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Flora, life forms and chorology of plant species in the Deh-Kohneh Forest in Sepidan, Fars Province, Iran

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ABSTRACT

A forest area in Deh-Kohneh, the northwest of Fars Province, Iran was studied from a floristic and ecological point of view. The species were classified according to their growth habit. Raunkiaer's life - forms system were used to characterize the flora of the study area. The location has a surface area of 466 ha by minimum altitude at 2100m and maximum at 2554m, between 30 ° 21' 32" to 30° 23' 00" north longitudes and 51° 46' 35" to 51° 49' 41" east latitudes. The results showed that the flora of this region include 97 species belonging to 79 genera and 25 families. The main families in this area were Poaceae (18 species), Rosaceae (11 species) and Apiaceae (10 species). Raunkiaer's life- forms showed that hemicryptophytes (53.6% of the species), phanerophytes (14.4%), therophytes (10.3%) and chamaephytes (8.2%) are the dominant life - forms of the area. The chorological studies indicated that all of species belong to Irano - Turanian zone, while 4% were common species in the Irano-Turanian and Hyrcanian zones.

Key words: Vegetation, Distribution, Irano-Turanian zone, Zagros, Iran.

INTRODUCTION

Vegetation of an area, in fact, is the advantage of interactions between biological communities and environmental conditions and also, is in direct relation with evolution of plants species and geographical conditions during the past ages (Ghanbarian *et al.* 2011). Identification of plants in both applied and scientific aspects have a great role in attention to the importance of vegetation in environmental science, so that we can well understand, utilize and protect the environment. Thus, scientific classification of plants were employed (Vaseghi *et al.* 2007). Furthermore, with respect to the environmental turbulences like global warming and climate changes which change the number of plant species, we could realize the importance floristic studies in all regions. Also, study on chorology and life - forms of vegetation help us

to protect and manage all genetic resources. Raunkiaer's life-forms system was used to characterize the flora of the area. Plant species and individuals can be grouped into different life-forms classes based on structural and functional similarities (Muller-Dombois & Ellenberg 1974). Life-forms have close relationships with environmental factors and can be viewed as strategies for obtaining resources (Crosswhite & Crosswhite 1984; Cody 1986). Raunkiaer (1934) proposed a life-form classification system based on the manner in which plants protect their perennating buds during unfavorable seasons. According to this classification system, plant species can be grouped into five main classes: phanerophytes, chamaephytes, hemicryptophytes, cryptophytes and therophytes. This sequence corresponds to an increasing protection of the

perennating buds. Climatic types can be characterized by the prevailing life form in plant communities growing under a given climatic regime, using the proportions of species in each life-form class, or the biological spectrum (Raunkiaer 1934; Cain 1950; Muller-Dombois & Ellenberg 1974). Few studies have been devoted to the structure and flora of the herbaceous layer in plant communities of Fars Province (Ghahraman 1996; Ghanbarian *et al.* 2011; Taiebikhorami *et al.* 2007; Khalili *et al.* 2007; Khodaghali *et al.* 2008; Dashtakian *et al.* 2002). In the present study, species were classified according to their growth habit followed using Raunkiaer's life-forms system to characterize the flora of the Deh-Kohneh forest in Sepidan, Fars Province, Iran.

MATERIALS AND METHODS

The present study was carried out in the Deh-Kohneh forest, an enclosed area with 466 ha, in Sepidan, the northwest of Fars Province, Iran. The area as a genetic storage of wild pear species, located between 30° 21' 32" to 30° 23' 00" north latitude and 51° 46' 35" to 51° 49' 41" east longitude. The minimum and maximum altitude is 2100m and 2554m, respectively. This region has northern aspect and the slope is moderate (20%) to high (80%) (Averaged 40%) (Negahdarsaber, 1990). The hottest month is August with the average temperature of 20.8 °C, while the coldest month, January, has the

average temperature of -14.8 °C. The range of annual average temperature in the study area is 9 to 15 °C, while the annual precipitation ranged from 630 to 1050mm. The dry season is started from beginning of May through October (seven months). Geologically, part of Zagros Folded Belt has been formed as the result of the collision between Arabic and Eurasia plates. Sarvak formation is the main geological formation of the study area. Asmari-Jahrom and Pabde -Gurpi are dominated formations in this region respectively. These formation resulted in carbonates soil (generates from calcareous parent material) in all of the specimens (Hamzehpour *et al.* 2010).

To study the area from a floristic and ecological point of view, specimens were collected in several field trips during the spring and summer 2015. Specimens were identified according to the common references (Boissier 1870; Rechinger 1963; Townsend 1966; Zohary 1973; Davis 1975).

