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Land Use Change Effects on Plant and Soil Properties in a Mountainous Region of Iran

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ABSTRACT

This study was conducted to show the effects of rangeland conversion into agricultural land uses in terms of on plant and soil degradation in Choram rangeland, Iran. Three sites, including dry farming, horticultural and rangeland were selected. Across site, vegetation factors such as plant production, canopy cover and density were measured. Soil samples were extracted at depths of 0-30 and 30-60 cm. The highest plant productions (60 kg ha^{-1}), vegetation cover (30%) and density of class I (3 n m^{-2}) were recorded in the rangeland. The lowest plant productions (19 kg ha^{-1}), vegetation cover (0.41%) and density of class I, II and III (2, 7, 6 n m^{-2}, respectively) were measured in the horticultural land use. Except saturation percentage, clay, silt and sand there were not significant differences among the soil properties of land uses. However, at depth of 30-60 cm the highest significant organic matter (14.33 kg ha^{-1}) and potassium (0.84%) were measured in the rangeland and dry farming land uses, respectively. Habitat conversion from the rangeland to arable lands could change the species properties and result in the reduction of vegetation cover and reduction of soil quality.

Key words: *Soil fertility, Land use change, Dry land, Plant properties*

INTRODUCTION

The agricultural revolution in 10000 years ago is considered as the biggest evolution of human life as it has become a turning point in social evolution, which also endangered human conflicting interests. At the beginning, due to the balance of population as well as alignment of man and nature, the conflict was not so clear. However, two recent developments, such as the industrial and chemical revolutions, and the uncontrolled increase of population forced human to confront nature seriously (*Kamkar and Mahdavi Damghani 2008*).

The present technology expands the range of the negative impacts of agriculture on the natural resources. In the present era, conservation of natural resources and achieving sustainable development are the major issues considered in worldwide agenda. In the case of Iran, these are implemented through comprehensive economic, social, and cultural plans (*Kouchaki et al. 2000*). The natural resources are resources are land, water, air, and the other environmental, in which humans have caused a considerable variation to increase production. In this regard, natural forests, lawns and marshes have been changed by human due to increase of construction, agricultural, and industrial activities (*Kouchaki et al. 2000; Kamkar and Mahdavi Damghani 2008*).

Unfortunately, one of the disruptive issues damaging the natural resources is agriculture (*Jagadamma et al. 1981*). Around 18 m ha of the total area of Iran is under cultivation, with about 10 to 12 m ha being under permanent agriculture while the rest is in the temporary form. In addition, 47% of cultivated land in farms is irrigated and the rest are dry land.

Due to inappropriate use of soil and water recourses, 115000 ha are connected to the areas of the moons annually (*Zehtabian and Khosravi 2010*). In the most parts of Iran, especially in the arid and semi-arid regions, there are many lands, which regardless of their potential, their use has been changed. These changes result in the destruction of natural resources in the country in the long-term. As such conversion of rangeland to agriculture is one of the most popular changes in Iran in absence of scientific assessment, that may be a particular usage is imposed on the lands unrelated to their potential, which affected the qualitative and quantitative features of the soil resources.

In an earlier study carried on evaluating the impact of agricultural activities on land degradation in Taleghan region (Iran), through comparing the measured parameters, the conclusion was that the soil of this area is categorized in the relatively poor zone in terms of organic matter, nitrogen, phosphorus, and potassium (*Zehtabian and Khosravi 2010*). Through investigation of the change of the forests'farming in Guilan province, it was reported that the amount of organic matter has had significant changes over the years after thereby affecting soil fertility (*Shiranpour et al. 2012*). *Kelishadi et al.* (*2014*) reported that land use type affects soil water storage, infiltration and runoff generation.

Therefore, through wrong management policy, the rangelands are destroyed and be abandoned wasteland. Given the above issues, it is better to keep the rangelands as possible, and deciding on land use change must only be done through evaluation of all aspects. It also seems that the quantitative and qualitative assessment of land use change would be necessary because it would be possible to predict such measures to restore the lands' original use before the land destruction.

