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The effect of altitude from the sea level on regeneration and change in forest's type of Zagros forests

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ABSTRACT: Highland forests are characterized with some patterns of local plant combinations. Sever environmental changes and topographical differences usually cause the creation of microclimates which restrict the emplacement and growth of trees. Because Zagros Mountains are classified among highlands, to evaluate the regional parameter of altitude from the sea level on transformation of forests type and breeding is in great importance. In order to classification the macro and micro diameter of trees wreath in different species of trees in Ghale_ghol (Nozhian) forests in Lorestan province, from the lowest altitude of the region with 1700 m to the highest with 2500 m, having 5 type like transects with 10m width and 200m distance from each other, furthermore in order to evaluate the breeding in this region, 5*5 meter plots were used into transects (per 30m one plot). Classification was done in the region based on the prevailing trees and bushes. The results of this study showed that because of the local and growth place changes owing to increase in altitude from the sea level, there were changes in types. These changes include four types, so that in higher altitudes, trees are replaced with bushes. Furthermore the most breeding and regeneration was observed in middle heights.

Key Words: Forest's type, Zagros forests, environmental changes, topographical

INTRODUCTION

Now day's world forest ecosystems are the most sophisticated and attract high attention. As our lifestyle is associated with forest as if small destruction of it, will bring irreversible effect of society. Zagros forests are combined of communities and species with different types which the majority of these communities constitute of *Quercus* species.

Due to the topography of the Zagros forest, height from the sea level is specialized and some quantitative and qualitative factors of trees such as species, number in acres and cover percentage, deepened on it. In a study of Quercus forests in Loveh, Gorgan, height above sea level has been introduced as one of the most important factors that influence the quality or poor habitat (Marvi, and Reza, 1363). Eelevation range and distribution of three species of oak in Baneh forest has considered and results showed that by increasing in altitude canopy has increased and in some areas with less access, more canopies was observed which is the reason of less destruction in this areas (Rahimzadegan, 1383). In a study on Siahkal forest was observed high diversity of tree species in the studied forest and despite a reduction in species variety by increasing in height, frequency of species reduced (Fallah and Mozafar, 1384). Two stands of undisturbed and three stands of exploited forest were examined and according the results, height above the sea level and intensity of utilization are the most important factors affecting the forest and reproductive structures (Hatimana *et al*, 2004) .

MATERIAL AND METHODS

A. Site study

Ghale_ gol with an area of 4456 hectares is located 35 kilometers from the city of Khorramabad between 259 262 to 271 375 m length and geographic altitude of 3682628 to 3689164 meters. The minimum and maximum height in this region is equal to 1700 and 2700 m. The average annual rainfall and temperature is 725 mm and 11 ° respectively. Annual humidity is estimated 42% .The soil texture in most areas is clay loam.

B. Forest inventory

In order to evaluate the effect of altitude on and change in forest type, the inventory area was determine by using the 1 : 50,000. Then Forest inventory were done from the lowest altitude of the region with 1700 m to the highest width 2500 m, having 5 type like transects width 10 m width and 200 m distance from each other. The length of strips was calculated 2160, 2112, 2050, 2165 and 2014 respectively by GPS. Along the strips, the large and small diameter of trees and shrubs of different species were measured (Fig. 1.).

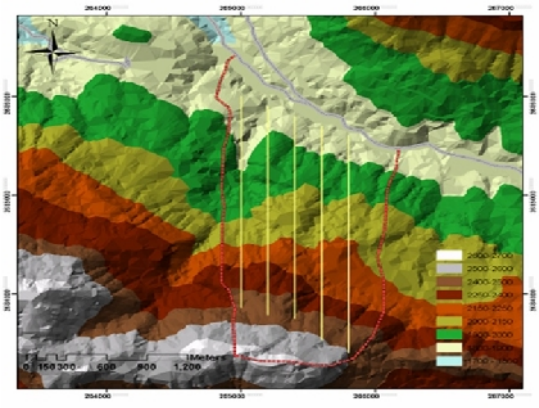

Fig. 1. Strip transect on map.

