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A Study of the Forest Types in Beech sites in Hyrcanian Forest (Case Study, Watershed No. 44 of Nowshahr Forests-Iran)

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Abstract: The recognition of the plant coverage of an area is the basis of ecologic studies; and plays an important role in the environmental life management. The goal of this study is introducing the trees and shrubs species in beech sites of Kojour as plant units. In this study, at first, the land form units were divided on topography maps (1:25000). Then at each land unit, the trees and shrubs were recognized through forest course, and a circular plot (1000 m^2) was selected regarding to stand conditions (in total 31 plots). According to physiognomic conditions the plant units were defined. The results were shown as types of the trees and the shrubs at each area regarding the altitude, aspect and percent of slope. The results indicate that the distribution of spices, the mixture of the trees and the forest types of beech sites are affected by ecological factors. There are better conditions in the forest stands, at higher altitude. The high quality spices are found in the northern aspects because of the suitable humidity where as destroyed stands are seen in the southern aspects. Going far from the villages, the forest types change by ecological factors.

Key words: Beech, forest types, hyrcanian forests, Iran

INTRODUCTION

Intensive forest management, including site preparation, leads to serious concerns that the productivity of intensively managed forests will decline over successive rotations. Site preparation can alter conditions for the soil biota, modify organic matter quality and quantity, and cause leaching of some nutrients, as well as alter temperature and moisture conditions (Ballard, 2000; Fox, 2000). It is widely recognized that forest vegetation varies according to soil fertility and acidity, temperature, light and moisture (Diekmann and Lawesson, 1999), and is a fairly good indicator of potential growth (Berges *et al*., 2006) and ecological integrity (Aubin *et al*., 2007) of managed forests (Lalanne *et al*., 2008). It is also admitted that management practices may modify the composition of understory plant communities through their influence on the above-mentioned factors (Van-Calster *et al*., 2007). On the ecological requirements of plant species are documented and indexed over wide environmental gradients (Diekmann, 2003), then lists of plant species and their echograms can be used to achieve a thorough assessment of site conditions, often in conjunction with humus types (Bartoli *et al*., 2000; Wilson *et al*., 2001). Among a regional pool, each forest, for past as well as present-day reasons, will select or favor a subsample of species and species traits, which will be redistributed according to niche requirements of species, assembly rules and disturbance effects (Rajaniemi *et al*., 2006).

The Hyrcanian (Caspian) district of northern Iran possesses a closed-canopy deciduous forest, unlike the arid to semi-arid landscape throughout most of Iran. Hyrcanian forests are located at green strip extending over the northern slopes of Alborz range of mountains and the southern coasts of the Caspian Sea. Hyrcanian forests encompass various forest types including 80 woody species (trees and shrubs). They are suitable habitats for a variety of hardwood species such as beech, hornbeam, oak, maple, alder, and Large-leaved lime (Sagheb-Talebi *et al*., 2003).

Economically important trees in Iran have historically been harvested to maximize wood production without considering sustainability. Eastern beech is a dominant and economically important tree species in Iran.

About 1.8 million hectares of these forests are located in northern Iran (i.e., the Hyrcanian Forests) on the northern slopes of the Alborz Mountains overlooking the Caspian Sea (Sagheb-Talebi *et al*., 2003). The Hyrcanian Forests consist of mixed broadleaf deciduous species, and have an uneven topography and very steep slopes like found in European forests (especially Balkan's European beech forests) (FAO, 2005).

Some areas like Kojour region, in Nowshahr city in the north of Iran are suitable site for different forests types. Kojour forests are located in the south slopes of

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Table 1: The characteristics of the plots in the study sites

Plot	Site	Aspect	Altitude (m)	Slope (%)	Plot	Site	Aspect	Altitude (m)	Slope (%)
1	Poul	NE	1900	60	17	Saas	E	2000	65
2	Poul	N	1600	35	18	Saas	E	2200	60
3	Poul	N	1600	55	19	Saas	E	2400	45
4	Poul	N	1800	45	20	Saas	NE	1900	20
5	Poul	N	1900	30	21	Saas	NE	2050	60
6	Poul	N	2200	40	22	Saas	NE	2100	20
7	Zanous	NE	2100	30	23	Saas	NE	2100	50
8	Zanous	NW	1800	30	24	Saas	N	2400	45
9	Zanous	NW	2000	45	25	keinj	N	1200	70
10	Zanous	NW	2100	60	26	keinj	N	1800	50
11	Zanous	NW	2200	45	27	Mikhsaz	NW	2100	50
12	Zanous	NW	2200	50	28	Mikhsaz	NW	2300	30
13	Zanous	NW	2300	50	29	Mikhsaz	NW	2400	50
14	Zanous	W	2000	40	30	Largan	NW	1900	55
15	Saas	E	1900	60	31	Largan	NE	2000	50
16	Saas	E	2000	60					