The aims of this study are to evaluate influences of land uses change on some plant species; and to identify influences of different land uses on selected physical and chemical properties of the soil in Choram rangelands (Kohgiluyeh and Boyer-Ahmad province, Iran).

MATERIALS AND METHODS

The Study Area

The study area is located in (34° 58′06″N, 47° 58′ 11″E), Kohgiluyeh and Boyer-Ahmad province, Iran. The regional climate is classified as cold and arid (Köppen), with an annual average precipitation of 468 mm, and maximum and the minimum average temperature of 20 and 2°C. The average height of the area is 736 m of sea surface level. The soil moisture and temperature regimes of the area are xeric and thermic.

Sampling Method

Before field work, primary studies and the topographical maps the area of study were analyzed. After specifying the land uses, three treatments including dry farming, horticultural and rangeland (control) were selected. Sampling of vegetation in any land use was conducted in systematically-randomized method. Regarding the kind, distribution pattern and density of plant vegetation, the quadrat size determined by minimal area method was employed. In each land use, 3-5 transectswith 50 or 100 m were stationed. Along the 50 m transects, the plots at intervals of 5 m from each other were posed, although this distance increased to 10 m in the 100 m transect. Data on vegetation and canopy cover were obtained using the line-intercept method (*Coulloudon et al. 1999*) while the plant production was estimated using clipping and weighing method (*Coulloudon et al. 1999*). The plant density was measured by counting the number of individuals of a species in a plot.

Regarding areas of the land uses, 4-8 soil samples (36 samples) were collected using a soil auger from depth of 0-30 cm and 30-60 cm. The soils were put in plastic bags with label; which were air dried and taken to the laboratory for analysis of its physical and chemical properties. The soil's texture was determined using laser diffractometry (*Wang et al. 2012*); pH was determined in a 1:5 soil to distilledwater slurry after one hour of agitation using a digital pH-meter (Model 691, Metrohm AG Herisau Switzerland) (*Thomas 1996*); electrical conductivity (ECe) using an EC-meter (DDS-307, Shanghai, China) (*Rhoades 1996*); total soil N was analyzed calorimetrically with a continuous flow ion analyzer following wet digestion in sulfuric acid (*Bremner 1996*); organic carbon was measured by the Walkley-Black method (*Nelson and Sommers 1996*). Available phosphorus was determined by the method of *Bray and Kurtz* (*1954*). Potassium was measured by flame photometry method (*Knudsen et al. 1982*); calcium carbonate was determined volumetrically by a calcimeter (*Allison and Moodie 1965*); saturation percentage (SP) determined by weighing method (*Wilcox 1951*).

Data Analysis

The statistical processing was mainly conducted by one-way analysis of variance (ANOVA) and T-test. Before performing analysis, data were checked for their normality with the Kolmogorov–Smirnov test and for homogeneity of variance with the Levene test ($p<0.05$), and where necessary, data were log-transformed. The soil and plant properties between the rangeland and arable lands were compared by T-test.The statistical significance of the differences between treatments was evaluated by analysis of variance (ANOVA). Duncan t-test between means was calculated only if F-test was significant at the 0.05 level of probability. A probability of 0.05 or lower was considered as significant. All statistical calculations were performed using SPSS release 18.0.

RESULTS AND DISCUSSION

Effect of land use conversion on characteristics of plant species

The comparison between canopy cover and

Table 1. Native plant species in the land uses.

