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Research Pape

Comparison of flora, life forms and chorology in the two untouched and degraded sites in Beech forests (Case study: Shafaroud forests.Gilan,Iran)

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Abstract: In order to study on environmental changes effects on understory vegetation, two untouched and degraded sites were evaluated in Shafaroud forests. Three sampling plots (one hectare in each site) were selected and each plot divided to four sub-plots (10*10m).In each Sub-plot plant samples were collected and identified using different flora references. Results showed that a total 45 species were known from untouched areas that belong to 28 families and 39 genera. 32(71%) dicotyledones, 8 (18%) monocotyledones and 5 (11%) pterydophyta were identified. Lamiacea with four species was the highest number species.17 families have only one species. Flora of degraded site includes 74 species (60 (80%) dictyledones, 9 (12%) monocotyledones and 5 (8%) pterdophyta) that belong to 32 families and 62 genera. Asteraceae with 9 species are the most abundant in this area. Also 7 species of Lamiaceae family were identified in degraded area. hemichryptophytes are the most frequent life forms in the both areas. From the view of geographical distribution, plants of untouched area included 69% species belonging to Euro-Sibrean and only 2.5% species belonging to Cosmopolitan while in degraded area 51% and 3.5% species belaged to Euro-Sibrean and Cosmopolitan, respectively.

Key Words: degraded ecosystems, life forms, chorology Caspian forests

Introduction

The Hyrcaninan forests are considered as the last residues of broadleaf forests. The beech (*Fagus orientalis* Lipsky) is one of the most valuable woody species in this region which has approximately 30 percent of standing volume of the Northern Forests of Iran (Resaneh *et al*., 2001).On one hand the permanent presence of undeveloped population in this forest and uncontrolled harvesting of the past which is continuing more intense and on the other hand, devastating threat of the climate change has made the persistence of this precious biome face serious hazards.

The vegetation is outcome of ecological conditions and environmental factors (Moghaddam, 2001).The study of characteristics of plant communities in different conditions can be effective in the optimal management. The selection of plant species with the purposes such reduction of erosion effects, production of required cellulosic and forage and ecotourism requires recognition of these communities. Also, natural ecosystems are of particular importance as the worthwhile heritage of human societies and their unique role in life cycles. Iran with more than 8000 plant species is one of the richest regions in the world as the floristic aspect, and Guilan province with 22 percent of the flora is of important features. Vegetation studies in this area due to its similarities with the plant species in Central Europe has always been regarded by European scholars (Shahsavari, 1997).Floristic investigations in each region in different situations show the ecological potentials and capacities. In similar environmental conditions, vegetation is more or less the same as expected, unless the habitats of plant communities are changed. Ecosystems in north of Iran with a long exceptional history are vulnerable due to traditional harvesting from natural resources and industrial harvesting in recent decades. According to the importance of the floristic reviews, they are categorized as comprehensive studies and in different biomes and ecosystems are mentioned. In these investigations, life form of plants is considerable. Life forms of plants are considered the most important structural features and Raunkiaer in 1934 presented the most comprehensive system of classifying life forms of plants in which the location of permanent tissues in different climatic conditions was the main criterion in plants classification (Asri, 2005). There are some floristic studies in the Northern forests of Iran conducted by researchers and are related to various plant communities.

But in these studies comparison and review the floristic status on northern forests which are the only programmable areas for economic efficiency in one hand, and its environmental importance in the other hand and Long-term impact of human intervention was less observed. This research was carried out with purpose of floristic comparison of untouched and degraded areas.

Material and Methods

Geographical location of study area

District number 9 of Shafa-roud forests is situated between two eastern longitude of 48˚27′-48˚30′ and two northern latitude of 37˚25′-37˚22′ with the altitude ranging from 850 to 2000 m above sea level and covers an area of 2402 ha. This district has 38 compartments that two compartments; 914 and 934 were selected (Figure 1). The study areas in mentioned compartments were in same elevation conditions; 1200-1400m above sea level. The slope ranges between 30-60 percent and the aspect was east-west.Soil depth was low-medium and rarely with slip pedrocks and gravels, the texture was loam and clay-loam and brown type. The pH was 5.5-6.5 and the average of rainfall of the district was 850mm (Forest Range and Watershed Management Organization, 2000).

