Int. J. Forest, Soil and Erosion, 2013 3(2): 60-63
ISSN 2251-6387

Research Pape

Study of Grazing and Exclusion Effects on Soil characteristic (Case study: Viseh Valley, Iran)

J. Mhmoudi[1], F. Zareian[2], M.R. Javadi[3]

1. Assistant professor, Islamic Azad university. Nour branch. Nour.Iran .
2. M.Sc student in rangeland, Islamic Azad University, Nour branch
3. Assistant professor, Islamic Azad university. Nour branch. Nour.Iran

Abstract: Rangeland exclusion to livestock is one of the management methods for range management increase vegetation cover and improvement soil. The goal of this study is to access the effects of grazing and exclusion on physical-chemical soil properties. 78 soil samples extracted from 0-30 cm depth of Viseh Valley sent to laboratory. Soil properties include: texture, Bulk density, sodium, potassium, $CaCO_3$, magnesium, EC, PH, organic matter and the texture of samples analyzed in the lab. SPSS, Excel software and paired sample t-test were employed to compare the data obtained from soil characteristics. Study of soil parameters changes indicates that exclusion do not have significant effect on percent of sand silt, clay, sodium, $CaCO_3$, EC, PH, organic matter but potassium, magnesium were significant difference in both site. Also, soil case study shows that exclusion have significant effect on soil parameters.

Key words: Grazing, Exclusion, Soil properties, Viseh Valley, Iran

Introduction

Sustainable use of natural resources and maintain a balance between yield and quality of natural resources has been considered in recent years. The stability of soil ecosystems can be an important component (Krzic *et al*., 2000). The spatial and temporal variability of rangeland soils are very important, these soils have been severe, and also wide spread (Potter *et al*., 2001). In natural ecosystems animals and plants are always in interaction with each other for grazing livestock, unless the grazing is done in good conditions, the ecosystem resources such as water, soil and plant did not damage (Basher *et al*., 1996). Effective grazing of plant shoots has little effect on production and can stimulate and increase plant production and cause to soil quality improve. However, severe grazing reduces the production of plant biomass (Sparks *et al*., 1996). Vegetation and pastures of increasing species diversity decreased with a low degree of palatability for livestock that have no value for soil conservation, and will increase evapotranspiration, soil nutrient loss and destruction (Basher *et al*., 1996). These methods are relatively simple and cheap in grazed pastures amended with different periods of time. Depending on local ecological conditions and degradation of rangelands and targets managers is recommended. In addition to strengthening the operations of grazed plants, significant changes in vegetation and soil occurs (Niknahad and Gharemakher ,2002). Effects on vegetation and soil resources in grazed area are presented in different results. This change due to different climatic conditions, edaphic factors and other factors has led to different results. The changes in speed and time required to achieve significant changes depends on climatic conditions. To study the significant changes in the arid regions, the stated area between 30 to 40 years is needed (Aghasi *et al*., 2006). Vahhabi (1989) results show that implementation of the changes in the replacement of grazed forage species is desirable. Hence with increasing density of vegetation, soil conservation, the loss of runoff surface is prevented. Results of long-term effects of grazed pasture on improving the physical characteristics - chemical and reduction of soil erosion, show that intensive management of soil and prevent its destruction will be grazed. Arzani and Abedi(2006) titled the Effect of pasture management and soil health and reached to the conclusion that by increasing the grazing intensity, the structural characteristics of plants such as the composition of vegetation and soil degradation caused by altered and completely remove the reference area are perennial plants.

