

## Flora, Life Form and Chorotypes of Plants in River Forest Behbahan, Iran

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**Abstract:** Flora in each region identified an important role in maintaining national reserves of each country to play. Iran is one of the most important centers of plant diversity into account old world comes closer to 22 percent of its 8000 plant species are exclusively. Behbahan area is located in southeastern province. Plant geography of the area within the region is Sudan eruption. In this study 82 plant species collected from the area were identified and collected to 70 genera and 26 belong to the family. Families by Compositae with 14 species, Caryophyllaceae with 6 species, Gramineae with 13 species, Papilionaceae with 81 species and the most important plant families that total 62.2 percent of all species are included. Investigation of life forms species shows that Therophytes are the most important. Chorological study showed that species belonging to the regions of Irano- Turanian and Common areas of Irano-Turanian and Mediterranean eruption were most important ecological groups in the region and other chorotypes are placed far from the next in importance.

**Key words:** Flora • Life form • Chorotype • Plant geography • Behbahan river forests

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### INTRODUCTION

Iran is one of the centers of plant diversity is considered old world so that nearly 22 percent of the 8000 plant species of flora are the endemic [1]. The life form of any plant is fixed that is developed based on the morphological adaptation of plants to environmental conditions. The life form differences in various societies make up basis of their structure. Different Classification of the life form there but among them Raunkiaer system is used most [2]. This system has been built based on vegetative buds position after spending the season unfavorable for growth and plants are based on six main groups: Phanerophyte, Chamaephyte, Hemicryptophyte, Cryptophyte, Therophyte and Epiphyte [2]. Life form also depends on genetics and environmental factors; because the environment can be vital in shaping different forms of plants is undeniable. According to these, plants communities in different climates can be different from the life form diversity are to enjoy. Spectrum of dominant life forms in a climate, represent how the plants adaptation on the climate is special [3]. Ecological range of each plant species has unique and a certain amount of changes will endure in environmental conditions. Field distribution in

species may be limited or wide [2]. Vegetation of each region has one of the most important figures and phenomena of nature and the best guide judgments about the ecological factors in the region. Because the plants are resistant organisms that tolerate in the long term all environmental conditions and occurrences and they are compatible with environmental stress [4]. Informed and familiar situations and vegetation status in any country, not just infrastructure development and scientific activities in the field and has commercial applications but will expand the intellectual part and human interest as well as their surrounding environment and nature. It would be useful for restoration and use of natural resources the country can play an important role [5]. Identify vegetation and geography of each region hile plant based ecological research and reviews the region, operating effectively measure and evaluate current and anticipated future status is considered, therefore, proper management practices of each region has a significant role [6]. Floristic study of plant and plant geography of each region, is made more identified its position in the global network of regional nature conservation [7] and it is one of the most effective methods to identify capacities, management and protection of genetic resources [8]. In general, identify

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and vegetation introduction of an area and the study of biodiversity as a research basis in environmental sciences is particularly important [9]. Among them can be quick and easy access to a particular plant species at the site and given time to determine the potential and capability of vegetative region, the region can increase the number of species density, species identification and are resistant to endangered and help plant species and preserve their treasures gene, identification of medicinal plants and the use of principles and help them determine vegetation named [9]. In recent decades, research in some floristic studies arid and semi arid country has been such that can be pointed [7, 10-21].

There are still areas that spite of the rich vegetation, less attention and are considered the forest area Behbahan is one of these areas. Behbahan Forest River is mainly a cover and is located at the margin of the Maroon river. Behbahan forest area in southeast region of Khuzestan and the range is placed vegetative Sudanian. This study has been done for the first time in the area and its main goals are accurate recognition of plant species, especially plants locally and are used to check and review the chorotype and life form them.