Table 2: The lists of the trees and shrubs in the study sites

Scientific name	Family
Acer campestre L.	*Aceraceae*
Acer cappadocicum Gled	*Aceraceae*
Acer velutinum Boiss.	*Aceraceae*
Berberis vulgaris L.	*Berberidaceae*
Carpinus betulus L.	*Corylaceae*
Carpinus orientalis Mill.	*Corylaceae*
Fagus orientalis Lipsky.	*Fagaceae*
Quercus petraea L. ssp. i*berica*)Stev.(Krasslin	*Fagaceae*
Quercus castanefolia C.A.M.	*Fagaceae*
Quercus macranthera Fisch & Meyer	*Fagaceae*
Fraxinus excelsior L. ssp. *coriariaefolia* (Scheele) Murray	Oleaceae
Cerasus avium (L.) Moench	*Rosaceae*
Crataegus meyeri Pojark	*Rosaceae*
Crataegus pentagyna Waldst & Kit.	*Rosaceae*
Malus orientalis Ugl.	*Rosaceae*
Mespilus germanica L.	*Rosaceae*
Prunus divaricata Ledeb.	*Rosaceae*
Pyrus boissieriana Buhse	*Rosaceae*
Sorbus torminalis (L.) Crantz	*Rosaceae*
Ulmus glabra Huds. (non Mill.)	*Ulmaceae*

Alborz in Hyrcanian zone. The primary function of these forests is supportive and environmental and their vital role in soil and water sources conservation as well as natural balance in this mountainous high slopes. Intensive graze, over-utilization of forests for firewood production and farming in wooded areas are amongst the main causes of deforestation in this area.

The recognition of the vegetation cover of an area is the basis of ecologic studies; in addition it plays an important role in the environmental life management. The aim of this research is to identify the tree and shrub species of Beech forest in Watershed No. 44 of Noshahr Forests as forest types. This research is focused to study trees and shrubs, forest types and hazards in these areas.

MATERIALS AND METHODS

This research done in the course of years 2009-2011 in Kojour forests, northern of Iran. One of the most abundant and economic hardwood genera in the northern hemisphere temperate forests is the *Fagus* (Beech) genus. So far 20 beech species have been identified however, controversies do exist, while all these species are distributed in the northern hemisphere, only *Fagus orientalis* Lipsky occurs in Iran. In Hyrcanian forests, pure and mixed beech forests are one of the most important, richest and most beautiful forests often lying on the northern slopes of Alborz mountain ranges adjacent to the Caspian Sea coasts. The vertical distribution of beech is highly dependent on climatic conditions so that at given latitude and humid climate, beech trees can be found in terrestrial up to alpine vegetation areas. Although the eastern beech could be found at altitudes ranging from 500 to 2000 m, the optimum growth can only be achieved at altitudes of 900 to 1600 m. Generally, the eastern beech is a semi-hydrophilic species with a high resistance to low temperatures and freezing, sunburn and other stresses, requiring high quality soils, which grows on deep and relatively deep, loamy to sandy-loamy, cambisol (forest brown soils) especially the acidic type as compared with the European beech (2).

The watershed No. 44 of Noshahr Forests is located in the central southern slopes of Alborz in Hyrcanian zone. The altitude is varied from 250 to 1800 meters above sea level.

Based on the climatic data from nearest meteorological stations in this region, the climate is semi-humid with cold winters (August with the highest average maximum temperature of 22ºC and February the coolest month with an average minimum temperature of 5ºC), yearly average temperature about 12ºC and yearly precipitation about 400 mm.