Plant species	Plant type	Land use
Rangeland	*Brassica* spp-*Hordeum bolbosum*	*Brassica* spp, *Fritillaria imperialis, Stachys lavandulifolia, Achillea millefolium, Dorema aucheri, Echium amoenum, Mentha spicata, Thymus* spp, *Arum maculatum, Matricaria chamomilla*
Horticultural	*Cynodon dactylon-Centurea* spp	*Cynodon dactylon, Brassica* spp *Carthamus tinctorius, Centurea* spp, *Borago officinalis, Peganum harmala*
Dry Farming	*Achillea millefolium -Thymus* spp-*Fritillaria imperialis*	*Centurea* spp, *Hordeum bolbosum, Brassica spp, Thymus* spp, *Dorema aucheri, Gundelia tournefortii, Artemisia sieberi, Malva sylverstris*

production of the dry farming and horticultural land uses with rangeland (control) were significantly different (P<1%), whereas the highest percentage of canopy cover and production were found to be related to the rangeland. Comparison of the plant species density (**Table 1**) across land uses are not significantly different with the rangeland (control) land use (**Table 2**) (P<5 %), although the maximum density of plant species of class one was related to the rangeland land use. The density of the plant species of classes two and three was significantly different in each land use with the rangeland land use, so that the maximum density of rangeland species of class two and three related to the rangeland (**Table 3**). All the properties of vegetation other than density of plant species of the class I was significant different (P<5%). Maximum production, canopy cover as well as the density of class I and II among three land uses related to the rangeland and the maximum density of the class III plant species was measured in the land use of dry farming. Minimum production of plant species and density of class I, II and III was measured for the horticultural land use (**Table 4**).

The phenomenon of changing the land use has turned into a serious problem facing the world. Natural ecosystems are vulnerable to these changes. Change of the land use is considered as one of the important factors in the degradation of the rangeland ecosystem and soil. Therefore, knowing the type and percentage of land use change in the rangeland is necessary as a management parameter in comprehensive organization and development. Maximum production, canopy cover, and density of the plant species class I and II were related to the rangeland. The minimum plant production, canopy cover, density of plant species class I, II, and III were measured in the horticultural land use (**Table 4**). Across land uses, the observed plant species in the rangeland were more than two. The reason for missing the rangeland plant species in dry farming and horticultural land uses was due to inappropriate soil conditions for the plant species. Appearance or disappearance of the plant species in the farmlands can be associated with the biological characteristics, the accessibility of food resources and differences between plant species in terms of ecological niche (*Castellanos et al. 2005*). The seeds of some rangeland plant species may be brought into the soil surface during land use changes and through plowing and later be demolished in germination trend (*Paywell et a1. 1997*). Many of opportunistic plant species or seedling farms are compatible with seed dispersal by wind, which can comply with the temporary condition caused in soil by agricultural operations (*Graham and Hutching 1998; Van der Valk and Pederson 1989*).

Comparison of the soil properties of land uses with rangeland

The comparison of the soil properties of rangeland with dry farming in 0-30 cm depth (**Table 5**) indicated that the other properties of the two land uses had no significant difference (P<5%), except saturation percentage (P<1%), clay (P<1%), and sand (P<1%). In the horticultural usage, comparison of the soil properties with the rangeland in 0-30 cm depth showed that the percentage of clay (P<1%), silt (P<1%), and sand (P<1%), differed significantly and the other characteristics measured at the two land uses had no significant difference (P<5%).

Comparison of the soil properties of the dry farming and the rangeland in the depth of 30-60 cm (**Table 5**) indicated that the soil properties of the two land uses were not significantly different (P<5%), except potassium, saturation percentage, clay and sand. Comparison of the soil properties of the horticultural area with the rangeland showed that there was no significant difference between the soil properties other than saturation percentage, clay, sand and silt (P< 5%).

Except for saturation percentage, clay, silt, and sand

Table 2. Some properties of land uses.

Land use	Land form	Slope class (%)	Altitude class (m)	Parent material
Rangeland	mountain	10-20	600-650	Limestone
Horticulture	mountain	10-20	650-700	Limestone
Dry Farming	mountain	10-20	700-750	Alluvial

Table 3. Comparison of vegetation characters in the land uses (T-Test).

