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Study on Floristic composition, Life form and Chorotype of Kishkhale Reserve area (Guilan province)

Tooba Abedi[1], Roya Abedi[2]

1. Academic Center for Education, Culture and Research.
2. Student of PhD Forestry, Natural resource Faculty of Guilan University.

Corresponding author email : t_abedi@erijd.ir**:**

ABSTRACT: The aim of this study was to identify the plant species and to introduce of the flora in Kishkhale with 3 ha area, located in the west of Guilan province, north of Iran. Data collected with systematic-random method during growing season. The life forms were determined according to Raunkiaer's system and the biological spectrum was plotted. Chorotype of plant species were determined. We identified 24 species belonging to 20 family and 23 genera. Phanerophyte and Hemicryptophyte were the most frequent life forms. The chorotype of most of species was restricted to Euro-Siberian region.
Key words: Floristic composition, Life form, Chorotype, Kishkhale, Guilan province

INTRODUCTION

The importance of a correspondence between height of the perennial buds and climate, a major component of the plant environment is incorporated in functional plant classification systems that use life forms (Mack, 2003). Plants can be grouped in life form classes based on their similarities in structure and function. A life form is characterized by plant adaptation certain ecological condition. Life form study is an important part of vegetation description and ranking next to floristic composition (Batalha and Martins, 2004).

Raukiaer (1934) proposed a life form classification system based on the manner in which plants protected their perennial buds during unfavorable season. According to this classification system, plants species can be grouped into five main classes (Carvalho da Costa et al., 2007; Mack, 2003; Batalha & Martins, 2004; Hussain & Perveen, 2009):

Phanerophytes: renewal bud above 25 cm from soil surface or projecting freely in the air.
Hemicryptophyes: renewal buds at the soil surface.
Cryptophytes (Geophytes): with surviving buds completely concealed in the ground or at the bottom of water (e.g., bulbs, corms, tubers).
Chamaephytes: short or prostrate plants; buds not above 25 cm from soil surface and situated close to ground.
Therophytes (annuals): renewal bud is protected in the seed and remaining dormant as seed during the unfavorable times (Mack, 2003; Petersen et al., 2006).

Raunkiaer developed the idea that plant compositions can be considered as an expression of the climate and that plants therefore could be used as a geographical tool to describe the climate and plant adaptation to different climates Also Plant life forms differentiate not only due to climatic variations, but seem also to relate to human disturbance and management (Petersen et al., 2006).

Life forms have close relationships with environmental factors and climate types can be characterized by the prevailing life forms in plant communities growing under a given climatic regime, using the proportions of species in each life forms class, or the biological spectrum (Carvalho da Costa et al., 2007). A biospectrum is formed when all the species of plants of a community are classified into life forms and their ratio expressed in number or percentage. Occurrence of similar biological spectrum in different regions indicates similar climatic conditions (Malik, et al., 2007) and it can be indicator of micro and macro climate (Malik, et al., 2007; Duran & Hamzaoglu, 2002).

Alternative systems of life forms have been developed by Mueller-Dombois and Ellenberg (1974) and Box (1981) (Mack, 2003; Malik et al., 2007).

Chorological study is another part of floristic studies that refers to geographical distributions and adaptation of plants to environmental variations. Each plant species have a certain ecological extension and tolerate a spatial environmental condition. Geographical distribution of plants depends on living condition and

environmental adaptation of that species (Esmailzadeh et al., 2006; Najafi et al., 2007). Plant distribution is a valuable source of data for biogeography, habitat requirement models, conservation of threatened species, regions of provenance for plant genetic resources and species selection for environmental restoration (González & Martín, 2006).A chorotype can show the geographic area where the groups of species could occur at there (Báez et al, 2005).

Nowadays, Many studies have been doing about this subjects in Iran and the world, such as: Floristic study in Qazaan reserve of Kashan (Batooli, 2004), in Genu protected area ormozgan (Najafi et al., 2007), Phytosocological study of English yew (Taxus baccata L.) in Afratakhteh reserve (Esmailzadeh et al., 2006), floristic study of Firuzeh watershed in North of khorasan province (Asaadi, 2009), Kazankaya canyon in Turkey (Duran & Hamzaoglu, 2002), vegetation composition of Creet in south Aegean (Vogiatzakis et al., 2003), Study of life form in Cerrado site (Batalha & Martins, 2004), flora of Sivas in Turkey (Akpulat & Celik, 2005). All of these studies are useful for monitoring, protection, reclamation and management of valuable species (Asaadi, 2009).

The main aim of this study was to identify the plant species and introduce the flora of Kishkhale reserve area.

MATERIALS AND METHODS

Kishkhale with 3 ha area is located in the Guilan province, north forests of Iran (37˚ 38´ N × 49˚ 2´ E, at -5 a.s.l) (Fig 1). The mean annual rainfall and temperature were about 1365.8 mm and 16 ˚C, respectively. The climate of the region is temperate and humid according to koeppen's climatic type.

