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## Evaluation of grazing intensity effects on mineral nutrients grassland soils (a case study grassland Golestan province of Iran)

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**Key words :** grazing intensity, mineral nutrients, reference (control) site, key (moderately grazed) site, critical (heavily grazed) site, grassland

**Introduction** Soil is one of the most important factors to resistance of Rangeland area and prepares an adequate nutrients and moisture for this ecosystem during all seasons. Effect on soil chemical elements and plants flora are the most important damages in grassland due to over grazing.

Bauer, 1987 reported that organic carbon in heavily grazing was lower than control area, According Frank et al., 1995, there were no significant differences between control, heavy and medium grazing on decrease of soil nitrogen. Menezes et al., 2001 also studied same report, between these treatments.

**Materials and methods Sampling** The watershed was sub-divided into three sub-sample areas according to grazing history and condition: a reference (control) area has been exempted of livestock grazing for over 30 years (1970-2004). Stocking rate for the moderately grazed (key site) and heavily grazed (critical site) sites were 1 and  $>3$  sheep ha<sup>-1</sup>, respectively, for 30-years. Sub-sample areas have similar climatic conditions, topography, soil texture and parent materials. Data were recorded in a single representative area of 5 hectares for each range condition category during the grazing season and all through the year from 2003 to 2005. Each representative sampling area of 5 hectares was subdivided into 5 notional strata of 1 ha each according to the slope gradient from top to bottom, and numbered from 1 to 5. Data were collected from five replicates (one in each stratum).

Annual mixed soil samples from all representative sampling areas were collected at 3 different periods (August, December and April) from March 2003 to the same time in 2005 (7 periodic soil samples for each soil layer of 0-15 cm and 15-30 cm). In each sampling period 15 mixed soil samples from representative sampling areas were collected by steel cylinders of 1 meter height and 60 mm diameter. The range of total nitrogen, absorbable phosphorus and absorbable potassium of soil were measured in the laboratory according standard methods.

**Statistical analysis** SPSS software was used for statistical analysis.

**Results** Statistical analysis showed that there was significant differences between range of total nitrogen, absorbable phosphorus and absorbable potassium of soil in different depth and time periods ( $P < 0.05$ ) also statistical analysis showed that the amounts of total nitrogen, absorbable phosphorus and absorbable potassium of soil in depth of 0-15 cm was more than 15-30 cm.

**Discussion and conclusion** The amount of total soil nitrogen in control area was more than other area such as critical and key sites especially in depth of 0-15 cm during two years because of plant bloom and maximum Root growth in the surface. Grazing intensity will caused absorbed phosphorus in the soil because of increases of natural fertilizers due to cattle.

The amount of potassium also will be decreased during over grazing in the control area because of potassium transfer from depth to surface of soil in these points.

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