Land use	Properties			Significance
	Dry Farming	Horticulture	Rangeland	
Plant production (Kg ha^{-1})	60.00±15b.1	19.00±0.40c	30.00±0.50a	**0.00
Canopy cover (%)	36.00±0.57a	0.41±0.01b	0.51±0.00b	**0.00
Density I (n m^{-2})	3.00±2.10a	2.00±0.81a	2.00±1.01a	0.24n.s
Density II (n m^{-2})	29.0±0.82a	7.00±0.71b	8.00±0.16b	**0.00
Density III (n m^{-2})	9.00±0.90b	6.00±1.02c	15.00±0.76a	**0.00

Table 4. Comparison of vegetation characters in the land uses (F-Test).

Land use	Density III (n m^{-2})	Density II (n m^{-2})	Density I (n m^{-2})	Plant production (kg ha^{-1})	Canopy cover (%)
Dry Farming	15.00±0.76^{a}	8.00.±0.16^{b}	2.00±1.01^{a}	30.00±0.50^{b}	0.51±0.00^{b}
Rangeland	9.00±0.90^{b}	29.00±0.82^{a}	3.00±2.01^{a}	60.00±1.15^{a}	36.00±0.57^{a}
T	5.19	36.37	00.1	56.96	63.60
Sig	0.03*	0.00**	0.42$^{n.s}$	**0.00	**0.00
Horticultural	6.00±1.02^{b}	7.00±0.71^{a}	2.00±0.81^{a}	19.00±0.40^{b}	0.41±0.01^{b}
Rangeland	9.00±0.90^{a}	29.00±0.82^{b}	3.00±2.01^{a}	60.00±1.15^{a}	36.00±0.57^{a}
T	-3.00	-19.05	-1.00	15.78	59.31
Sig	0.09$^{n.s}$	0.00**	42 $^{n.s}$	**0.00	**0.00

Values shown are the means±SD. Different letters in each column indicate significant differences among land uses (P< 0.05). *significant at the 0.05 probability level, **Significant at the 0.01 probability level,, n.s means non significant.

there was no significant difference in the soil properties of the land uses (P<5 %); wherein the highest and lowest saturation percentage and clay are related to the dry farming and the horticultural usage, respectively (**Table 6**). In terms of silt percentage, the dry farming and the rangeland had also no significant difference; nevertheless, both land uses had more silt amount compared to the horticultural land uses (**Table 6**). In addition, the horticultural and dry farming usages fed the highest and lowest percentages of sand respectively. Despite the non significant differences in influential factors of the soil fertility, the highest amount of nitrogen, phosphorus, potassium, and organic matter was related to the dry farming.

Comparison of the soil properties of land uses in the 30-60 cm depth (**Table 7**) showed that the soil properties of these land uses were not significantly different except for potassium, organic matter, saturation percentage, clay, silt, and sand (P<5 %). Dry farming land use had more potassium compared to two other land use and the rangeland had more organic materials. The dry farming and the horticultural usages had the highest and lowest saturation percentage and clay, respectively. In terms of silt, there was also no significant difference between the dry farming and the rangeland usage, although both the the land uses had more percentage of silt than the horticultural use. In addition, the horticultural and the dry farming land use had the highest and the lowest percentage of sand, respectively.

The amount of acidity and calcium carbonate at the rangeland land use compared with the dry farming and the horticultural was higher, although significant difference never observed statistically. The soil acidity has an effect on such factors as the availability of nutrients needed by plants, incitement of the heavy elements and activity of soil microorganisms. Soil acidity may vary due to different land management (*NRCS 1998*). Generally, it can be stated that turning the rangeland to other land uses has reduced the soil acidity at a depth of 0-30 cm. During examination of acidity of land uses, the percentage of calcium carbonate is a measure of soil acidity justification, in a way that the increase of acidity in the rangelands is attributed by increasing the amount of calcium carbonate, which is a characteristic of arid region's soils. *Balesdent et al.* (*2000*) reported that due to the impact on microorganism activity and soil organic carbon, the plantation leads to increasing the soil acidity and it conflicted this idea because of the soil and climate conditions of the region. In fact, comparison of calcium carbonate in the soils showed an increasing amount of lime in the rangeland soil leading to increases of the soil acidity.