Amiri and Basiri (2008) investigated the effect of a 26 year old grazed on vegetation changes and permeability of soil in Semirom. Results show a significant increase in plant cover and species composition of grasses in the grazed study also showed a decrease in the rate of water infiltration under grazing conditions than grazed. Menezes *et al.* (2003) showed that grazed semi-arid regions of Canada (Alberta) after 70 years have not led to grassland productivity. Decreased bulk density, increased litter and organic carbon, increase soil fertility, reduce soil erosion and other factors of the positive results of operations that grazed on vegetation in the various studies (Aghasi *et al*., 2006). Potter *et al*. (2001) in their study concluded that the rate of soil organic carbon and nitrogen decreased by increasing grazing intensity and the highest values in the grazed treatments have been measured. The soil properties with respect to vegetation management practices, changes are slower and therefore less dynamics (Krzic *et al*., 2000) in some cases, even despite to the significant increase in long-term grazing vegetation, little changes in soil properties caused simply (Bashr and Lynn, 1996). Menezes *et al.* (2003) reported no significant difference in a period of 4 years between grazed and soil factors and nitrogen PH and carbon. Steffens and Kolbl (2007) studied the effects of physical and chemical properties on soil in semi-arid steppe in, because of the intensity, the increase in apparent weight are showed, organic matter and nitrogen decreases and the PH in this study did not change. So far, many researchers have been emphasize in management practices that further studies corrective action, such as grazed and cultivated plant species showed significant effects on vegetation and soil in the area is compatible. The corrective actions in accordance with local conditions increased plant cover and percentage of litter and plant species in the area, the amount of organic matter in the soil increased and improved the soil physical and chemical properties.

Materials and Methods

Introducing the region

The study area is located between "20 '00 ° 51 to" 45 '05 ° 51 east longitude, and "20 '46 ° 35 to" 50 '49 ° 35 north latitude. Watershed area is 2516.53 ha. Regional Environmental Plan 23.62 km, minimum altitude is 1315 m and its maximum altitude is 2554 m. According to the meteorology and climate studies, the total average annual rainfall of 417 mm which is equal to its highest occurs in spring at April. The mean annual temperature, based on studies of nearby stations -0.9° to 33 °C varies. The geological structure and geological studies related to the Tertiary Period is the Eocene Karaj Formation. The dominant vegetation in the area of pasture and rangeland plants in the region is more than 80 percent. Natural trees and shrubs are seen in the region of very low density and the amount is less than one percent of the region. Four types of pasture vegetation types are: 1 - wheat grasses type, 2 - type grasses diverse shrub, 3 - type grasses Artemisia species, 4 - perennial grasses in the area of diverse vegetation types have been identified. There is no problem in the area and type of livestock, livestock of sheep and goats but by considering the number and time of grazing problems are seen in the area, thus the existing range allotments Viseh and Kelak names under grazing livestock pastures are more than six months, whereas only animals allowed on this project can be done to determine the capacity of rangeland use for a month are more Tendency in almost all types of negative type, and a whole range except for the breeding and preservation and restoration of rangeland vegetation . Tendency in almost all types of negative type, and a whole range except for the breeding and preservation and restoration are rangeland vegetation. According to the general conditions of mountains and hills, surrounding the area that often surrounds is not desirable in terms of cover. out of the rock mass stone and rocks presenting findings at or below 10 cm soil layer, indicating that this soil depth in these zones, especially in the highlands and rocky reef areas, soils are very shallow to shallow.

Although the downstream areas and areas with a slope of broken soil depth is more appropriate. But most of these sectors dominated settlements, facilities, etc. accordingly. Therefore, considering the general conditions soil burning area such as genetic conditions, geological structure, climate, and factors governing the erosion and destruction, it is reasonable to accept evolution and transformation of the soil and was not very active and dynamic and suitable result.

Sampling and analysis of physical - chemical soil

The study area grids (1000 × 1000 m) were randomly assigned within them, a total of 55 samples (15 samples in the grazing area, 40 samples of the grazed area) of 30-0 cm soil depth were collected in the spring (Figure 1). The following tests on the samples after drying in air and 2-mm sieve was then passed by the hydrometric method of soil physical degradation, EC soil EC devices use a digital meter, PH using PH meter, the lime by acid-base titration method to measure calcium and magnesium Complexim etry method, sodium and potassium samples flame photometry method, block method was used to measure organic matter.

