

COMPARISON OF GRAZED AND UNGRAZED VEGETATION OF SUBALPINE  
ECOLOGICAL ZONE AT SARI

Mohammad Noor\*

**Summary.** *Vegetation changes in an exclosure at Sari (Kaghan) established in August 1976 were compared with areas open to grazing after one year of protection. Forage production increased three fold. The increase was due both forbs and grasses. The percent cover of grasses and forbs also increased. The percent cover of Agrostis gigantea and Potentilla sibbaldia increased significantly inside whereas Poa alpina was more outside the exclosure. The later reacted as increaser in the area open to grazing. Agrostis gigantea and Potentilla sibbaldia reacted as decreasers in the grazed area. The frequency of grasses and fobs was not affected.*

**Study area.** Sari, where the exclosure was established in August 1976 is situated about 7 km southeast of Shogran (Kaghan) in the subalpine zone. The altitude is 2900 metres, average annual rainfall 1000 mm and snowfall 500 cm. Soil has a moderate amount of organic matter suitable for plant growth.

**Vegetation:** The vegetaion consists of the following major species:

**Trees:** *Abies pindrow*, *Picia smithiana*, *Pinus wallichiana*.

**Shrubs:** *Berberis* spp., *Rhododendron* spp., *Salix* spp., *Vibrunum cotinifolium*, *V. nervosum*.

**Forbs:** *Achillea millefolium*, *Bupleurum longicaule*, *Chaerophyllum reflexum*, *Chenopodium botrys*, *Epilobium hirsutum*, *Gentiana argentic*, *Minuartia* sp., *Parnassia laxmanni*, *Polygonum aviculare*, *P. amplexicaule*, *P. nepalense*, *Potentilla albifolia*, *P. nepalensis*, *P. sibbaldia*, *Ranunculus* cf. *diffusus*, *Senecio chrysanthemoides*, *Taraxacum officinale*, *Trifolium repens*, *Veronica serpyllifolia*.

**Grasses:** *Agropyron dentatum*, *Agrostis gigantea*, *Carex* sp., *Digitaria* sp., *Phleum alpinum*, *Poa alpina*, *Poa annua*.

**Method.** An exclosure of 0.5 hectares was established on 50% slope during August 1976 at Sari. The area was closed to grazing. The area inside and comparable area outside the exclosure was traversed by four permanent line transects each 30m long, two along the contour and two across the contour. Hussain's method (1968)\* was used to

\*The author is Junior Silviculturist/Research Officer, in the Range Managment Branch, Pakistan Forest Institute, Peshawar.

\*\*Hussain, S. I. 1968. Determination of Forage production Leaflet No. 1 Range Management Branch, Pakistan Forest Institute, Peshawar.

determine forage production in October 1977. On each transect line five circular quadrats of one m<sup>2</sup> each were systematically clipped at 6 metre intervals both inside and outside the enclosure. All the palatable grasses and forbs were clipped one cm above ground with hand shears. For shrubs, only current year growth was clipped. The clipped material was weighed green and air dried, in grams and averages converted into kilograms per hectare by multiplying the air dry weight with ten.

To study the aerial cover and frequency of occurrence twenty 60 × 25 cm rectangular quadrats were studied systematically on each transect line at a regular interval of 1.5 metre both inside and outside the enclosure. Total aerial percent cover and species-wise percent cover was recorded for each species in each of the quadrats.

The transect averages and frequency were worked out for each species. The data were analysed statistically, "t" test was applied for comparison of forage production and percent cover inside and outside the enclosure.

**Results and discussion.** Forage production: The average forage production (dry matter) was 2076 kg/hectare inside and 574 kg/hectare outside the enclosure, thus a three times increase due to closure. The increase in the forage production due to closure was significantly more. Grasses, forbs and shrubs all showed significant differences due to closure:

	Average yield — kg/ha	
	Inside (ungrazed)	Outside (grazed)
Grasses	936**	246
Forbs	952**	296
Shrubs	188**	32

Percent aerial cover: Average percent cover for grasses, forbs and shrubs varied as follows:

	Percent cover	
	Inside (ungrazed)	Outside (grazed)
Grasses	40.90*	27.93
Forbs	65.51*	38.47
Shrubs	6.50	3.95
Total:	112.19*	70.35

\*Significant at .05 level.

\*\*Significant at .01 level.





Ecological enclosure at Sari established in August, 1976, observations in Oct., 1977



The aerial percent cover of grasses and forbs was significantly greater inside the enclosure whereas shrubs did not show any significant differences. Total cover increased  $1\frac{1}{2}$  times inside the enclosure.

The average percent cover of main species is given below:

Species	Percent cover (average)	
	Inside (ungrazed)	Outside (grazed)
<i>Agrostis gigantea</i>	31.18**	7.36
<i>Carex</i> sp.	1.18	0.87
<i>Digitaria</i> sp.	0.20*	—
<i>Medicago lupulina</i>	1.67	1.07
<i>Plantago</i> spp.	3.87	3.73
<i>Polygonum amplexicaule</i>	0.62	0.43
<i>Poa alpina</i>	8.50	19.64*
<i>Potentilla albifolia</i>	3.65	3.45
<i>Potentilla nepalensis</i>	3.65*	1.71
<i>Potentilla sibbaldia</i>	28.96**	7.85
<i>Ranunculus cf diffusus</i>	0.94	0.64
<i>Taraxacum officinale</i>	0.51	0.93
<i>Trifolium repens</i>	35.40	35.95

**Conclusion.** *Agrostis gigantea*, *Potentilla sibbaldia* and *Potentilla nepalensis* develop vigorously after the area is protected from grazing as compared to species like *Poa alpina* and *Trifolium repens* and suppress the other species. *Poa alpina* can resist continuous and heavy grazing while *Agrostis gigantea*, *Potentilla sibbaldia* and *Potentilla nepalensis* are sensitive to grazing. *Poa alpina*, *Trifolium repens* range vegetation type derived from continuous and heavy grazing could be converted into a better and preferred *Agrostis gigantea*, *Potentilla sibbaldia* vegetation type by effecting protection in the area.

\*Significant at .05 level

\*\*Significant at .01 level