Data was organized listing the species, their families, life-form and chorology.

Observations were made on aerial shoot reduction during unfavourably dry conditions and presence of underground storage organs. Species were classified as phanerophytes, chamaephytes, hemicryptophytes, cryptophytes and therophytes according to the Raunkiaer method. We computed the proportion of species in each life-form class.

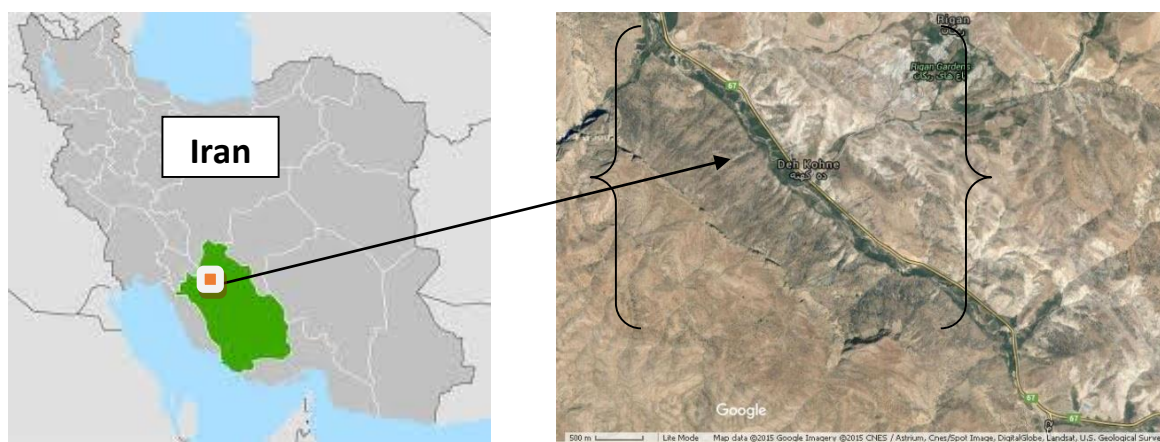


Fig. 1. Location of the study area.

RESULTS

In the study area, 97 species were recorded belonging to 79 genera and 25 families (Table 1). The families with the highest number of species were Poaceae (18 species), Rosaceae (11 species) and Apiaceae (10 species). Nine families were represented by only a single species. The results showed that

hemicytopytes (53.6% of species), phanerophytes (14.4%), therophytes (10.3%) and chamaephytes (8.2%) are the dominant life forms of the area respectively. The chorological studies indicated that the most species belonged to Irano-Turanian zone, while 4% were common species in both Irano-Turanian and Hyrcanian zones (Fig. 2).

Table 1. List of family, species, life form and chorotypes of Deh-Kohne forest.