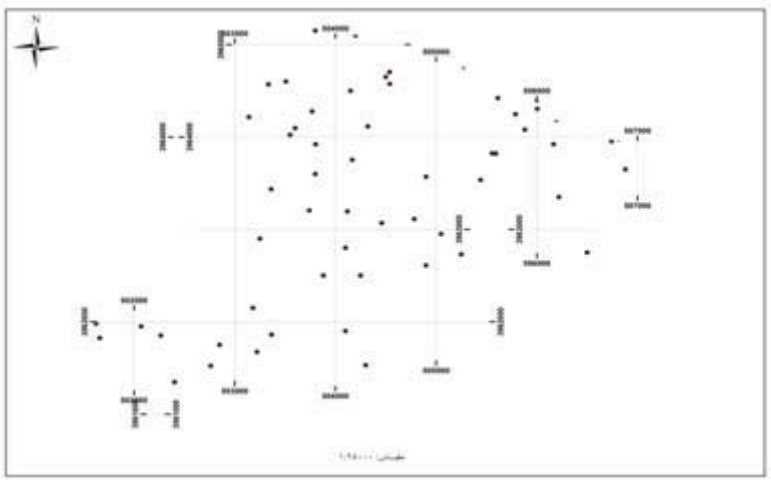

Figure 1. Sampling locations in the area

Statistical description of data

Distribution of parameters, such as; standard deviation, coefficient of variation, skewness, and the strain data obtained by using statistical analysis software SPSS17 and compared the two regions. Normally in the absence of data, using the log normal distribution was used to normalize them. Data between 1 - to 1 is considered as normally distributed data, Independent t tests to examine differences in soil properties (the area under it and grazed) were used. T-test is a parametric test used to compare averages. For this population due to independent groups, independent samples t-test was used. All statistical comparisons are done on the surface.

Results

Comparison between the two regions, physical and chemical properties of soil and grazed are as below:

Bulk density

As shown in the Table 1 the average bulk density in the region is 1.6400 and grazed in the region is 1.66386, according to1 Independent t-test the p-value equal to 906/0 is the higher amount, assuming it can be concluded that H. Between the two regions cannot be denied and there is no significant difference at 5% level.

Silt Variable

The average of silt in exclusion area is 20.1333 and at the grazed area is 5714/23. The p-value is equal to 0.578 and this value is greater than $\alpha = 0.05$ hence it can be concluded that, there is no significant difference in terms of silt.

Sand Variable

Concentration of sand in the Exclusion area is 69.4667 and in the grazed region is 65.2619 The p-value is equal to 0.357 thus, it is no difference between the percentage of sand in the grazed and exclusion area.

Clay Variable

The mean percentage of clay in the Exclusion and grazed area are 10.4000 and 11.2143 according to p-value there is no significant difference at 5% between two regions.

Ca Variable

The average of calcium concentration in exclusion area measured is 4.3700 and in grazed area are 2.2226 the p-value for Ca is 0.110. It can be concluded that there is no significant difference in calcium amount in 5% in two regions.

Acidity Variable

Soil acidity in the exclusion region is 7.1707 and at the under management grazed area is equal to 7.5411 according to the p-value (0.998) there is no significant difference between the concentration.

Lime Variable

The average of lime in the exclusion region is 6.8333 and in the grazed area is equal to 6.8290. The p-value is equal to 0.998 so the variable amount of lime in the grazed area and exclusion region has no significant difference at 5% level.

Electrical conductivity Variable

The average variable of electrical conductivity in the exclusion and grazed area are 0.6917, 0.07510 , respectively. The p-value is 0.45. There is no significant difference between two regions.

Organic matter Variable

The average of organic matter in the grazed area is equal to 0.6787, 0.6898 and the value of this variable in the independent t-test p-value is equal to 0.916. Finally we can conclude that there is no significant difference at 5% level between two areas.