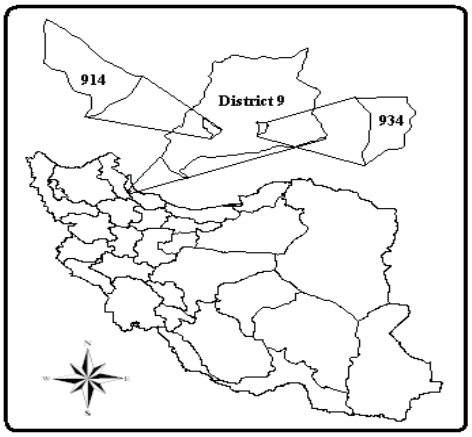

Figure 1. Situation of study area

Methods

In order to investigate and compare the flora, life forms and geographical distributions of degraded and untouched forest ecosystems, two areas which were in same conditions (e.g. elevation, vegetative type and aspect) were considered. Therefore, compartment 914 and 934 were selected as untouched and degraded area, respectively. According to the aims of the survey each compartment, three sampling plots with one hectare area were selectively considered. In each sampling plot, one transect on the slope and also in each transect four sub-plots of 10*10 meter were established. The selective-systematic method was carried out. Plants were sampled from subplots in two time periods of early May and late September and were transferred to botany laboratory of the Forest Research Center to be pressed.

Then, specimen were identified by following references: flora of Iran (Asadi *et al*., 1991-2011), flora Iranica (Rechinger, 1963-2010), colored flora of Iran (Ghahraman, 1976-2008), trees and shrubs of Iran (Mozaffarian, 2004) and Fern and fern allies of Iran (Khoshravesh *et al*., 2009). The life forms plants were determined by means of the Raunkiaer classification (Archibold, 1996).and the geographical distribution of plants were distinguished by mentioned flora.

Results

I. untouched area

In this area, 45 species of 39 genera and 28 families were identified. 32 species (71%) were dicotyledonous, 8 species (18%) were monocotyledons and 5 species (11%) were ferns. The Lamiaceae family with 4 species was the most frequent. 17 plant families also included only one species (Table 1).Plants are classified into 5 main life forms of Hemicryptophytes, Geophytes, Phanerophytes, Therophytes and Camephytes according to Raunkier method.

The Hemicryptophytes with 56 pecent and Therophytes and Camephytes with three pecent had the most and the least frequency, respectively. While Geophytes and Phanerophytes have considerable presence of 18 and 20 percent, respectively (Figure 2).

As geographical distribution aspect, 69% of species are belonged to Euro–Siberian region and species that have abroad distribution(cosmopolitan),isallocated to only 2.5 percent of the flora of the study area.

Irano-Turanian, Euro–Siberian and Mediterranean species are the next category (Figure 3).