## MATERIAL AND METHODS

**Study Area:** The study area is located in South West of Iran in Khoozestan province; between (30° and 38' and 53'') and (30° and 39' and 38'') eastern longitude and (50° and 09' and 37'') and (50° and 10' and 25'') northern latitude (Fig.1). The considered study site covers an area of 75 hectares. The altitude of the study area is from 250 to 300 meters above sea level. According to statistics in Behbahan weather station, average precipitation and the mean annual temperature are 350mm and 5.24° respectively. In terms of climate in this area based on coefficient method drought De Marton (4.1) with semi-arid climate and is based on the method of Amberger coefficient (7.31) is placed in the range of arid climate areas.

**Research Approach:** For this study, Open transect was used [22]. 31 transects totally as long as 10 km were randomly placed at 100 m far from each other and perpendicular to the Maroon river of the region. A square releve with an area of 100m<sup>2</sup> was regularly considered at every 50m on each transect. For review of herbaceous cover on the forest floor, two micro-plots were used in the two corners of a square releve. Plant samples after collected were transferred the herbarium in department of

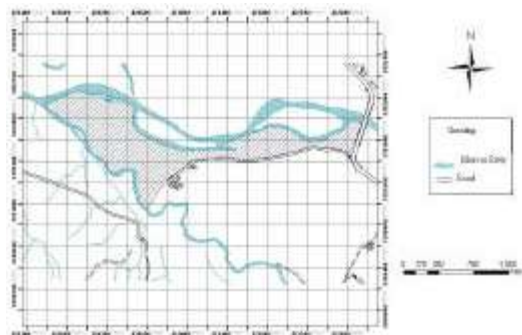


Fig1: The study area situation

Behbahan natural resources. The samples were identified using valid references such as botanical Flora Iranica [23], Flora of Iraq [24], Flora of Turkey [25] Flora of Iran [26] Flora of Khoozestan [27], Flora of Iran [28] and other valid resources [27, 30-34].

The life forms of plants were determined by Raunkiaer method [35]. The distribution of plant species was determined using the above flora. Geographical distribution of species was determined based on vegetative areas classified by Zohary [36,37] and Takhtajan [38].

## RESULTS

In this study 82 plant species from the area in 2009 and collected that was identified 70 genera and 26 belong to the family. List of families and species in the study area and life forms and their distribution are in Table 1. The families of Compsitae (14 species) species, Caryophyllaceae (6 species), Gramineae (13 species), Papilionaceae (18 species) were the most important families. These families are included a total of 62.2 percent of all the species. Frequency graph of each plant species belonging to each family is shown in Figure2. Life forms study by Raunkiaer method showed that the most important groups are therophytes. In this study, therophytes are included 78%, geophytes 7.2%, phanerophytes 7.1%, hemicryptophytes 4.9% and chamaephytes 2.4% of the life forms species. Spectrum of life forms for plant species was shown in Figure3.

In terms of geographical distribution, chorotypes such as Irano-Turanian, Polyregional, Cosmopolite, Mediterranean, European-Siberian and Sudanian with amounts of 19.5%, 6%, 4.9%, 2.4%, 1.2% and 1.2% respectively were having in the highest and lowest levels between vegetative elements (Figure 4). Among the common regions vegetative, Irano-Turanian

Table1: List of family, species, life form and chorotypes of Behbahan river forest