Variable sodium

Table 1. Comparison of results of statistical factors in the soil under Grazing and Exclusion

Parameters	Area	Std Deviation±Mean	df	t	T test
Bulk density	Grazing	0.03071±1.6400	55	0.119	ns
	Exclusion	0.04269±1.66386			
Silt Variable	Grazing	10.16202±20.1333	55	-0.966	ns
	Exclusion	11.89413±23.5714			
Sand Variable	Grazing	14.33212±69.4667	55	0.930	ns
	Exclusion	15.26523±65.2619			
Clay Variable	Grazing	5.09622±10.4000	55	-0.560	ns
	Exclusion	4.74489±11.2143			
Ca Variable	Grazing	8.56154±4.3700	55	1.624	ns
	Exclusion	0.94702±2.2226			
ph Variable	Grazing	1.78127±7.1707	55	-1.276	ns
	Exclusion	0.20677±7.5411			
Lime Variable	Grazing	4.10708±6.8333	55	0.003	ns
	Exclusion	5.51824±6.8290			
Electrical conductivity	Grazing	0.26342±0.6917	55	-0.761	ns
Variable	Exclusion	0.27809±0.7510			
Organic matter Variable	Grazing	0.28814±0.6787	55	-0.105	ns
	Exclusion	0.36886±0.6898			
Variable sodium	Grazing	1.07703±3.3000	55	-0.541	ns
	Exclusion	1.25944±3.4859			
Variable Mg	Grazing	0.22981±1.3111	55	-5.316	**
	Exclusion	0.50806±1.9795			
Variable K	Grazing	25.22170±189.61	55	-4.386	**
	Exclusion	35.30597±230.26			

Variable equal to the average sodium in the region is 3.3000 and in the grazed area is 3.4859. The t-test p-value for a variable amount of sodium, 0.591 is calculated. So between the two regions in terms of variable amounts of sodium, there is no significant difference.

Variable Mg

In the grazed region and the average variable of Mg is 1.3111 and in the exclusion region is 1.9795. P-value for the variable element magnesium was calculated by using independent t-test zero. There was a significant difference between the two regions at the 5% level there.

Variable K

Below average in the region because of the variable K, and grazed, respectively, 189.61 and 230.26 is assessed. And also using the t-test p-value was zero. Between the two regions in terms of variable amounts of potassium are significantly different at 5%.

The results of soil studies and studies show that implementation of these changes affect the improvement of soil properties have been grazed. Clay, sand, silt, the apparent weight of the soil and grazed in the area has no significant difference And in two regions of mostly sand - loam and loam - is sand. Soil physical properties in the short term are not affected by plant characteristics and soil than in the presence of plants varies. Apparent weight of soil in the grazed area, adding variety and amount of vegetation and provide the appropriate physical conditions within the plant root. The Niknahad (2002), Aghasi (2006) and Zarei (2009) in their studies of the same in the two regions not found in the tissue .Raiesi (2001), Mohammadi (2005), Paknia (2006) and Zarei (2009) found the same results in this regard. Calcium and lime in the two regions dose not significantly change in total area because the soil is calcareous and calcium function of climate, soil, rock and soil is the mother alkali cation exchange properties due to organic matter, soil contains plenty of potassium, which results Sanadgol (2002), Paknia (2006), and Zarei (2009), is consistent.

Conclusion:

Grazed pasture is one of the efficient management than the other methods. Therefore it is essential that grazed is of the main programs in renewable natural resource projects to be considered. It should be noted. Issue grazed on pasture management practices to improve the quality and reduce soil degradation and soil erosion is important. However, the status of the animal grazing should be considered. It should be noted that despite the good performance and low cost implementation grazed treatments compared with other management measures, subsistence interests of the residents are considered to be associated with the least negative consequences of social and economy.