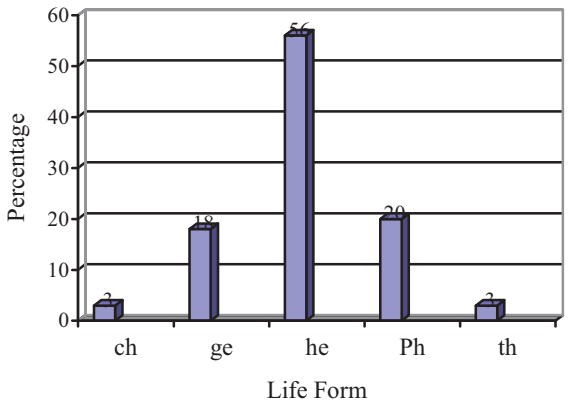

Figure 2. Percentage of life forms in the untouched area

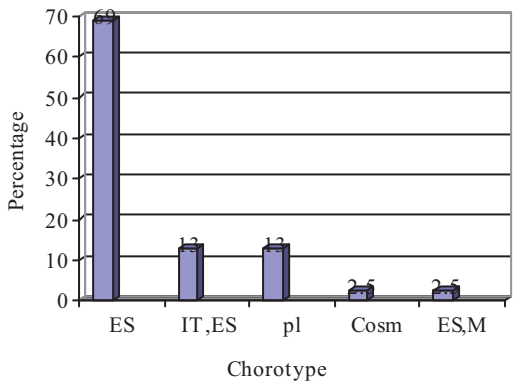

Figure 3. Percentage of chorotype in the untouched area

II. degraded area

In this area, 74 species of 62 genera and 32 families were identified. 60 species (80%) were dicotyledonous, 9 species (12%) were monocotyledons and 5 species (7%) were ferns. The Asteraceae family with 9 species was the most frequent. Amount of species in the Lamiaceae family withthree speciesmorethan semi-disturbed area was 7 and also 19 plant families also included

only one species (Table 2). In the damaged compartment 53 percent of plant species were belonged to Hemicryptophytes and only 2 percent of plant species were Chamephytes (Figure 4).

Table 1. List of species, Families, Their life- forms, and chorotype in the untouched area

Life forms:Ge –geophyte Ph-phanerophyte, Ch- chamaephytes, He- hemicryptophytes, Th –therophytes
Chorotypes :, Irano-Turanian (IT) ,Euro-Siberian(ES),Cosmopolitan (Cosm),Mediterranean(M),Pluriregional (Pl)

Species	Family	Life form	Chorotype
Ferns			
Asplenium scolopendrium(L.)Newm.	Aspleniaceae	He	pl
Asplenium adianthum-nigrum L.	Aspleniaceae	He	pl
Dryopteris affinis(Lowe)Fraser-Jenk.	Dryopteridaceae	He	ES
Polysticum aculeatum(L.)Roth	Dryopteridaceae	He	pl
Pteris cretica L.	Pteridaceae	Ge	pl
Angiosperms-Dicotyledone			
Acer cappodocicum Gled.	Aceraceae	Ph	ES
Acer velutinum Boiss.	Aceraceae	Ph	ES
Sanicula europaea L.	Apiaceae	He	ES,M
Ilex spinigera(Loes)Loes	Aquifoliaceae	Ph	ES
Vincetoxicum scandens Sommier & Levier	Asclepiadaceae	He	ES
Carpinus betulus L.	Betulaceae	Ph	ES
Cardamine bulbifera (L.)Crantz.	Brassicaceae	Ge	ES
Cardamine hirsuta L.	Brassicaceae	Th	cosm
Euphorbia amygdaloides L.	Euphorbiaceae	Ch	ES
Euphorbia boissieriana(Woron.)Prokh.	Euphorbiaceae	Th	IT
Merccurialis perennis L.	Euphorbiaceae	He	ES
Fagus orientalis Lipsky	Fagaceae	Ph	ES
Geranium sp.	Geraniaceae	Th	IT
Geranium robertianum L.	Geraniaceae	He	IT,ES
Hypericum androsaemum L.	Hypericaceae	Ph	ES
Calamintha grandiflora(L.)Moench	Lamiaceae	He	ES
Lamium album L.	Lamiaceae	He	IT,ES
Salvia glutinosa L.	Lamiaceae	He	IT,ES
Stachys persica Gmelin.	Lamiaceae	He	IT,ES
Circaea lutetiana L.	Onagraceae	He	ES
Prenathes cacaliifolia (M.B.) Beauverd12	Asteraceae	He	ES
Lathyrus vernus (L.)Bernh.	Papilionaceae	He	ES
Vicia crucea(Desf.)B.Fedtsch.	Papilionaceae	He	ES
Cyclamen coum Miller subsp. *caucasicum*(C. Koch)O.Schwarz	Primulaceae	Ge	ES
Primula heterochroma Stapf	Primulaceae	He	ES
Fragaria vesca L.	Rosaceae	Ge	ES
Prunus divaricata Ledeb	Rosaceae	Ph	ES
Gallium rotoundifolium	Rubiaceae	He	ES
Galium odoratum(L.)Scop	Rubiaceae	He	ES
Solanum Kieseritzkii C.A.Mey.	Solanaceae	He	ES
Solanum sp.	Solanaceae	He	ES
Urtica dioica L.	Urticaceae	He	Pl
Viola odorata L.	Violaceae	He	IT,ES
Monocotyledone			
Arum maculatum L.	Araceae	Ge	ES
Carex sp.	Cyperaceae	He	ES,SS
Tamus communis L.	Dioscoraceae	Ge	ES
Polygonatum orientale Desf.	Liliaceae	He	ES
Epipactis sp.	Orchidaceae	Ge	ES
Neottia nidus-avis(L.)L.C.Rich.	Orchidaceae	Ge	ES
Chlorantha platanthera (Cust.)Richenb.	Orchidaceae	Ge	ES
Brachypodium sylvaticum (Hudson)p.Beauv.	Poaceae	He	IT,ES