The effective properties of the soil fertility, including nitrogen, potassium, and organic matter did not have significant changes, although the measured values of these properties in the dry farming and the horticultural use were mostly compararable to the rangeland land use at the surface soil layer. Nitrogen is considered as one of the macronutrients to plant growth and has

Table 5. Comparison of soil properties in the land uses (T-Test).

Land use	Clay (%)	Silt (%)	Sand (%)	SP (%)	$CaCO_3$ (%)	OM (%)	K (mg kg^{-1})	P (mg kg^{-1})	N (mg kg^{-1})	EC (dS m^{-1})	pH	Depth
Dry Farming	23.66±0.33^{b}	39.83±0.47^{a}	36.50±0.22^{a}	30.60±1.31^{a}	73.91±0.70^{a}	0.95±0.08^{a}	21.12±2.30^{a}	6.90±0.44^{a}	0.09±0.01^{a}	0.19±0.00^{a}	7.19±0.03^{a}	
Rangeland	36.33±0.33^{a}	40.33±0.42^{a}	16.23±0.30^{b}	36.66±1.30^{b}	74.00±1.41^{a}	0.88±0.15^{a}	37.11±1.08^{a}	6.90±0.44^{a}	0.08±0.01^{a}	0.18±0.02^{a}	7.97±0.01^{b}	
T	32.27	1.00	11.25	4.86	0.07	0.38	1.91	0.14	0.36	0.52	2.60	
Sig	0.00**	0.36**	0.00**	0.00**	0.94^{n,s}	0.71^{n,s}	0.11^{n,s}	0.89^{n,s}	0.72^{n,s}	0.62^{n,s}	0.04*	0-30
Horticulture	58.00± 0.25^{a}	27.00± 0.36^{b}	15.00± 0.25^{b}	37.21± 2.12^{b}	74.62± 42.1^{a}	0.94±0.17^{a}	11.40±0.70^{a}	5.93±2.17^{a}	0.09±0.01^{a}	0.18±0.00^{a}	7.91±0.02^{a}	
Rangeland	36.33± 0.33^{b}	40.33± 0.42^{b}	23.16±0.30^{a}	36.66±1.30^{a}	74.00±1.41^{a}	0.88±0.15^{a}	11.37±1.08^{a}	6.90±0.44^{a}	0.08±0.01^{a}	0.18±0.02^{a}	7.97±0.01^{b}	
T	65.00	63.24	6.92	1.34	0.28	0.20	0.01	0.43	0.17	0.00	2.58	
Sig	0.00**	0.00**	0.02*	0.14^{n,s}	0.78^{n,s}	0.84^{n,s}	0.98^{n,s}	0.67^{n,s}	0.86^{n,s}	1.00^{n,s}	0.04*	
Dry Farming	27.33±0.21^{b}	37.50±0.22^{b}	35.16±0.40^{a}	50.60±1.38^{a}	73.33±1.55^{a}	0.49±0.03^{a}	14.43±0.80^{a}	5.01±1.16^{a}	0.04±0.00^{a}	0.16±0.00^{a}	7.94±0.03^{a}	
Rangeland	36.50±0.22^{a}	38.66±0.22^{a}	24.83±0.30^{b}	38.66±1.99^{b}	75.66±0.16^{a}	0.84±0.29^{a}	10.13±1.24^{b}	5.81±1.78^{b}	0.08±0.02^{a}	0.15±0.00^{a}	7.98±0.01^{a}	
T	41.80	7.00	24.50	7.20	1.45	1.26	2.64	-0.51	-1.23	1.19	0.98	
Sig	0.00**	0.00**	0.00**	0.00**	0.20^{n,s}	0.26^{n,s}	0.04*	0.90^{n,s}	0.27^{n,s}	0.28^{n,s}	0.37^{n,s}	30-60
Horticulture	57.16±0.30^{a}	24.66±0.21^{b}	18.16±0.40^{b}	32.21±2.15^{a}	75.75±0.17^{a}	0.60±0.13^{a}	11.25±1.12^{a}	5.00±1.49^{a}	0.05±0.01^{a}	0.16±0.00^{a}	8.01±0.02^{a}	
Rangeland	36.50±0.22^{b}	38.66±0.21^{a}	24.00-±0.30^{a}	38.66-±1.99^{b}	75.66-±0.16^{a}	0.84-±0.29^{a}	10.13-±1.24^{a}	5.81-±1.78^{a}	0.08-±0.02^{a}	0.15-±0.00^{a}	7.98-±0.01^{a}	
T	29.82	26.24	13.48	5.40	0.34	74.0	0.66	-0.27	-0.76	1.06	0.94	
Sig	0.00**	0.00**	0.00**	0.00**	0.74^{n,s}	0.48^{n,s}	0.53^{n,s}	0.79^{n,s}	0.47^{n,s}	0.33^{n,s}	0.38^{n,s}	