References:

Arzani H, Abedi M 2006. Investigation on the effects of management practices of rangeland health attributes and indicators changes. Seasonally Journal of Reaserch of Iran's Range and Desert. 13: 2. 145- 161. (In Persian)

Aghasi M, Bahmaniar J, Akbarzadeh M 2006. Comparison of The Effects of Exclusion and Water Spreading on Vegetation and Soil Parameters in Kyasar Rangelands, Mazandaran Province. Journal of Agricultural Sciences and Natural Resources. 13(4): 73-87. (In Persian)

AMIRI F, BASIRI M 2008. Comparison of Some Soil Properties and Vegetation Characteristic in Grazed and Ungrazed Range site. Rangland. 2(3): 237-253. (In Persian)

Basher LRLynn IH 1996. Soil changes associated with cessation of sheep grazing in the Canterbury highcountry. New Zeland. J. Ecology (New Zeland). 20 (2): 179-189.

Islam K R, Weil R R 2000. Soil quality indicator properties in mid-Atlantic soils as influenced by conservation management. J. Soil Water Conserv. 54: 69-78.

Krzic M B, roersma K, Thompson D J, Bomke A A 2000. Soil properties and species diversity of grazed crested wheatgrass and native rangelands. J. Range. Manage. 53 (3):353-358.

Menezes, R S C, Elliott E T, VALENTINE D W, Williams S A 2003. Carbon and Nitrogen Dynamics in Elk Winter Ranges. J. Range manage. 54: 4000-408.

Mohammadi J, Khademi H, Nael M 2005. Study the Variability of Soil Quality in Selected Ecosystems of Central Zagros .JCPP: 3: 105-120. (In Persian)

Moghadam M 1998. Rangeland and Range-keeping. Tehran University Press. p 470. (In Persian)

Nael M, Khademi H, Hajabbasi M A 2004. Response of soil quality indicators and their spatial variability to land degradation in central Iran. Appl. Soil Ecol. 27: 221-231. (In Persian)

Niknahad, Gharemakher H 2002. The study of some of the effects of Haloxylon sp.plantations on vegetation and soil properties in Qom. MA thesis. Natural Resources. Tarbiat Modarres University. (In Persian)

Potter K N, Daniel J A, Altom W, Torbert H A 2001. Stocking rate effect on soil Carbon and Nitrogen in degraded soils. J. Soil and Water Conser. 56(3): 233-236.

Paknia R 2006. Geostatistical Anlysis of Spatial variability of selected Soil Chemical properties protected pasture in sabz ku site-Chaharmahal o Bakhtiari, Master of Science Thesis. Islamic Azad University. Tehran. Iran. (In Persian)

Rice C W, Owensby C E 2000. The effects of fire and grazing on soil carbon in rangelands. PP. 323-342. In:R.F. Follet, J.M. Kimble and R. Lal (Eds.). The Potential of U.S. Grazing Lands to Sequester Carbon and Mitigate the Greenhouse Effect. CRC Press. Boca Raton.

Raiesi F G, Asadi E, Mohammadi J 2001. The role of range management on soil nutrients in Sabz Kou rangelands of Chahar Tag. The First National Seminar on Livestock and Range Management Research Programs Johnston. 24-25. July 2001. Semnan. Iran (P. 91). (In Persian)

Sparks D L, Page A L, Helmke P A, Leoppert R H, Soltanpour P N, Tabatabai M A, Johnston G T, summer M E 1996. Methods of soil analysis. Madison. Soil Sci. Soc. of America.

Steffens M, Kolbl A, Totsche K U, Kogel I 2007 Grazing Efffects on soil Chemical and Physical Properties in semi arid steppe of Inner Mongolia(P. R. China). Geoderma, 143: 63-72.

Sanadgol A 2002. short term and grazing intensity effects on soil. vegetation and livestock products in Bromus tomentellus pasture. Range management PhD thesis.Tehran university. 135pp. (in persian).

Zarei A 2009. Study of Plantation effects on Vegetation cover and Soil characteristic of desert land (Case study : Salt hill of Qom Province. MS.c in Rangland Management. factulty of natural resources. university of Tehran. (In Persian)

Vahabi M 1989. Study on and Comparison of Changes in Vegetation, Plant Composition, Forage Quantity and Infiltration under Enclosure and Grazing Treatments in Fridan region. Esfahan. M.Sc. Thesis in Rangeland Management Engineering. Tehran University, 187 p. (inPersian)