ADVANCES IN BIORESEARCH
Adv. Biores., Vol 8 [3] May 2017: 146-149

Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.8.3.146149

Advances in Bioresearch

ORIGINAL ARTICLE

Investigation of Degradation Effects on some Soil properties in the Caspian forests (a case study: Talesh - Iran)

Beitollah Amanzadeh*[a], Ahmad Rahmani[b], Ehsan Kahneh[c,] Aiuob Moradi [a], Arsalan Hemmati [a] and Baba Khanjani Shiraz [a]
a-Research Division of Natural Resources, Gilan Agricultural and Natural Resources Research and Education Center, Agricultural Research, Education and Extension Organization(AREEO), Rasht, Iran.
b- Research institute of Forests and Rangelands, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran
c Tea Research Center, Horticultural Sciences Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Lahijan, Iran
Corresponding Author: b.amanzad@yahoo.com*

ABSTRACT
*In order to study the effects of human activities on soils of natural ecosystems, two untouched and degraded sites were selected in Shafaroud forests, Guilan Province. Three sampling plots (one hectare in each site) were selected. Each plot divided into four sub-plots (10*10m). Soil samples were taken from the corner and center of each sub-plot in two soil depths (0-10 and 10-20 cm. After air drying, some soil properties such as pH, particle density, soil texture, organic carbon (OC), total nitrogen (N), available phosphorus, electrical conductivity, exchangeable Calcium+Magnesium and potassium were measured. The result showed that the soil texture in two sites was sandy loam. There was no significant difference between the pH, EC, K and N in the surface soil in two regions. Amount of organic carbon and available phosphorus in that soil layer significantly decreased in degraded soil. The exchangeable content of Ca + Mg has significantly decreased about 24 percent. In the subsurface soil, only the amount of exchangeable Ca + Mg was significant and other parameters were not significantly different from each other.*
***Key Words**: degraded ecosystems, soil, human activates, Caspian forests*

Received 20.02.2017 Revised 02.04.2017 Accepted 27.04.2017

How to cite this article:
B Amanzadeh, ARahmani, E Kahneh, A Moradi, A Hemmati and B KShiraz .Investigation of Degradation Effects on some Soil properties in the Caspian forests (a case study: Talesh - Iran). Adv. Biores., Vol 8 [3] May 2017.146-149

INTRODUCTION

Effective factors on degradation of ecological systems are widespread. Huttl and Schneider [1] have been introduced various natural and anthropogenic factors such as climatically extremes, biotic stresses, selection of tree species, harvesting regimes, litter raking, off-site amelioration measures, former land use, air pollutant deposition and soil acidification, as caused by internal and external processes in degradation of forest ecosystems. Grazing and hoof action by elk significantly increased bulk density (from 0.87 gr.cm^{-3} ungrazed to 0.94 gr.cm^{-3} grazed), with greater effects on soils with fewer rocks [2]. Steffens *et al.* [3] declares that Bulk density increased significantly with increasing grazing intensity. Organic carbon, total N and total S concentrations decreased significantly with increasing grazing intensity. Since neolithic colonization of the land, man has interfered with forests [4]. Kissling *et al*. [5] were compared short- and long- term effects of human trampling on above-ground forest vegetation and soil physical, chemical and microbial characteristics in Switzerland. They found both similarities and differences in short- and long- term trampling effects.

Yousefi *et al.* [6] revealed that rate of soil compaction effect on beech regeneration. Caspian forests also which called the Hyrcanian forests the most valuable forests in Iran-cover the northern slops of the Elborz Mountain. In 1958 these forests were estimated at 3.4 million hectares [7] but currently is estimated around 1.85 million hectares [8].This area is rich in hardwood species. The role of these forests other than wood production is supportive and environmental and their vital function in soil and water

sources conservation as well as natural balance distribution. Intensive grazing, over-utilization of forests as full and land use change are amongst the main causes of deforestation in this region. Understanding the effects of disturbance by human interferers on ecosystem processes is essential for the management of recreational areas.

MATERIAL AND METHODS

The research was carried out in two untouched and degraded sites in the Caspian region of northern in Iran. The studied stands were located in Guilan province at 28° 38′N and 48° 49′ E, extending between 1200 and 1400 m a.s.l. with a mean precipitation of 990 mm. Soil type is forest brown soil and soil texture varies between sandy loam.

Dominant tree species were beech (*Fagus orientalis* Lipsky), Hornbeam (*Carpinus betulus* L.) Maple (*Acer velutinum* Boiss), Alder (*Alnus subcordata* C.A.M) and other broad leave species.