Field sampling procedure was systematic-random method. Data was collected from 100 m^2 (10×10 m) sampling plots in tree, shrub and herbaceous layers. All of species were identified and data was organized listing the species. Determining the life form was done by Raunkaier's method and chorology of species was based on Zohari method.

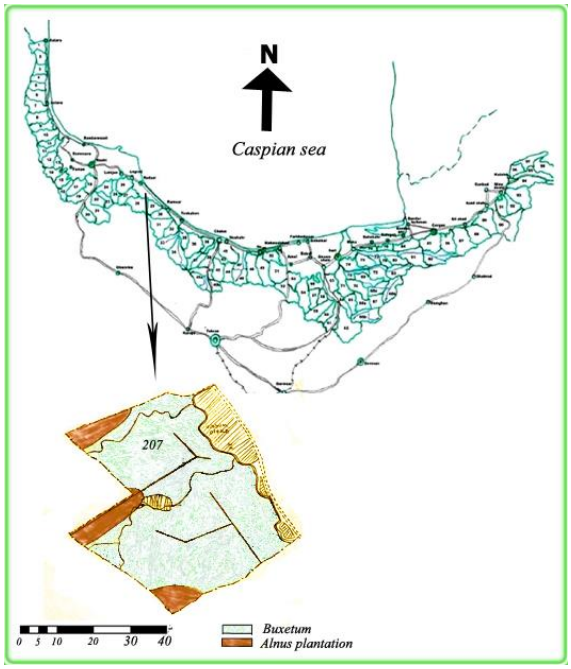

Figure1. Location of the study area

RESULTS

The results of this study show that 24 plant species belonging to 20 families and 23 genera have been recognized (Table 1). The life form spectrum of plant species is as followed: phanerophyte 70.83%, hemicryptophyte 12.5%, cryptophyte 12.5% and therophyte 4.17% (Fig 2). The chorotype distribution of species is as follow: Euro-Siberian 65.22%, Plurring 13.4%, Euro-Siberian and Mediterranean 8.70%, Euro-Siberian and Irano-Turanian 4.35%, Iran-Turanian and Mediterenian 4.35% and cosmic elements 4.35% (Fig 3).

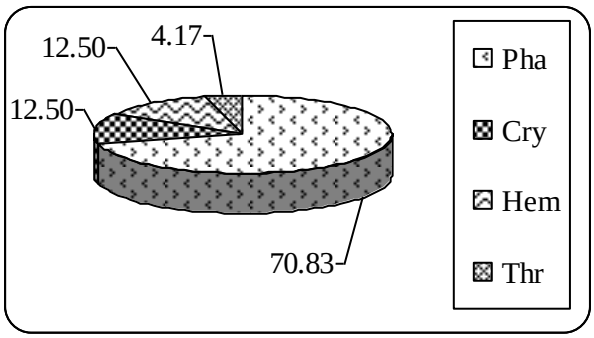

Figure2. Floristic life form spectrum of Kishkhale

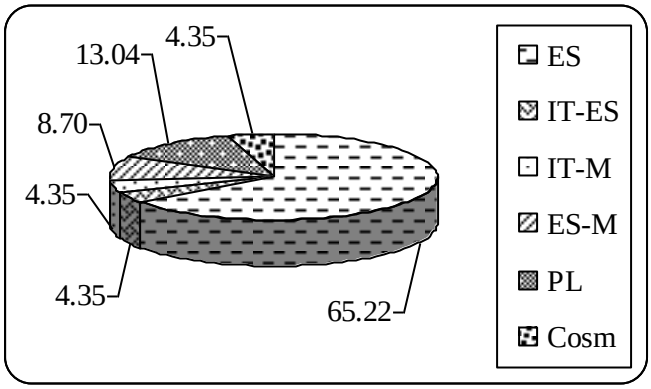

Figure3. Percentage of chorotype of species in Kishkhale

DISCUSSION

Kishkhale is a reserve site of box tree (Buxus hyrcana Pojark.) and located in coast of Caspian Sea in the west of Guilan province. Among all plants, phanerophytes with 70.83% are dominant and hemicryptophytes and cryptophytes with 12.50% are the next order. Life forms of plants indicated the possibility of adaptation of plants to environmental factors especially climatic condition (Asaadi, 2009).

Asaadi (2009) stated presence of hemicryptophyte plants in a region is due to cold climate and therophyte adapted to dryness and shortage of rainfall of the region and focused each plant species has a special ecological area with a known tolerance to life conditions. Therefore, the geographical distribution of plant species depending on life conditions of area and adaptation of plants to there.

Malik et al. (2007) reported that hemicryptophytes are indicator are temperate zone, and in the moist temprate regions hemicryptophytes are the major life form class, while therophytes are characteristic of desert climate and cryptophytes are indicator of Mediterranean climate. Also, they considered deforestation is one of the major factors that has decreased the regeneration of woody species and the lower percentage of phanerophyte and chamephyte can be can be indicate the condition that deforestation is conductive for the development of these life forms.

In our study area therophyte had the lowest percentage (4.17%) and chamepfites were absence. Malik et al. (2007) stated dominanace of therophytes occure due to unfavorable habitat conditions; chamephytes become more prominent in alpine habitat.