Table 1: Method of forest's type.

Type	Tree species	Tree mixture		
		First	Second	Third
Dominant	*Quercus*	>90 ٪		
	Amygdalus	>90 ٪		
	Quercus_Acer	50-90%	<50%	
	Quercus_Acer	<50%	<50%	
	Quercus_Acer_Pyrus	50-90%	<50%	>10%
	Quercus_Acer_Pyrus	<50%	<50%	>10%

Forest type in the study area was observed on the dominant species of tree shrub canopy (Jazirei, 1382). Net type is a type that determined species canopy cover more than 90 percent of the surface area. If one species doesn't cover 90 percent of the forest with its canopy and this amount is achieved with the participation of the two species, Type is listed in order of their contribution in the coverage. If none of the species canopy reaches to 50 percent, Type is determined respectively with three species which appeared to cover a larger share than the others. Furthermore in order to evaluate the breeding in this region, 5*5 meter plots were used into transects (every 30m one plot). 4 types were observed in the study area, which includes three types of tree and 1 type shrub.

RESULTS AND DISCUSSION

Results of this study showed that with the increase of sea level change can be seen in the forest's type. Quercus type with the area of 4.8 hectares is expanded from 1700 to 2030 meters altitude, which is about 47% of forest land areas. The amount of seed regeneration and breeding was estimated 5 and 112 per hectare respectively. From 2030 m to 2200 m altitude, *Quercus*, *Pyrus* and *Acer* with the area of 2.5 hectare is expanded which approximately included 24 % of the total forest land. Seed regeneration and breeding was estimated 12 and 176 per hectare respectively. *Amygdalus*, *Quercus* and *Acer*, are the most dominant type in the height of 2200-2350 and 2350-2500 meter respectively. The area for Quercus_Acer was estimated 1.3 hectares which allocated 12% of total forest. Amygdalus with the area of 1.8 hectares included 17% of the forest lands. Quercus forests of Lorestan the same as other Zagros forest are destroyed and Their structure is out of normal So that the effects of degradation such as coppies forest was observed in appearance, indicating a severe cut of seedlings.

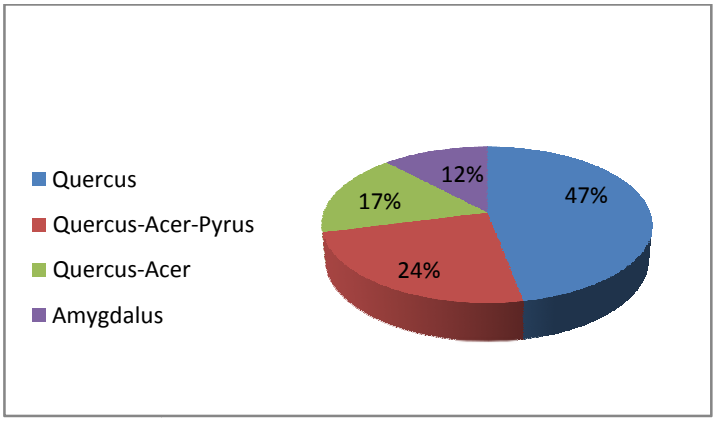

Fig. 2. Area of forest's type in region of study.