Three sampling plots (one hectare in each site) were selected. Each plot divided to four sub-plots (10*10m). Soil samples were taken from the corner and center of each sub-plot in two soil depths (0-10 and 10-20 cm. After air drying, some soil properties such as pH and electrical conductivity (1:1), particle density (Pycnometer method), soil texture [9], organic carbon (OC) [10], total nitrogen (N), available phosphorus [11], exchangeable Calcium+Magnesium and potassium [12] were measured. Data were analyzed using T test by SAS software.

RESULTS AND DISCUSSION

There wasn't a significant difference between the particle density, pH, EC, K and N on the surface soil (depths of 0-10) in two regions. But amount of organic carbon and available Phosphorus in that soil layer significantly decreased in degraded soil (Table1). Kissling *et al.* [5] studies revealed that soil pH and soil organic matter content were not affected by short-term trampling, but increased with long-term trampling intensity.

Camping *et al*. [13] studies showed that low to moderate grazing intensity has little affect on soil quality, however, oak tree removal resulted in a decrease in most soil quality parameters investigated (carbon, nitrogen, phosphorus, pH) within 5 to 15 years following tree removal.

Our study in the 0-10 cm soil depth shows that human interferers reduce P, Mg +Ca, O.C and organic matter in the forest soils.

Table1. Some properties of soil in depths of 0-10 cm in the study regions

Soil properties	T value
p.d (g cm-3)	-0.315^{ns}
Pava.(mg/kg)	5.16^{**}
Mg+Ca ex. (mg/kg)	3.3^{**}
pH	0.579^{ns}
EC(ds/m)	-0.99^{ns}
O.C%	2.84^{*}
O.M%	2.85^{**}
Nt %	0.413^{ns}
K ex. .(mg/kg)	0.906^{ns}

*significant at the level of 0.05% **significant at the level of 0.01% ^{ns} non-significant at the level of 0.05%

Available Phosphorus in the 0-10 cm depth soil of degraded site received from 94.74 mg/kg to 32.43 mg/kg and the exchangeable content of Ca + Mg has decreased about 24 percent (Fig.1).

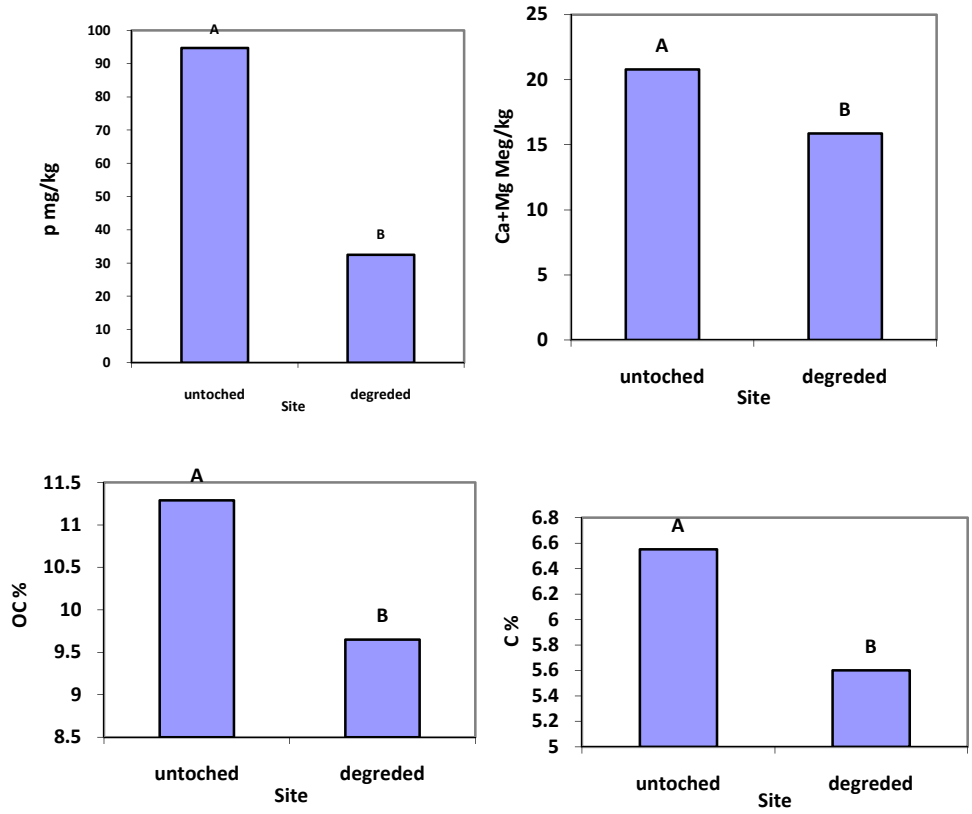

Fig.1.Some properties of soil in depths of 0-10 cm in the study regions

In the subsurface soil (in the 10-20 cm depth), only the amount of exchangeable Ca + Mg was significant and other parameters were not significantly different from each other. This results is similar to Augusto *et al.* [14] studies that defines the composition of forest over story has an impact on the chemical, physical and biological characteristics of soil. This impact was highest in the topsoil. Although particle density wasn't significant difference in the both of the sites in two soil depths, Bulk density as important factor, increased significantly in human activates that was shown in researches of Steffens *et al.* [3], Kissling *et al.* [5], Tripathi & Singh [16], Chen *et al.*[15].

