva *et al.* (1980); and Anderson and Holte (1981) reported that first 10-

13 years of livestock exclusion were inadequate to detect vegetation changes in semi-arid rangelands. Brand and Goetz (1978) estimated that 22 years were sufficient for the completion of secondary succession at West Tracy Mountain enclosure. Brand and Goetz (1986) reported that 40 years of livestock exclusion were in-sufficient to detect the changes at *Artemisia tridentata* site in Southwestern North Dakota. Average yield and species composition were not different in the enclosure when compared with adjacent grazed area. England and Devos (1969) stated that vegetation of exclosures on grazed rangelands may differ from pristine vegetation. Palatable vegetation in the exclosed and grazed area was compared to assess changes in vegetation and study secondary succession.

MATERIALS AND METHODS

In July 1972 a one hectare livestock enclosure was established on western aspect having moderate slope at Banda Daud Shah, Kohat. Soil is shallow and stony. Mean annual precipitation is approximately 300 mm, majority of which occurs from February to September "growing season". Maximum temperature may rise to 45°C in June. Average relative humidity at 0800 hours is 45 percent.

The dominance of *Eleusine flagellifera*, *Cymbopogon schoenanthus* and *Aristida depressa* in the grazed rangelands indicates that these species had evolved with continued overgrazing. Initially, these species will gain vigour and become dominant in the exclosed area.

In May 1978 vegetation in the exclosed and adjacent grazed area was sampled. Both the transect lines and quadrat were randomly located. Four transect lines each 30 meter long, were laid out in each of the exclosed and grazed area. Twenty, 1 m² quadrats (5 on each transect line) in the exclosed and twenty in the grazed area were sampled.

Palatable grasses and forbs were clipped by species to the ground level in each quadrat. The current year's growth within the reach of livestock was clipped for trees/shrubs. Green weight of clipped material was recorded, and put in the paper-sac. The clipped material was airdried until it gained a constant weight. The species composition was estimated from forage production data (Bonham 1989). statistical analysis by species and life form were performed, using the t-test to determine significant differences (Steel and Torrie, 1980).

RESULTS AND DISCUSSIONS

The average yield (gm/m²) and composition of grasses, forbs and trees/shrubs were not significantly different ($P \leq 0.05$) in the exclosed and adjacent grazed areas (Table 1). The higher ($P \leq 0.05$) yield and composition of *Aristida depressa* on the grazed area than on the exclosed area showed that this species reacted as increaser under continued livestock grazing.

Non significant differences in the yield and species composition/life forms between exclosed and grazed area in semi-arid rangelands are consistent with prior research studies (Brand and Goetz 1978 and 1986; Hull 1976; Sneva *et al.* 1980; Anderson *et al.* 1981; add West *et al.* 1984). Our study showed that 6 years of livestock exclusion were inadequate to detect significant changes in vegetation on the semi-arid grazed rangelands and provide insight into secondary

succession.

CONCLUSION

This study showed that livestock exclosures should be maintained for longer time (25 years) to detect changes in vegetation and study secondary succession in semi-arid rangelands of Banda Daud Shah, Kohat. The changes in vegetation may also be evaluated on a site specific basis.

Table 1 Average yield (gm/m²) and species composition of palatable vegetation in the exclosed and grazed area, at Banda Daud Shah, Kohat

Species Life forms	Average yield (gm/m ²)		Estimated species	
	Exclosed area	Grazed area	Exclosed area	Grazed area
Grasses:				
<i>Aristida depressa</i>	2.25	4.13*	3.75	8.24*
<i>Cymbopogon schoenanthus</i>	9.9	3.4	16.51	6.78
<i>Chrysopogon aucheri</i>	6.2	4.9	10.34	9.77
<i>Digitaria nodosa</i>	1.75	1.18	2.92	2.35
<i>Eleusine flagellifera</i>	9.5	10.58	15.85	21.10
<i>Tetrapogon villosus</i>	7.25	5.8	12.09	11.57
<i>Enneapogon persicus</i>	1.8	3.53	3.02	7.04
<i>Tripogon purpurascens</i>	3.8	4.15	6.33	8.28
Total:	42.45	37.64	70.81	75.13
Forbs:	5.35	3.03	8.92	6.04
Trees/shrubs:	12.15	9.45	20.27	18.82

* Significant ($P \leq 0.05$)

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