Family	Species	Life form	Chorotypes
Cruciferae	Malcolmia africana (L.) R. Br.	Th	IT,M,ES
Cruciferae	Capsella bursa-pastoris (L.) Medicus	Th	Cosm
Cruciferae	Sinapis arvensis L.	Th	IT,M,ES
Compsitae	Anthemis pseudocotula Bioss.	Th	IT
Compsitae	Calendula persica C. A. Mey.	Th	IT,S
Compsitae	Carduus arabicus Jacq. Ex Murray	Th	IT,M,S
Compsitae	Carthamus oxyacanta M.B.	Th	IT
Compsitae	Centaurea hyalolepis Bioss.	He	IT
Compsitae	Filago pyramidata	Th	IT,M
Compsitae	Koelpinia linearis Pall.	Th	IT
Compsitae	Urospermum picroides (L.) Desf.	Th	M,IT
Compsitae	Senecio glaucus L.	Th	IT,S
Compsitae	Leontodon laciniatu(Bertol.)Widder.ExBormm.	Th	IT,M
Compsitae	Sonchus asper (L.) Hill	Th	M,IT
Compsitae	Launaea capitata (Spreng.) Dandy	He	S
Compsitae	Hedynois rhagiolooides(L.)F.W. Schmidt	Th	M,IT
Compositae	Conyzanthus squamatus	He	polyregional
Caryophyllaceae	Herniaria cinerea DC.	Th	IT,M,SS
Caryophyllaceae	Arenaria leptocladus (Reichenb.) Guss.	Th	polyregional
Caryophyllaceae	Minuartia hybrida	Th	IT
Caryophyllaceae	Polycarpon tetraphyllum (L.) L.	Th	ES,M
Caryophyllaceae	Silene apetala Willd.	Th	IT,M,
Caryophyllaceae	Spergularia mariana (L.) Griseb.	Th	Cosm
Chenopodiaceae	Chenopodium murale L.	Th	IT,M,ES
Cuscutaceae	Cuscuta palaestina Boiss.	Th	IT,M
Cyperaceae	Cyperus alternifolius L.	Ge	Cosm
Ephedraceae	Ephedra foliata	Ph	IT,S
Gramineae	Vulpia ciliata Link	Th	M,IT
Gramineae	Lophochloa Phleoides (Vill.) Reichenb.	Th	IT,S
Gramineae	Polypogon monspeliensis (L.) Desf.	Th	M,IT,S
Gramineae	Saccharum Ravennae (L.) Murray	Ge	M,IT
Gramineae	Bromus rubens L.	Th	M,IT,S
Gramineae	Trachynia distachya (L.) Link	Th	M,S,IT
Gramineae	Hordeum glaucum Steud.	Th	M,IT
Gramineae	Schismus arabicus Nees	Th	IT,M
Gramineae	Eragrostis sp. P. Beauv.	Th	M,SS
Gramineae	Cynodon dactylon (L.) pers.	Ge	Cosm
Gramineae	Bromus Danthoniae Trin.	Th	IT
Gramineae	Stipa capensis Thunb.	Th	IT,S,M
Gramineae	Bromus scoparius L.	Th	IT,M,ES
Geraniaceae	Erodium pulverulentum (Cav.) Willd.	Th	IT,M,S
Geraniaceae	Erodium malacoides (L.) L, Her ex Gordon	Th	IT,M
Geraniaceae	Geranium rotundifolium L.	Th	IT,M,ES
Gentianaceae	Centaurium pulchellum(swartz)Druce	Th	IT,ES
Juncaceae	Juncus rigidus Desf	Ge	ES
Liliaceae	Asparagus persicus Baker	He	IT
Malvaceae	Malva parviflora L.	Th	M,IT
Mimosaceae	Prosopis fracta (Banks & Soland.) Macbr.	Ch	IT,M,SS
Poaceae	Lolium rigidum Gaudin	Th	M,IT
Poaceae	Vulpia myuros (L.) J. F. Gmel.	Th	IT,M,ES
Poaceae	Henrardia Persicum	Th	IT
Papilionaceae	Alhagi mannifera	Ge	IT,M,S,SA
Papilionaceae	Onobrychis Crista-galli (L.) Lam.	Th	M
Papilionaceae	Hymenocarpus circinnatus (L.) Savi	Th	M
Papilionaceae	Ononis reclinata L.	Th	polyregional
Papilionaceae	Scorpiurus muricatus L.	Th	M,IT