As geographical distribution aspect, 69%of speciesare belonged to Europe–Siberia region. The cosmopolitan species were more than it in semi-disturbed area (Figure 5). Other species belonged to Irano-Turanian, Euro-Siberian and Mediterranean region.

Table 2. List of species, Families, Their life- forms, and chorotype in the degraded area

Life forms:Ge –geophyte Ph-phanerophyte, Ch- chamaephytes, He- hemicryptophytes, Th –therophytes
Chorotypes :, Irano-Turanian (IT) ,Euro-Siberian(ES),Cosmopolitan (Cosm),Mediterranean(M),Pluriregional

Species	Family	Life form	Chorotype
Ferns			
Asplenium adianthum-nigrum L.	Aspleniaceae	He	pl
Polysticum aculeatum(L.)Roth	Dryopteridaceae	He	pl
Polystichum sp.	Dryopteridaceae	He	pl
Pteridium aquilinum (L.)Kochn.	Hypolepidaceae	Ge	ES,Cosm
Asplenium trichomanes L.	Aspleniaceae	He	pl
Angiosperms-Dicotyledone			
Acer velutinum Boiss.	Aceraceae	Ph	ES
Froriepia subpinnata(Ledeb.)Baill.	Apiaceae	Th	ES
Ilex spinigera(Loes)Loes	Aquifoliaceae	Ph	ES
Vincetoxicum scandens Sommier & Levier	Asclepiadaceae	He	ES
Centaurea hyrcanica Bornm.	Asteraceae	He	ES
Cirsium vulgare (Savi)Ten.	*Asteraceae*	*He*	*ES*
Eupatorium cannabinum L.	Asteraceae	He	IT,ES
Filago vulgaris Lam.	Asteraceae	Th	IT,ES
Lapsana communis L.	Asteraceae	He	IT,ES
Leontodon hispidus L.	Asteraceae	He	ES
Senecio vernalis Waldst.&Kit.	Asteraceae	Th	IT
Tanacetum parthenium (L.)Scultz-Bip.	Asteraceae	He	IT,ES
Taraxacum sp.	Asteraceae	He	IT,ES
Alnus subcordata C.A.Mey.	Betulaceae	Ph	ES
Carpinus betulus L.	Betulaceae	Ph	ES
Myosotis anomala H.Riedl	Boraginaceae	He	ES En
Sambucus ebulus L.	Caprifoliaceae	He	ES,M
Calystegia sepium (L.)R.Br.	Convolvulaceae	Ge	IT,ES
Sedum sp.	Crassulaceae	Th	IT,ES
Sedum stoloniferum S.G.Gmel.	Crassulaceae	Ge	ES
Euphorbia amygdaloides L.	Euphorbiaceae	Ch	ES
Euphorbia helioscopia L.	Euphorbiaceae	Th	IT,ES,M
Fagus orientalis Lipsky	Fagaceae	Ph	ES
Quercus castaneaefolia C.A.Mey.	Fagaceae	Ph	ES
Geranium dissectum L.	Geraniaceae	Th	IT,ES