Family	Species	Life-form ¹	Chorotype ²
Aceraceae	<i>Acer monspessulanum</i> L.	Ph	IT
Amaryllidaceae	<i>Ixiolirion tataricum</i> (pall.) Herb.	Gb	IT
Anacardiaceae	<i>Pistacia atlantica</i> Desf.	Ph	IT
Apiaceae	<i>Bunium</i> sp.	Gt	IT
	<i>Chaerophyllum macropodium</i> Boiss.	He	IT
	<i>Eryngium billardieri</i> F.	He	IT
	<i>Falcaria vulgaris</i> Behm.	He	IT
	<i>Ferula persica</i> Wild.	He	IT
	<i>Pimpinella</i> sp.	He	IT
	<i>Prangos uloptera</i> DC.	He	IT
	<i>Prangos ferulacea</i> (L.) Lindl.	He	IT
	<i>Smyrniopsis aucheri</i> Boiss.	He	IT
	<i>Smyrniium cordifolium</i> Boiss.	He	IT
Asteraceae	<i>Anthemis</i> sp.	Th	IT
	<i>Cichorium intibus</i> L.	He	IT, H
	<i>Cirsium libanoticum</i> DC.	He	IT
	<i>Cousinia</i> sect. <i>alba</i>	He	IT
	<i>Gundelia tournefortii</i> L.	He	IT
	<i>Inula britannica</i> L.	He	
	<i>Scariola orientalis</i> (Boiss.) Sojak.	He	IT
	<i>Tanacetum polycephalum</i> Schultz-Bip.	He	IT
Berberidaceae	<i>Berberis integerrima</i> Bge.	Ph	IT
Boraginaceae	<i>Solenanthus circinatus</i> Ledeb.	He	IT
Brassicaceae	<i>Drabopsis verna</i> C. Koch.	Th	IT, H
	<i>Fibigia macrocarpa</i> (KY & Boiss.)	He	IT
	<i>Hesperis persica</i> Boiss.	He	IT
	<i>Matthiola ovatifolia</i> Boiss.	He	IT
Caprifoliaceae	<i>Lonicera nummulariifolia</i> Jaub & Spach	Ph	IT
Caryophyllaceae	<i>Gypsophila polyclada</i> Huds.	He	IT
	<i>Silene spergulifolia</i> (Wild.) M.B.	He	IT
Dipsacaceae	<i>Pteroccephalus canus</i> Coult. ex DC.	He	IT
Euphorbiaceae	<i>Euphorbia plebeia</i> Boiss.	He	IT
	<i>Euphorbia</i> sp.	He	IT
Gentianaceae	<i>Gentiana olivieri</i> Griseb.	He	IT
	<i>Geranium tuberosum</i> L.	Gt	IT
	<i>Biebersteinia multifida</i> DC.	He	IT
Lamiaceae	<i>Ajuga chamaecistus</i> Ging.	Ch	IT
	<i>Ballota aucheri</i> Boiss.	He	IT
	<i>Marrubium anisodan</i> C. Koch.	He	IT
	<i>Phlomis aucheri</i> Boiss.	He	IT
	<i>Phlomis olivieri</i> Benth.	He	IT
	<i>Phlomis persica</i> Boiss.	He	IT
	<i>Salvia verbasifolia</i> M.B	He	IT
	<i>Stachys inflata</i> Benth.	He	IT
	<i>Stachys ixodes</i> Boiss & Hausskn. Ex.Boiss	He	IT
Liliaceae	<i>Colchicum kotschyi</i> Boiss.	Gb	IT
	<i>Fritillari aimperialis</i> L.	Gb	IT

	<i>Muscari neglectum</i> Guss	Gb	IT	
Oleaceae	<i>Fraxinus rotundifolia</i> Miller.	Ph	IT	
Papilionaceae	<i>Astragalus adscendens</i> Boiss & Hausskn.	Ch	IT	
	<i>Astragalus cephalanthus</i> DC.	Ch	IT	
	<i>Astragalus cyclophyllos</i> Beck.	He	IT	
	<i>Astragalus gossypinus</i> Fisch.	Ch	IT	
	<i>Astragalus sojakii</i> Podlech	He	IT	
	<i>Glycyrrhiza glabra</i> L.	He	IT,H	
	<i>Hedysarum criniferum</i> Boiss.	He	IT	
	<i>Ononis spinosa</i> L.	Ch	IT	
Plumbaginaceae	<i>Acantholimon melananthum</i> Boiss.	Ch	IT	
Poaceae	<i>Agropyrum repens</i> (L.) P. Beauv.	Gr	IT	
	<i>Agropyrum</i> sp.	He	IT	
	<i>Alopecurus arundinaceae</i> Poir.	Gr	IT	
	<i>Arrhenatherum kotschyi</i> Boiss.	Gb	IT	
	<i>Boissiera squarrosa</i> Hochst .ex Steud	Th	IT	
	<i>Bromus danthoniae</i> Trin.	Th	IT	
	<i>Bromus sterilis</i> L.	Th	IT	
	<i>Bromus tectorum</i> L.	Th	IT	
	<i>Bromus tomentellus</i> L.	Th	IT	
	<i>Dactylis glomerata</i> L.	He	IT, H	
	<i>Festuca ovina</i> L.	He	IT	
	<i>Heterantherium piliferum</i> (Banks & Soland.) Hochst	Th	IT	
	<i>Hordeum bulbosum</i> L.	Gb	IT	
	<i>Hordeum violaceum</i> Boiss. et Huet	He	IT	
	<i>Oryzopsis pubiflora</i> Hack.	He	IT	
	<i>Poa bulbosa</i> L.	Gb	IT	
	<i>Psathyrostachys fragilis</i> (Boiss.) Nerski.	He	IT	
	<i>Taeniatherum crinitum</i> (Schreb.) Neveski.	Th	IT	
	Polygonaceae	<i>Polygonum thymifolium</i> Jaub & Spach	Ch	IT
		<i>Rheum persicum</i> Los.	Gr	IT
Ranunculaceae	<i>Ranunculus kotschy</i> Boiss	He	IT	
	<i>Ranunculus arvensis</i> L.	Th	IT	
	<i>Ranunculus</i> sp. L.	He	IT	
Rosaceae	<i>Agrimonia eupatoria</i> L.	He	IT	
	<i>Amygdalus elaeagnifolia</i> Spach.	Ph	IT	
	<i>Ceracus brachypetala</i> Boiss.	Ph	IT	
	<i>Ceracus microcarpa</i> (C.A. Mey.) Boiss.	Ph	IT	
	<i>Cotoneaster lurestanica</i> Klotz.	Ph	IT	
	<i>Cotoneaster persica</i> Pojark.	Ph	IT	
	<i>Crataegus aronia</i> (L.) Bosc ex DC.	Ph	IT	
	<i>Pyrus glabra</i> Boiss.	Ph	IT	
	<i>Pyrus syriaca</i> Boiss.	Ph	IT	
	<i>Rosa</i> sp.	Ch	IT	
Rubiaceae	<i>Sanguisorba minor</i> Scoop.	He	IT	
	<i>Asperula brachyantha</i> Boiss.	He	IT	
Scrophulariaceae	<i>Galium</i> sp. L.	He	IT	
	<i>Scrophularia</i> sp.	He	IT	
Thymelaceae	<i>Veronica orientalis</i> Miller.	He	IT	
	<i>Daphne mucronata</i> Royle.	Ph	IT	