In this study, at first, the land form units were indicated on topography map (scale 1:25000). The division of land form units is based on altitude (altitude classes: each 100 meters above sea level), aspect and percent of slope (slope percent classes: <20, 20-40, 40-60, 60-80 and >80%). Then at each land unit, trees and shrubs were recognized through forest course. Experimental plots

Table3- The list of spieces in the study plots

plot	site	forest type	coverge%	Beech	Hornbeam	Cappadocian maple	maple	oak oak	lezzory	ash ash	elm elm	oreintal hornbeam	Hedge maple	wild cherry	maytree	pear	medlar tree	holly	apple tree	plum tree	barberry
1	Poul	B-H	50-75	*	*		*														
2	Poul	B-H	>75	*	*																
3	Poul	B-H	50-75	*	*	*		*							*						
4	Poul	B	>75	*																	
5	Poul	B-E	50-75	*							*				*			*			
6	Poul	B-H	5_25	*	*		*		*	*											
7	Zanus	H-B	25-50	*	*			*					*			*			*		
8	Zanus	O-B	25-50	*				*				*									
9	Zanus	B-C	25-50	*	*			*	*	*	*	*	*	*							
10	Zanus	B-A	50-75	*	*	*				*											
11	Zanus	B-H	25-50	*	*			*		*		*	*		*	*			*	*	*
12	Zanus	B-H	>75	*	*	*		*	*	*				*							
13	Zanus	B-O	50-75	*	*	*		*	*	*			*			*					
14	Zanus	B-C	25-50	*	*	*				*		*	*								
15	Sas	B-H	50-75	*	*	*			*							*					
16	Sas	B-H	50-75	*	*	*		*	*					*		*					
17	Sas	B-O	>75	*	*				*	*			*								
18	Sas	B-O	50-75	*				*													
19	Sas	B-O	50-75	*				*					*				*		*		
20	Sas	B-H	50-75	*	*	*			*												
21	Sas	B-H	>75	*	*	*		*	*					*							
22	Sas	B	>75	*																	
23	Sas	B-A	25-50	*		*				*			*						*		
24	Sas	B-V	>75	*				*		*			*	*							
25	Kinij	O-B	50-75	*	*			*				*	*				*			*	
26	Kinij	B-O	>75	*		*		*		*		*									
27	Mikhsaz	O-B	25-50	*	*			*	*												
28	Mikhsaz	H-B	50-75	*	*	*		*		*			*	*		*					
29	Mikhsaz	O-B	25-50	*	*				*							*			*		
30	Largan	B-O	50-75	*	*							*									
31	Largan	B-H	50-75	*	*	*		*	*	*			*								

Table 4: The forest types in the study sites

Forest type	Plots	Aspect	Altitude(m)	Slope%
(Beech)	4-22	N,NE	1800-2100	20-45
(Beech-Hornbeam)	2-3-6-12-15-16-20-21-31	(N-NE-NW-E)	1600-2200	20-60
(Beech-Oak)	13-17-18-19-26	(NW-E)	1800-2400	45-65
(Beech-Oriental Hornbeam)	9-14-30	(NW-W)	1900-2400	40-55
(Beech-Maple)	1	(NE)	1900	60
(Beech-Cappadocicum Maple)	10	(NW)	2100	60
(Beech-Hedge Maple)	23	(NE)	2100	50
(Beech-Wych Elm)	5	(N)	1900	30
(Beech-Common Ash)	14	(W)	2000	40
(Oak-Beech)	8-25-27-29	(NW)	1200-2400	30-70
(Hornbeam-Beech)	7-28	(NE-NW)	2100-2300	30

with different dimensions were selected regarding to stand conditions. Then a list of woody plants was determined on the basis of forest coverage, altitude, slope aspect and percentage. According to physiognomic conditions the forest types were defined. In this research, forest types were defined based on frequency of species, receptivity based on first and second dominant species.

RESULTS

The characteristics of selected plots in the study area showed in Table 1. Also a list of woody plants in theses plots showed in Table 2. Forest typology was based on first and second dominant species (Table 3). In most of plots, Beech and Hornbeam were dominant species (9 plots). This type is mostly seen one at altitude of 1600-2200 m above sea level and in all aspects of slope especially northern, eastern, northeastern and northwestern. In the plots No. 4 and 22, Beech was only species (Table 4).

The tree and shrub types were determined on the basis of elevation, slope percent and aspect. Results showed that the most of forests units located in north aspect, and between 1800-2400 m above sea level. In north aspects, three forest types, in western aspects, only one type was found in this elevation range (Fig. 1). In the most of study area, there was any plant coverage at the southern aspects.