Hypericum perforatum L.	Hypericaceae	He	Pl
Calamintha grandiflora(L.)Moench	Lamiaceae	He	ES
Calamintha officinalis Moench	Lamiaceae	He	ES
Mentha aquatica L.	Lamiaceae	Ge	IT,ES,M
Origanum vulgare L.	Lamiaceae	He	IT,ES
Salvia glutinosa L.	Lamiaceae	He	IT,ES
Teucrium hyrcanicum L.	Lamiaceae	He	ES
Prunella vulgaris L.	Lamiaceae	He	IT
Orobanche sp.	Orobanchaceae	Ge	IT
Lathyrus vernus (L.)Bernh.	Papilionaceae	He	ES
Trifolium campestre Schreb.	Papilionaceae	Th	IT
Trifolium caucasicum Tausch	Papilionaceae	Ge	IT
Trifolium repens L.	Papilionaceae	Ge	IT
Vicia sp.	Papilionaceae	He	ES
Plantago lanceolata L.	Plantaginaceae	He	IT
Plantago major L.	Plantaginaceae	He	IT,ES,M
Rumex conglomeratus Murr.	Polygonaceae	He	IT,ES
Primula heterochroma Stapf	Primulaceae	He	ES
Crataegus microphylla C.Koch	Rosaceae	Ph	ES
Fragaria vesca L.	Rosaceae	Ge	ES
Geum urbanum L.	Rosaceae	Ge	ES
Mespilus germanica L.	Rosaceae	Ph	ES
Potentilla reptans L.	Rosaceae	He	IT,ES
Prunus divaricata Ledeb	Rosaceae	Ph	ES
Pyrus sp.	Rosaceae	Ph	ES
Galium odoratum(L.)Scop.	Rubiaceae	He	ES
Phuopsis stylosa	Rubiaceae	Ge	ES

Table 2. Cont.

Life forms:Ge –geophyte Ph-phanerophyte, Ch- chamaephytes, He- hemicryptophytes, Th –therophytes
Chorotypes :, Irano-Turanian (IT) ,Euro-Siberian(ES),Cosmopolitan (Cosm),Mediterranean(M),Pluriregional

Species	Family	Life form	Chorotype
Cruciata sp.	Rubiaceae	He	IT
Gallium sp.	Rubiaceae	Th	IT,E
Digitalis nervosa Steud.&Hoschst.	Scrophulariaceae	He	ES
Verbascum sp.	Scrophulariaceae	He	IT,ES
Veronica persica Poir.	Scrophulariaceae	Th	Cosm
Urtica dioica L.	Urticaceae	He	Cosm
Viola odorata L.	Violaceae	He	IT,ES
Viola tricolor L.	Violaceae	Th	ES
Monocotyledone			
Carex divulsa Stocks	Cyperaceae	He	ES,M
Carex sylvatica Huds.	Cyperaceae	He	ES,SS
Tamus communis L.	Dioscoraceae	Ge	ES
Luzula forsteri (Smith)DC.	Juncaceae	Ge	ES
Dactylis glomerata L.	Poaceae	He	IT,ES
Melica sp.	Poaceae	He	ES
Melica uniflora Retz.	Poaceae	He	ES
Poa trivalis L.	Poaceae	He	pl
Vulpia myuros(L.)J.F.Gmel.	Poaceae	Th	IT,ES,M