Table2. Some properties of soil in depths of 10-20 cm in the study regions

Soil properties	untouched	degraded	T value
p.d (g cm-3)	2.41	2.42	-0.175^{ns}
Pava.(mg/kg)	19.27	11.95	1.46^{ns}
Mg+Ca ex. (mg/kg)	15.73	9.8	7.4**
pH	5.59	5.63	-0.458^{ns}
EC(ds/m)	0.13	0.13	0.181^{ns}
O.C%	2.34	2.31	0.098^{ns}
O.M%	4.03	3.98	0.095^{ns}
Nt %	0.19	0.2	-0.526^{ns}
K ex. .(mg/kg)	217.05	147.85	1.58^{ns}

REFERENCES

1. Hüttl , R. F., Schneider B. U., (1998). Forest ecosystem degradation and rehabilitation. Ecological Engineering 10,19-31.
2. Binkley,D., Singer,F., Kaye.M., Rochelle.R.,(2003).Influence of elk grazing on soil properties in Rocky Mountain National Park. Forest Ecology and Management 185 ,239–247.
3. Steffens, M., Kölb, A., Totsche, K.U., Kögel-Knabner I.,(2008).Grazing effects on soil chemical and physical properties in a semiarid steppe of Inner Mongolia (P.R. China).Geoderma, 143: 63-72.
4. Kilian,W.,(1998).Forest site degradation—temporary deviation from the natural site potential. Ecological Engineering 10 ,5–18.

5. Kissling,M., Hegetschweiler, K . T., Rusterholz, T.H., Baur,H.,(2009). Short-term and long-term effects of human trampling on above-ground vegetation, soil density, soil organic matter and soil microbial processes in suburban beech forests. Applied Soil Ecology 42 , 303–314.
6. Yousefi,K., Srdabi, H., Amin- Amlashy, M. Amanzadeh, B., (2010). Effects of soil physical & chemical properties, influenced by human and livestock activities on Beech forests regeneration at Khorgom of Giulan.A Final Report Of Project. Research Institute of Forests and Rangelands(RIFR). I.R.Iran.
7. Jafari,M.,(1997).Present Status of Afforestation Research.(pp.50-70). Research Institute of Forests and Rangelands(RIFR). I.R.Iran.
8. Jafari,M.,(2010).Climate Change Impacts On Iranian Ecosystems. Research Institute of Forests and Rangelands(RIFR).I.R.Iran.
9. Bouyoucos, G.J. (1962). Hydrometer method improved for making particle size analysis of soils. Agron. J. 54:464-465.
10. Walkley, A. and I.A. Black. (1934). An examination of the Degtjareff method for determining organic carbon in soils: Effect of variations in digestion conditions and of inorganic soil constituents. Soil Sci. 63:251-263.
11. Olsen, S.R., C.V. Cole, F.S. Watanabe, and L.A. Dean. (1954). Estimation of available phosphorus in soils by extraction with sodium bicarbonate. U.S. Dep. of Agric. Circ. 939.
12. Kalra, Y.P.; Maynard, D.G. (1991). Methods manual for forest soil and plant analysis. For. Can., Northwest Reg., North For. Cent., Edmonton, Alberta, Canada. Inf.
13. Camping, T.J., Dahlgren, R.A., Tate, K.W ., Horwath, W.R., (2002). Changes in soil quality due to grazing and oak tree removal in California blue oak woodlands. In: Standiford RB, McCreary D, Purcell KL (eds.). Oaks in California's Changing Landscape, Berkeley, CA: USDA, Gen. Tech. PSW- 184, 75-85.
14. Augusto, L., Ranger,J., Binkley,D., Rothe, A.,(2002). Impact of several common tree species of European temperate forests on soil fertility. Ann. For. Sci. 59 , 233–253 .
15. Chen, F., Fahey .T., Yu .M., Gan,L., (2010). Key nitrogen cycling processes in pine plantations along a short urban–rural gradient i n Nanchang, China.Forest Ecology and Management 259, 477–486.
16. Tripathi, N. , Singh. R.S., (2009). Influence of different land uses on soil nitrogen transformations after conversion from an Indian dry tropical forest. Catena 77 ,216– 223.