Petersen et al. (2006) considered plant life forms differentiate not only due to climatic variations, but seem also to relate to human disturbance and management.

Hussain and perveen (2009) studied the life form of plants in habitat at a higher altitude and reported chamephyte are the most dominant class of life form in the study area, followed by therophyte, phanerophyte and hemicryptophyte.

Carvalho et al. (2007) reported the high proportion of therophyte at the Noa Me Deixes reserve is in agreement with the predictions for area with Koppen's climatic diagram. They stated predominant of therophyte reflect an effective strategy for avoiding water losses due to humidity extremes and water deficiencies.

Batalha and Martins (2004) reported phanerophyte and hemicryptophyte were the most life forms with high percentage (52.21% and 18.58%, respectively) at woodland in the Cerado site. They considered since the

importance of trees and shrubs in this woodland, the proportion of phanerophyte increased in life form spectrum of this region.

Vogiatzakis et al. (2003) recommended hemicryptophyte constitute 52% of the floristic composition, followed by chamephetes in Crete and they suggested a typical oro-mediterenean life form spectrum in this region. They stated those two predominant life forms reflect the harsh environmental conditions.

Mack (2003) illustrated tropical lowland forests, in which the treat of drought is nil, contain many phanerophytes with the perennial bud >25 cm above the soil surface.

We did not find any chamephete in our study area. Mack (2003) believe an absent life form within a community can reflect an intrinsic site factor that precludes the life form, alternatively the absence may simply reflect the failure of any species with that life form to emerge in the flore or to at least reach the community.

Duran and Hamzaughlo (2002) reported the high number of phanerophytes in shrub layer in Kazankaya canyon (Turkey). They explain it by climate, topography and the effects of mediterranean microclimate in the area. Esmailzadeh et al. (2006) stated dominance of phanerophytes and hemicryptophytes in a region reflect the temperate climate condition with cold and rainy winter and cool summer that is suitable condition for forest elements.

The study of plant's chorology showed Euro-Siberian elements are dominant (65.22%). North forests of Iran are Hyrcanian zone belonging to Euro-Siberian zone. So, this result is reasonable.

Akpulate and Celik (2005) in the study of flora of Sivas (Turkey) explain Iran-Turanian and mediterranean elements were generally distributed in open and steppe area whereas Euro-Siberian elements were found in humid shadowy areas, around damp springs and in meadows at high altitudes. Our study was done in Box tree (Buxus hyrcana Pojark.) reserve. This species grow in the shade thus this result can be acceptable in this area. Asaadi (2009) considered that the chorotype distribution of plants reflect the climate condition and showed IT (Iran-Turanian region) is characterized by low rainfall and a long dry season.

Dominance of phanerophyte life form and Euro-Siberian chorotype distribution of plant reflect that all plant species were adapted with environmental factors and climate.

These researches will help us in bringing a better understanding of the flora of a region.

Table1. list of species, families, their life-forms, and chorotypes in Kishkhale
(Ph: Phanerophyte, H: Hemicryptophyte, Cr: Cryptophyte, Th: Throphyte, Ch: Chamephyte; ES: Euro-Siberian, IT: Irano-Turanian, M: Mediterranean, PL: Plurring, Cosm: Cosmic)

Scientific name	Family	Life-form	Chorotype
Acer cappadocicum Gled.	Aceraceae	ES	Ph
Acer insigne Boiss.	Aceraceae	ES	Ph
Albizzia julibrissin (Willd.) Benth.	Mimosaceae	ES	Ph
Alnus glutinosa (L.)Gaertn.	Betulaceae	ES	Ph
Buxus hyrcana Pojark.	Buxaceae	ES	Ph
Carpinus betulus L.	Betulaceae	ES	Ph
Diospyros lotus L.	Ebenaceae	ES-IT	Ph
Euphorbia amygdaloides L.	Euphorbiaceae	ES	H
Ficus carica L.	Moraceae	IT-M	Ph
Gramineae sp.	Gramineae	-	H
Hedera pastuchovii Woron. Ex Grossh.	Araliaceae	ES	Ph
Mentha longifolia (L.) Hudson	Labiatae	Cosm	Cr
Oplismenus undulatifolius (Ard.) P.	Gramineae	ES	Th
Parrotia persica (DC.) C.A . Meyer.	Hamamelidaceae	ES	Ph
Phyllitis scolopendrium (L.)Newn.	Aspleniaceae	PL	Cr
Polypodium vulgar L.	Polypodiaceae	PL	Cr
Prunus divaricata Ledeb.	Rosaceae	ES	Ph
Pterocarya fraxinifolia (Lam.) Spach.	Juglandaceae	ES	Ph
Quercus castaniifolia C.A.M	Fagaceae	ES	Ph
Rubus hyrcanus Juz.	Rosaceae	PL	Ph
Ruscus hyrcanus Woron.	Liliaceae	ES	Ph
Smilax excelsa L.	Asparaginaceae	ES-M	Ph
Viola odorata L.	Violaceae	ES-M	H
Zelkova carpinifolia (Pall.)	Ulmaceae	ES	Ph

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