¹Life forms in the study area , Ph -phanerophyte, Ch - chamaephytes, He- hemicryptophytes, Th -therophytes, Gb -Geophytes Bulb, Gr- Geophytes Rhizome, Gt- Geophytes Tuber

²Chorotypes in studied area Irano-Turanian (IT) Irano-Turanian, Hyrcanian (IT-H)

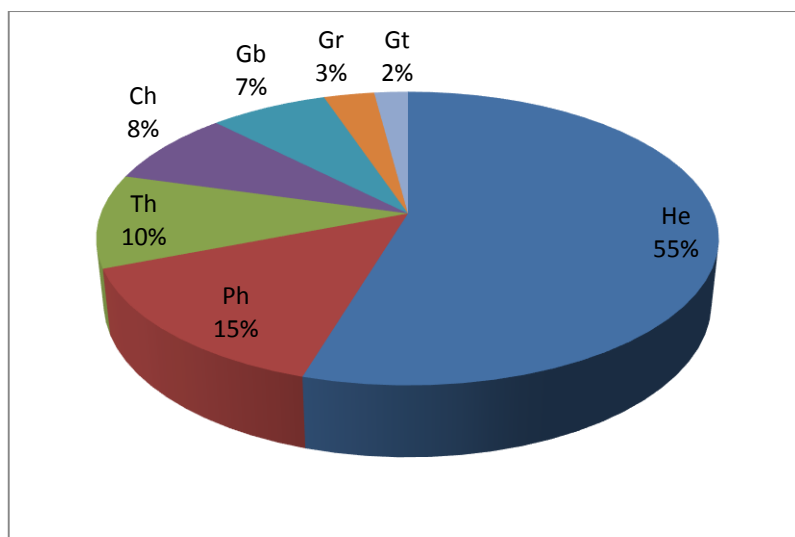


Fig. 2. Life forms in studied area , Ph-phanerophyte, Ch - chamaephytes, He- hemicryptophytes, Th - Therophytes, Gb -Geophytes Bulb, Gr- Geophytes Rhizome, Gt- Geophytes Tuber.

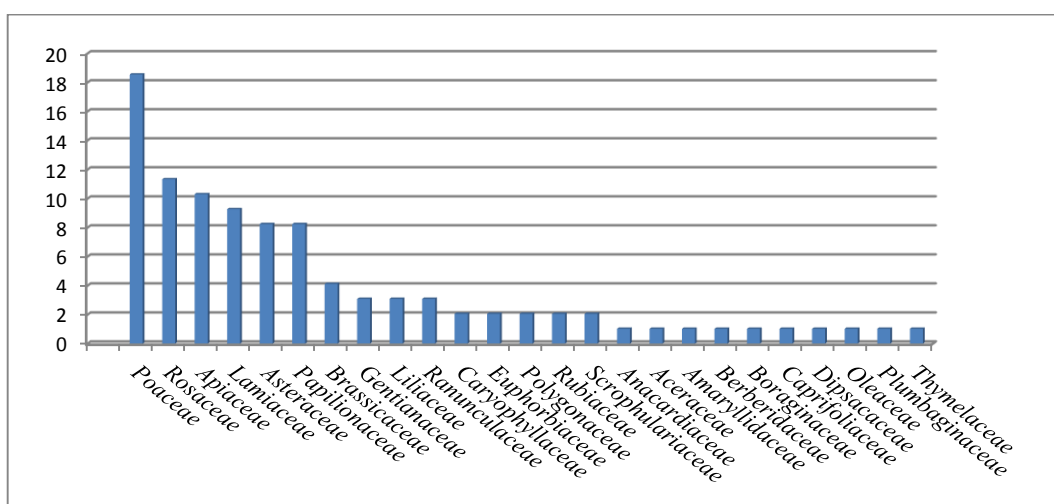


Fig. 3. Frequency of plants families in Deh-Kohneh forest.