Table1: Continue

Family	Species	Life form	Chorotypes
Papilionaceae	Trigonella uncatata Boiss. 8 Noe	Th	IT
Papilionaceae	Astragalus crulinata	Ch	M,S
Papilionaceae	Medicago coronata (L.) Bartalini	Th	M,IT
Papilionaceae	Medicago laciniata (L.) Miller	Th	IT,M,SS
Papilionaceae	Medicago minima (L.) Bartalini	Th	IT
Papilionaceae	Medicago polymorpha L.	Th	IT,M,ES
Papilionaceae	Melilotus indicus (L.) All.	Th	Polyregional
Papilionaceae	Trifolium campestre Schreb.	Th	IT,M,ES
Papilionaceae	Trifolium Clusii	Th	M,IT
Papilionaceae	Hippocrepis bisiliqua Forssk.	Th	IT,M,SA,S
Papilionaceae	Vicia sativa L.	Th	IT,M,ES
Papilionaceae	Trigonella monantha	Th	IT
Papilionaceae	Medicago orbicularis (L.) Bartalini	Th	M,IT,ES,S
Polygonaceae	Emex spinosus (L.) Campd.	Ph	IT
Plantaginaceae	Plantago lagopus L.	Th	M,IT
Plantaginaceae	Plantago Coronopus L.	Th	IT,S,M
Primulaceae	Anagalis arvensis L.	Th	IT,M,ES
Primulaceae	Lysimachia limum-Stellatum L.	Th	IT,ES,M,S
Rubiaceae	Galium setaceum	Th	IT
Solanaceae	Lycium Shawii Roemer & schult	Ph	IT
Salicaceae	Populus euphratica Olivier	Ph	IT,ES
Scrophulariaceae	Veronica polita	Th	polyregional
Tamaricaceae	Tamarix arceuthoides Beg.	Ph	IT
Umbelliferae	Torilis leptophylla (L.) Reichenb.	Th	IT,M,ES
Umbelliferae	Ammi majus L.	Th	IT,ES,S
Verbenaceae	Vitex pseudo-negundo (Husskn.) HandMzt.	Ph	IT

