

Grazing effects on some soil characteristics in Lar rangelands

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Introduction Heavy grazing pressures jeopardise the sustainability of the ecosystem by reducing soil fertility (Dormaer *et al.*, 1998). Different results have been reported of grazing intensities on soil chemical properties, which stem from climate, soil, vegetation, management and kind of animal (Dormaer *et al.*, 1998; Javadi, 2003; Sanadgool, 2002).

Materials and Methods The site was in northern Iran, 84 km east of Tehran with 410 mm/year mean precipitation, which falls mostly as snow. The main type of livestock is sheep. The dominant species were *Agropyron spp.*, *Bromus tomentellus*, *Poa bulbosa*, *Astragalus spp* and *Thymus kotschyanus*. Three adjacent grazing areas of ca. 4 ha each were selected: reference area (ungrazed & closed), key area (moderately grazed) and critical area (heavily grazed). Twenty soil samples were taken from each layer (0-10cm, 10-30cm) in each sampling period (early, mid and late grazing). The samples were air-dried and passed through a 2 mm sieve prior to chemical analysis.

Results Organic matter, total C and N were higher in the reference area, however, P, K and pH were higher in the critical area. Values were higher in the surface layer except for pH.

Table 1 Nutrient concentrations in three areas at each depth (A: 0-10cm, B: 10-30cm)

Areas	K(ppm)		P(ppm)		%N		%C		pH	
	A	B	A	B	A	B	A	B	A	B
Reference	760b	565d	42.8b	23.8e	.34a	.13d	3.4a	1.1c	6.1e	6.2d
Key	707c	484e	45.6a	17.7d	.27c	.13d	2.8b	1.1c	6.3c	6.2d
Critical	1000a	736bc	47.0a	26c	.3b	.14d	2.8b	1.2c	6.6b	6.9a
SEM	14.48		0.8366		0.006090		0.05502		0.02578	

Means with the same letter are not significantly different. (P=0.05)

Conclusions Reduction in soil C and organic matter in critical areas could be caused by grazing, which reduces vegetation cover, root biomass and nutrient recycling in the rangeland. Our results are similar to those of Willms *et al.* (1990) and Sanadgool (2002). The differences observed in soil N among the three areas maybe related to changes in vegetation type. Percentage of legumes was higher in the reference area compared to the other areas (Javadi, 2003). Increment in K and P under heavy grazing was probably due to more urine and faeces and fewer plants being present to use the available P and K. Higher P, K, N and C content in the surface layer could be due to higher organic matter, litter and vegetation cover. The pH results were similar to those reported by Dormaar (1998), who found that the increase in pH was an indicator of soil loss. With increased grazing pressure the depth of the soil profile decreases, resulting in organic matter being closer to the surface. Results of this study seem to indicate that heavy grazing reduces soil quality by changing plant growth form, species composition and reduction in vegetation cover as well as soil trampling.

References

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