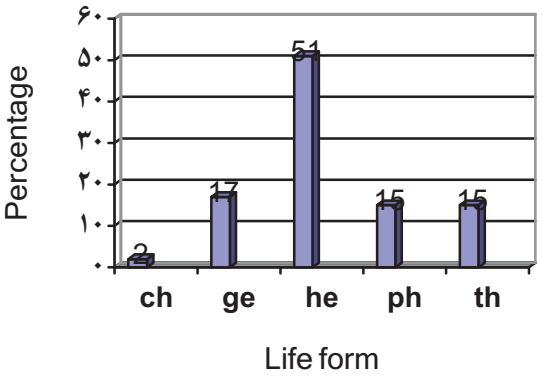

Figure 4. Percentage of life forms in the degraded area

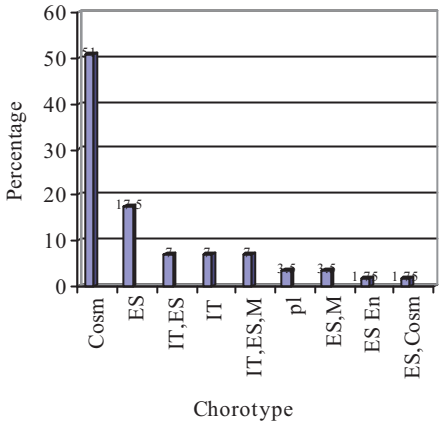

Figure 5. Percentage of chorotype in the degraded area

Discussion

The number of forest floor plant species in degraded area is about twice in comparison with untouched area. In untouched area, Mediterranean species are not found and number of cosmopolitan species is limited, whereas in degraded area Mediterranean species are considerable and cosmopolitan species can be seen increasing. The amount of dicotyledonous and ferns in degraded area is more than untouched area. Ferns include a considerable area which can be destruction and creation the necessary space of light and food abundance produced from the decomposition of organic materials can provide opportunities to develop these species.

In forest ecosystems, number of species will be reduced due to diminish the amount of incoming light on the lower story with density increasing, but this rule does not apply in range land ecosystems; in Salami *et al.*(2008) research, diversity in protected pastures was evaluated more than it in grazing pastures and regarding to this, Tothmeresz and Matus (1990) and Torok (1991) believed that grazing as a disturbing parameter for nature, has negative effects on diversity, although this effect will occur in the forest ecosystems over time. Ferns development can reduce the process of soil erosion temporarily in comparison with bared areas but they lack the required performance against climatic factors compared with the ideal conditions while fern is a serious threat to forest regeneration and also increases costs related to development of forest plantation. As noted, fern species in the two areas are similar in term of diversity but the dominance that will be discussed in a separate category had a distinct situation. In both area, Hemicryptophytes was dominant and this is similar to results of Akbarinia *et al.* (2004) in Sangdeh of Sari and Atashgahi *et al.* (2009) in eastern forests of Dodangeh of Sari. Therophytes which can reach to the highest biological spectrum in dry and not conducive areas, in the degraded area are five times more than untouched area. The high frequency of this life form in degraded area indicates that such manipulation shave taken place in the region. The numbers of Phanerophytes which are specific characteristics of the northern forests especially in the beech stands were reduced from 20 to 15 percent in the degraded area which indicates that the status of degraded area is driven to ward ecosystem instability. The climax of succession in the northern

forests of Iran at altitudes over1200 meters above sea level is recognized by beech species. This important commercial species not only plays economic role, but also has a crucial role in various environmental aspects, wildlife and water and soil conservation which abundant presence of light tolerate shrub species such Rosacea family (e.g. medlar and hawthorn) in the degraded area indicates high distance of this ecosystem from natural conditions. Human interference is the biggest problem in the management of this valuable ecosystem and if it's economic effect is ignored, its impact on basins management would be unavoidable. The observed differences in the two areas life forms and chorotypes has drawn alarming prospect while unfortunately, due to the retrograding process of these ecosystems reversibility to normal conditions will face many challenges.

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