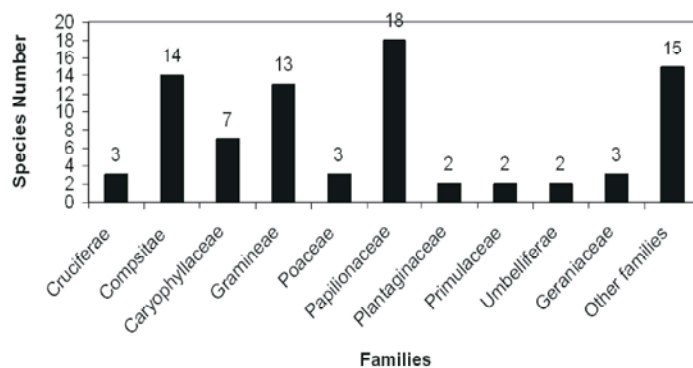


Fig. 2: Frequency graph of plants families in river forest of Behbahan

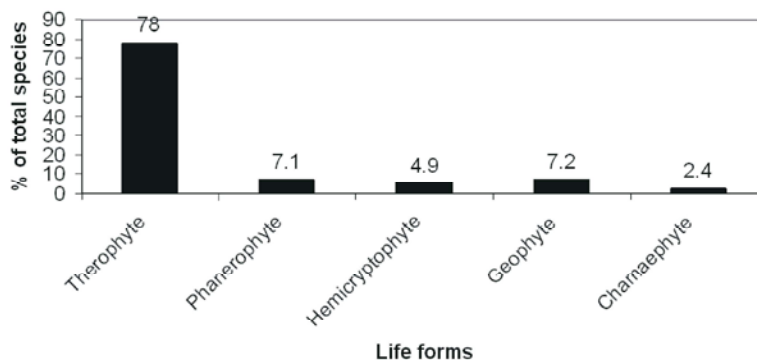


Fig. 3: Life form spectrum of plants in river forest of Behbahan

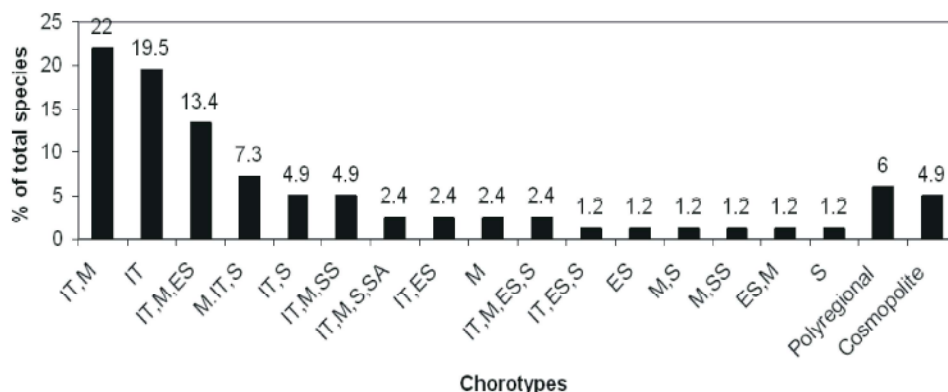


Fig. 4: Chorological types spectrum in flora in Behbahan river forest region

and Mediterranean (IT,M) were with the highest (Figure4). The regions of European-Siberian and Mediterranean (ES,M), Mediterranean and Sahara-Sindian (M,SS), Mediterranean and Sudanian (M,S) and Irano-Turanian, European-Siberian and Sudanian (IT,ES,S) were with the lowest (Figure3).

### DISCUSSION

The river forest of Behbahan is located in the area of the city area and in southeastern of Khuzestan Province. Average rainfall in this region is 350 mm, but despite the good rainfall, the climate is dry and semi-arid due to limited distribution of the specific to winter and early spring. Moderate winters with high precipitation in this season provides suitable for growth of gramineous plants, including annual and perennial plants. Long term drought that began in mid-spring and continues to late summer and fall that to be caused plants to grow mainly limited to the period of favorable development is the winter and spring. As a result a high percentage of vegetation in this region (78 percent) make up annual herbaceous. Herbaceous perennial plants share from the vegetation in this area generally appear in the life form of hemicryptophytes and geophytes, are respectively, 4.9 and 7.2 percent. Phanerophytes exist that form a shrub and some tree, make up the upper storey forest in this region. These groups constitute a relatively small percentage (7.1%) of total plant area. The presence of plants severely affected by river flow that passes from the region. River Forest of Behbahan placed based division Zohary [37] in the range of the Sudanian region vegetative phytogeographically. However, Sudanian vegetative elements tend to devote a small percentage (1.2%) of the elements in this region that it equal to the

elements of European-Siberian in this area. Vegetative elements of Irano-Turanian include the highest percentage of vegetative elements (19.5%) in this area. Due to adjacent study area vegetative with Irano-Turanian region, high percentage of these elements in this range is not unexpected. In fact, this area is considered a ecotone zone between two regions include Irano-Turanian and Sudanian vegetative. Percentage of common elements in Irano-Turanian and Sudanian (4.9%) can itself be evidence of this claim. Among the various plants families in the region, families by Graminae, Compositae, Papilionaceae account for the largest percentage of the available species. High rainfall and short winter and early spring provide conditions favorable for the growth of broad-leaved herbaceous plants in this area. Papilionaceae family with different genus like medicago and trifolium and having species annual and abundant comprise a major part of the regional vegetation. Have a high proportion of grasses vegetation in the area, are due to high rainfall and humidity from the river flow Maroon.

### ACKNOWLEDGEMENT

The author would like to thank Behbahan department of natural resources and Mr. Bayatt, head of department, for his warm and friendly assistance. I am also grateful to Behbahan College of natural resources and the botany department at this college for great help to us.

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