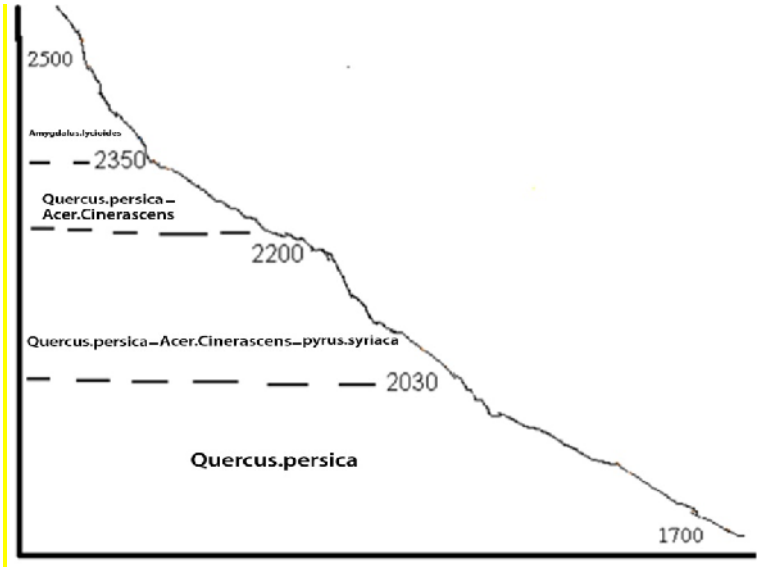

Fig. 3. Profile of altitudinal in site of study.

Table 2: Number of regeneration in forest's type.

Forest type	Region height	Seed regeneration (Per hectar)	Breeding number (Per hectar)
Quercus	1700 - 2030	5	**112**
Quercus_Acer	2030 - 2200	12	**176**
Quercus_Acer_Pyrus	2200 - 2350	9	**153**
Amygdalus	**2350-2500**	-	**71**

In general, land position affected forest to some extent. With increasing height from sea level, the air temperature decreases over slopes. Due to the plant requirement to the special thermal optimum for growing in particular area, we can observe variety among species in different height .Flora classes and distinct forest types are the results of height variety which lead to change in climate. Also in this study we observed the effect of height on forest type so that duo to height variation, four types were estimated and in higher altitude shrub replaced with trees. With increasing altitude, because the lack of suitable condition, the reproductive rate of the species and breeding power is reduced. In the upper elevations due to the habitat destruction and the presence of livestock and nomads in the region, density of tree is reduced and trees regeneration are not in a good condition. Lack of appropriate native foundation, mother tree and suitable soil and inadequate seed viability has lead to reduction of generation.

From the point of view of stock mans, the higher lands are considered as a summer resort, and the nomadic migration along with their livestock from those areas is considered to be one of the most effective ways to lessen forest destruction and help forest preservation. Pay great attention to the artificial process of reforestation is considered the effective way for stop forest destruction. Attention to the restoration of degraded areas or enrich existing forests is one of the ways of dealing with qualitative and quantitative degradation. So the use of native species for forest restoration and enrichment is one of the most persistent and appropriate methods to increase the quantity and quality of the forest area. Further studies are required to achieve a general rule about the relation between height and forest changing. In related to that issue) 1) has considered the ecological role of height on tree diversity of Siahcal forest. He observed a high diversity of tree species in the forests studied and increasing in height from sea level, has lead to reduction in species diversity despite increasing in their frequency. According this study, with increasing altitude reproductive rate decreases. In other word, rocky terrain and soil erosion in higher altitude put negative effect on regeneration. In a study which was conducted on Marivan forest, increase in high from sea level was considered as a reason for quercus reduction breeding (Poorhashemi, 1383).

The majority of forests are young and coppice. Because of rejuvenating, seedlings are seen in small number. Of course large number of seeds are eaten by animals or gathered by ranchers.

Therefore, the natural regeneration of this forest is difficult. Of course livestock grazing and dry land farming are considered as factors which affected natural regeneration. Lorestan forest due to excessive exploitation and conventional dairy, wood farming and cultivated by dry farming in the forest over the past years and now, have been severely dilapidated and not normal. So that many natural and ecological processes, such as biodiversity, natural regeneration, water and soil conservation is not applied. Hence there is urgent need for forest restoration and renovation to return to the initial state. The following principles should be considered in the revival of the forest:

1. The main use of local and native species for restoration.
2. Preserving the natural state of the forest.
3. Serious attention to habitat condition for the usage of species.
4. Strengthening ecological processes such as biodiversity, natural regeneration and cycles of nutrients and water.
5. Gradual restoration of destroyed forests.
6. The implementation of the recovery plan.
7. Participation and cooperation of the local people.
8. Principled and purposeful usage of forest products (The use of forage forest floor for traditional livestock and to control the fire).

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