DISCUSSION

The results indicate that the distribution of species, the mixture of trees and the forest types of the experimental area are affected by physiographical factors. There are better conditions regarding to the species composition, density and quality of species in the forest stands which are placed on higher altitude. Sagheb-Talebi *et al*. (2003) studies indicated that natural dense sites are found at the altitudes of 1000 to 2100 m. However some communities could be observed down to 600 m altitude

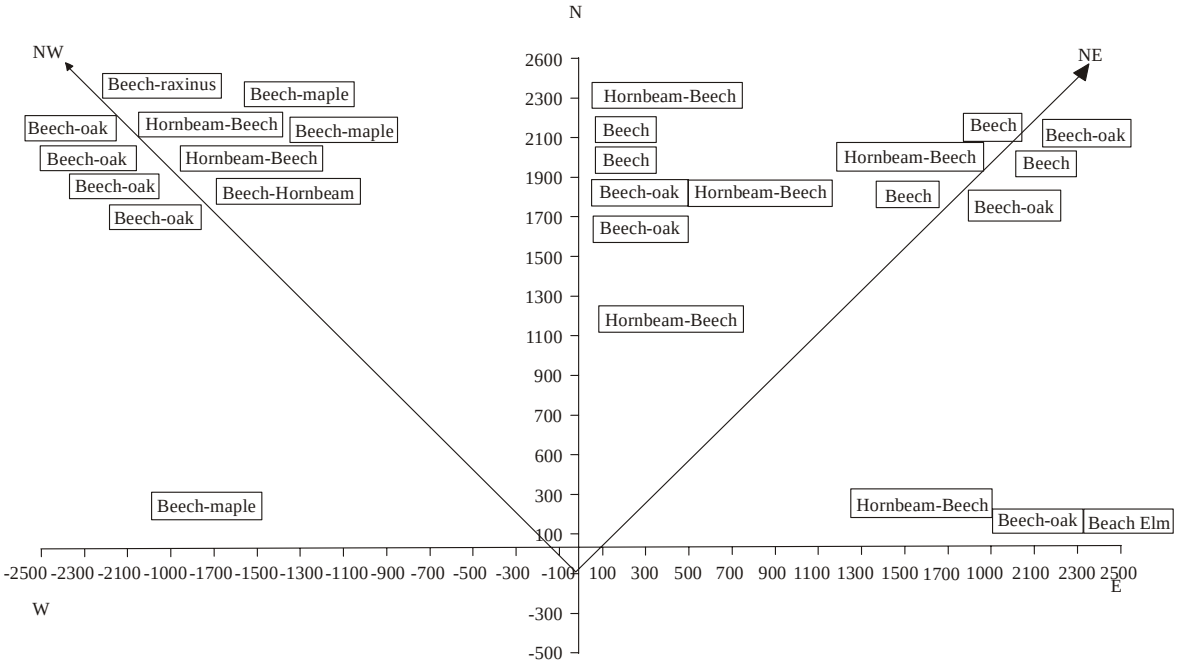

Fig-The diagram of the forest types in study area

Fig. 1: The diagram of the forcest types in studd area

depending on the local and microclimatic conditions. The beech trees are found in small groups up to 500 m a.s.l. while individuals have been reported from 110 m up to 2650 m. At low altitudes, they occur mixed with *Carpinus betulus* while *Carpinus orientalis* is seen mixed with beech trees at higher altitudes. The best beech stands are found at the altitudes of 900 to 1500 m on northern slopes (Ballard, 2000).The high quality species are found in the northern aspects because of the suitable humidity whereas destroyed stands are seen in the southern aspects. Wind, snow, thunder, landslide and wild animals are natural disturbances in this area. Intensive graze, over-utilization of forests for firewood production and farming in wooded areas are the main causes of deforestation. The condition of the region and the richness of the flora have resulted in various ecosystems. However, abundance of villages, conversion of forest areas to farmland, deforestation for firewood production and other rural consumption have changed the natural view of the region over the past decade.

CONCLUSION

The changes of forest plants in beech forests are eclipsed physiographic factors. Elevation and aspect have an important role on plant cover. Thus, the must do new research in this field to earn the more information. Because, the case study in forest (for example present study) recognized surreptitious angles in this theme.

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