Values shown are the means±SD. Different letters in each column indicate significant differences between land use and rangeland sites ($P< 0.05$).*Significant at the 0.05 probability level, **significant at the 0.01 probability level, n.s means non significant.

Table 6. Comparison of soil properties among land uses (0-30 cm depth).

Properties	Land Use			Significance
	Dry Farming	Horticulture	Rangeland	
pH	7.97±0.01^{a}	7.91±0.02^{a}	7.91±0.03^{a}	0.06$^{n.s}$
EC (dS m^{-1})	0.18±0.02^{a}	0.18±0.00^{a}	0.19±0.00^{a}	0.06$^{n.s}$
N (mg kg^{-1})	0.08±0.01^{a}	0.09±0.01^{a}	0.09±0.00^{a}	0.36$^{n.s}$
P (mg kg^{-1})	6.90±0.44^{a}	5.93±2.17^{a}	7.26±2.09^{a}	0.88$^{n.s}$
K (mg kg^{-1})	11.37±1.08^{a}	11.40±0.70^{a}	12.21±2.30^{a}	0.23$^{n.s}$
OM (%)	0.88±0.15^{a}	0.94±0.17^{a}	0.95±0.08^{a}	0.34$^{n.s}$
$CaCO_3$ (%)	74.00±1.41^{a}	74.62±1.42^{a}	73.91±0.70^{a}	0.96$^{n.s}$
SP (%)	38.66±1.99^{b}	32.21±2.15^{c}	50.60±1.38^{a}	0.00**
Clay (%)	23.16±0.30^{b}	15.00±0.25^{c}	36.50±0.22^{a}	0.00**
Silt (%)	40.33±0.42^{a}	27.00±0.36^{b}	39.83±0.47^{a}	0.00**
Sand (%)	36.51±0.33^{b}	58.00±0.25^{a}	23.66±0.61^{c}	0.00**

Values shown are the means±SD. Different letters in each row indicate significant differences among land uses (P< 0.05). **Significant at the 0.01 probability level, n.s means non significant.

Table 7. Comparison of soil properties among land uses (30-60 cm depth).

Properties	Land Use			Significance
	Dry Farming	Horticulture	Rangeland	
pH	7.98±0.01^{a}	8.01±0.02^{a}	7.94±0.03^{a}	0.06$^{n.s}$
EC (dS m^{-1})	0.15±0.00^{a}	0.16±0.1^{a}	0.16±0.00^{a}	0.15$^{n.s}$
N (mg kg^{-1})	0.08±0.2^{a}	0.05±0.01^{a}	0.04±0.00^{a}	0.51$^{n.s}$
P (mg kg^{-1})	5.81±1.78^{a}	5.00±1.49^{a}	5.01±1.16^{a}	0.15$^{n.s}$
K (mg kg^{-1})	10.13±1.24^{b}	11.25±1.12^{b}	14.33±0.800^{a}	0.00**
OM (%)	0.84±0.29^{a}	0.60±0.13^{b}	0.49±0.03^{b}	0.05*
$CaCO_3$ (%)	75.66±0.16^{a}	75.75±0.17^{a}	73.33±1.55^{a}	0.18$^{n.s}$
SP (%)	38.66±1.99^{b}	32.21±2.15^{c}	50.60±1.38^{a}	0.00**
Clay (%)	24.84±0.40^{b}	18.16±0.40^{c}	35.16±0.40^{a}	0.00**
Silt (%)	38.66±0.21^{a}	24.66±0.21^{b}	37.51±0.22^{a}	0.00**
Sand (%)	36.50±0.22^{b}	57.16±0.30^{a}	27.33±0.21^{c}	0.00**