DISCUSSION

The Deh-Kohneh forest protected area, located at the south of the Central Zagros, the southwest of Iran, is known as genetic reserve of wild pear species. Studies on the herbaceous flora, life- forms and chorology of plant species in the Deh-Kohneh forest are scarce and this study demonstrates the importance of herbaceous plants in this area. Poaceae, Rosaceae and Apiaceae were among the richest families in the present study and were represented mainly by herbaceous species (Hemicryptophytes, Phanerophytes, Therophytes, Chamaphytes and Geophytes). The chorological studies showed that all of the species belong to Irano-Turanian zone, and 4%

of them were common in both Irano-Turanian and Hyrcanian zones (Takhtajan1986; Zohary 1973).The appearance of all genera, which are characteristic elements of the Irano-Turanian zone, showed that this region belongs to this zone. The low incidence of some genera include *Dactylis*, *Glycyrrhiza*, *Drabopsis* and *Cichorium*, which are the members of the Hyrcanian zone, shows that this area was not affected by this zone. The frequency of Asteraceae may be due to damage caused by grazing in some areas of the region which should be considered warning for the area. Experience has shown that when the percentage of degradation of vegetation in the

area increase, the members of some plant families, such as family Asteraceae are found in greater extent in the region flora (Vaseghi *et al.* 2007).

According to Fig. 2, Hemicryptophytes have more richness than the other region life-form in the area. Hemichryptophytes are the characteristics of the cold climate and mountainous region (Archibold 1995).

Since the climate is cold and dry, so frequency of Hemichryptophytes is affected by the climate.

All studies conducted on vegetation in Fars Province have been done for brief studies on a scale 1/250000. Study on flora and geographical origin of vegetation in each area is one of the most effective methods for genetic resources conservation and management of biodiversity, so the presented study conducted in a limited forest area, as long as the pattern close to nature preserves, and can be compared with grazed same areas.

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فلور، شکل رویش و کورولوژی گونه‌های گیاهی جنگل ده کهنه سپیدان استان فارس، ایران

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چکیده

محدوده جنگلی ده کهنه سپیدان در شمال استان فارس از دیدگاه بوم‌شناسی و تهیه فهرست گونه‌های گیاهی مطالعه شد. طبقه‌بندی گونه‌ها بر اساس زیست‌گاه و شکل زیستی عناصر گیاهی موجود در رویشگاه با استفاده از طبقه‌بندی شکل‌های زیستی رانکایر انجام شد. جنگل مورد مطالعه، منطقه‌ای محصور با مساحت ۴۶۶ هکتار، بین عرض ۳۲" و ۲۱" و ۳۰° تا ۰۰" و ۲۳° و شمالی و طول ۳۵" و ۴۶" و ۵۱° الی ۴۱" و ۴۹" و ۵۱° شرقی با حداقل ۲۱۰۰ و حداکثر ۲۵۵۴ متر ارتفاع از سطح دریا قرار دارد. نتایج نشان داد که این ناحیه شامل ۹۷ گونه گیاهی از ۷۹ جنس و ۲۵ خانواده می‌باشد. خانواده‌های گندمیان با ۱۸ گونه، گل‌سرخ با ۱۱ گونه و چتریان با ۱۰ گونه از گیاهان عمده این منطقه هستند. مطالعه فرمهای رویشی این منطقه در طبقه‌بندی رانکایر نشان داد که ۵۳/۶٪ از گونه‌ها متعلق به همی‌کریپتوفیت‌ها، ۱۴/۴٪ از گیاهان فانروفیت‌ها، ۱۰/۳٪ از گیاهان جزء تروفیت‌ها و ۸/۲٪ آنها از کامفیت‌ها می‌باشند. مطالعات کورولوژی نشان داد که تمام گونه‌ها متعلق به ناحیه رویشی ایران - تورانی بوده که ۴٪ از آنها بین این ناحیه و ناحیه رویشی هیرکانی مشترک بوده‌اند.

*مؤلف مسئول