Values shown are the means±SD. Different letters in each row indicate significant differences among land uses (P<0.05). Significant at the 0.05 probability level, **significant at the 0.01 probability level, n.s means non significant.

been introduced as the plant development bottleneck (*Salardini 2012*). After nitrogen, potassium is also most usable element in plants due to the important role in regulation of photosynthesis, transport of carbohydrates, protein, etc, but since the soils often contain large amounts of potassium, the plants rarely become deficient from this element (*Jafari and Sarmadian 2011*) and also the reason of increase of these properties in the dry farming and the horticultural land use is the chemical fertilizers used by the farmers which are in consistent with the results of *Mojadadi et al.* (*2012*). The researchers investigated the effect of changing in the forest land use on the chemical properties of soil reporting that the organic matter, total nitrogen, and pH reduces by making use of forests to other land uses, although the amount of absorbed potassium rose which was because of the chemical potash fertilizer added to the region soil.

Dry farming with *Medicago sativa* had significantly more usable potassium towards the rangeland (*Mofidi et al. 2012*). It should be noted that the difference between the total amounts of potassium in different soils could be due to the difference in various levels of clay, silt, and sand (*Sekhon et al. 1992*). Diverse dispersal of clay in the various soils leads to the difference for the soil potassium (*Srinivasarao et al. 2007*). In general, most of the exchangeable potassium with ammonium acetate is in the clay and silt parts of the soils (*Ajiboye and Ogunwale 2008*). The potassium in the plants has increased in dry farming land use.

The organic matter is an important part of the soil properties, playing a major role in its productivity and fertility (*Stevenson 1994*), which is known as an appropriate index to the soil quality and the environmental health in recent decades; In addition, it is very sensitive to tillage operation, farming ratios, fertilization operations, and the other effective factors on the whole soil organicmatters (*Laik 2009*). The amount of organic matter in the soil of dry farming and horticultural was more than the rangeland land use in the surface soil layer, which was most likely due to the cultivation and adding the organic material (organic and chemical fertilizers) and to the density of farming plant species. Land use changes soil organic carbon due to human activities and tillage-induced decomposition of organic matter (*Khormali et al. 2009*). In addition, in the study of Ayoubi et al. (2014) on effects of rangeland degradation to the soil quality in a semiarid region of western Iran reported that organic carbon has decreased following rangeland degradation. In general, plants encourages the soil fertilization thus it can help soil organic carbon improve within the frequency and cultivate system (*Koutika 2005*). Therefore, the dry farming and the horticultural uses are expected to have increase of the organic matter in the soil due to planting new vegetation and appropriate fertilization. *Ahmadi et al.* (*2003*) reported that reducing the amount of organic carbon in the soil could be attributed by the plant harvest by the livestocks and subsequently reducing the amount of additive litter in the soil.

Reducing the amount of organic matter will also result to microbial biomass reduction and reuse of soil organic matter (*Jones 1971*), which reducing the organic matter in the surface layer of soil in the rangeland land use corresponded with the findings. *Hajabbassi et al. (2007*) investigated the effect of conversion of rangelands to agricultural land use on some physical and chemical properties of soil and reported that this land use changes resulted in 39% increase in the amount of organic matter.

Heshmati et al. (*2011*) and *Mofidi et al.* (*2012*) also confirmed the issue that the conversion of rangeland to agriculture land use would reduce the soil organic matters. Changes of organic carbon content sometimes show favorable management practices (*Shahriari et al. 2011*). Some studies showed that suitable land management increases orgnic carbon contents of the soil (*Ebrahimi et al. 2016, Ayoubi et al. 2012*). *Falahatkar et al.* (*2014*) reported that conversion of the forest to rangeland resulted into loss of organic carbon content of the soil in northern Iran.

Some parts of the organic matter drifted down as soluble liquid from the surface toward the lower parts of soil over time (*Mingxin and Chorover 2003*). The soils with no tillage operations process (like rangelands and forests) is permanent. However, soils with tillage operations (especially the back plowing, like agricultural and horticultural lands), putting the materials to the soil depth is partly disrupted and the most dissolved organic material is mixed with topsoil.

The change in land use would reduce the amount of soil lime in the horticultural and dry farming land use compared to the rangeland, which could be due to the increase of irrigation. Similar results after investigating the effect of conversion of rangeland land use on the physical and chemical properties of soil in Noshahr (Iran). The soil saturation percentage in the dry farming and the horticultural land uses were more and less than the rangeland (*Malek Pour et al. 2011*). *Majid et al.* (*2002*) also reported that through the increase of clay and organic matter in the soils, the saturation percentage is increased as well. Since the highest and the lowest total percentage of clay and organic matter were related to the dry and the horticultural land uses, the dry farming and the horticultural land uses contained the highest and the lowest saturation percentage.

One of the stable physical properties of the soil is its texture and effects on the other soil properties such as soil bulk density, soil moisture storage, structure, permeability, cation exchange capacity, saturation percentage, and the content of organic matter (*Jafari and Sarmadian 2011*). No significant changes in the averages of the components of the soil texture occurred were observed in changing the rangeland land use into the dry farming and the horticultural. Based on the percentages of sand particles, silt, and clay in both studied depths, the dry farming, rangeland, and horticultural land uses were categorized in the texture classes loam clay, loam, and loam sandy. In other words, the soil texture, in the land uses horticultural, rangeland, and dry farming, gets heavier. These indicated more air opening of parent materials in the dry farming to the rangeland and less air opening of the materials than the rangeland. Thus, dry land and horticultural have the heaviest and lightest soil texture. In the soil texture, smaller seems to be useful in the short-term, although lasting this process in long-term could reduce the qualitative and effective properties on the soil fertilization and turns the soil to be unsuitable. *Kay* (*1990*) reported that soil texture has little sensitivity to the management changes, but examination of land uses demonstrated the tangible changes in the soil texture due to the usage change. Unsuitable land use change results in soil physical degradation and makes the land more sensitive to the soil erosion. This is due to macro-aggregates which are fragmented into primary particles which are susceptible to detachment by runoff (*Celik 2000, Mokhtari Karchegani et al. 2014*). Conversion of the rangeland into the agriculture land does not influence the change of the soil texture class, but the amount of clay in the dry farming was significantly increased (*Mofidi et al*. (*2012*). It seems that this phenomenon can change the soil texture class in long-term.

CONCLUSIONS

The lands' capability in terms of soil fertility varies. In the study area, reclamation of rangeland land-use is not possible. Thus, the long-term solution is to reduce of tillage to improve capability in managing hazards in the agricultural lands. In the rangeland, regulating the excessive livestock and preventing it from entering the rangeland before land preparation to graze can improve soil properties in the long term. The use of late-renewable natural lands and stable use, which is one of the major principles of any community development, should be consistent with the physical condition and working potential of each region in long-term. It means that the use of these lands and resources should be consistent with all the natural phenomena and laws to preserve them. If such laws and phenomena are disregarded, the inappropriate effects must not be observed immediately. But after sometime, the natural resources would lose their efficiency and will bring dangerous consequences.

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