



APPROACH TO PLANT COMMUNITIES IN DESERT REGIONS OF KHORASAN PROVINCE IN IRAN

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ABSTRACT

At present, although there is of good information about Iran flora, but about ecology and recognition of plant communities, especially in dry parts of the country's information is relatively low. Based on research conducted, vegetation of desert areas of Khorasan classified Wolfgang Frey & Probst method (1977) based on ecological criteria and physiognomy on five main structure and overall vegetation cover were identified include: trees, shrubs, psamophyte vegetation and halophyte vegetation. Results showed that trees grown in the geographic domain of desert territory of Khorasan is composed of three different communities and has an area of 70,602 hectares of which about 6 / 0 percent of total vegetation cover the study area. Shrubs with seven community (except psamophyte and halophyte species), and an area of over 2,125,480 hectares in total are equivalent to 6 / 17 percent of total area.

KEYWORDS: Plant communities, ecological criteria, physiognomy, Desert areas, Khorasan province.

INTRODUCTION

Studies of plant ecology and plant geographical analysis through the comprehensive surface have been conducted by Kochi (1861), Melkyour (1937) and Reshinger (1939). Gili (1939) is the first researchers who are paid to plant sociology. Bubak (1951) has done many studies about plant geography. Zohari (1981), regarding the structure and evolution of flora and vegetation of the Middle East has done extensive research. The first comprehensive data on formation of woody vegetation and other vegetation units have been conducted by Zohari (1963), Mobayin & Trehgobeh (1970). Zohari (1973) have investigated geobotanical foundation of the Middle East (including Iran vegetation) to once again in detail. Wolf Gong Frey and Will Farid Probst (1986) have done studies on plant geography and vegetation formation in Iran (Fig2). Armen Takhtajan (1986) about Iran's position in world crop areas; Frank White and Leonard G (1991) Plant geography links about Africa and Southwest Asia; Vendelbo (1971), some regional patterns of emissions in the range of Flora Iranica; A. C. Hej & vendelbo (1978), release patterns and inhabitants in Iran; Fraitag (1986), concerning emissions, climate and flora of Iran and Afghanistan and sandy deserts.

Goals

- 1 - Identify types of vegetation index in desert regions of Khorasan province (Fig.1).
- 2 - Determine the scope and extend plant communities in desert areas.
- 3 - Identification of various environmental parameters including soil, climate, geology and ... within each plant type.
- 4 - Preparation and presentation of vegetation maps.

CHARACTERISTICS OF THE STUDY AREA

Geographical coordinates

Khorasan province with an area equivalent to 296189 sq km in North-East and East of Iran and geographic circuits, and 18 minutes to 55 degrees and 61 degrees 30 minutes

east longitude and 30 degrees to 38 degrees 13 minutes north latitude and is located 8 minutes. North and North East are limited to Turkmenistan, from East to Afghanistan, the South East of Sistan and Baluchestan, Kerman province to the south of the West provinces of Yazd, Esfahan and Semnan, Golestan Province and the northwest. Maximum and minimum altitude are 3211 and 300 meters, respectively, the first located on peak of Binalud mountain and the latter is located in the north of Saraks city. Desert areas in Khorasan province have an area equivalent to approximately 23653950 ha that 80 percent of the total area of the province is included (Map 1).

Weather

Variable and diverse climate of Khorasan province lead to be part of semi-arid to arid. The main reason for Variable climate interact province weather front is different from the West, Northwest and North East provinces are entered. Absolute maximum and minimum air temperature in the Weather Stations in Halvan (Tabas) and Emamqoli respectively 50 and -32 ° C has been reported. Average maximum temperature in the hottest months between 26/7 ° C in Emamqoli to 42/3 ° C in Tabas Dastgerdan fluctuates. The average minimum temperature of coldest month year minimum -8/8 ° C in Torbatehdayarieh and the highest rate of 2/2 C in Boshruyeh is recorded. Generally, air temperature of North and North West Province to South East and South side, increases. Hottest months of July and January respectively and are the coldest months of the year. Descending rate as atmospheric temperatures vary in different parts of the province and its value in the North West and North Highlands mountain range is located south of the province is over. So that the maximum rainfall in the northwest province-based stations in the in the forest area of Golestan 900-1000 mm and a minimum amount of rainfall in Dyhuvk with 76/3 mm have been reported. Average precipitation in the province based on weather stations ranges, between 180-200 mm that 50%

downside over three months March, April and May is revealed.

Evapotranspiration rate also changes in adherence temperatures, but low in northern province in southern provinces is high. Maximum and minimum capacity of evaporation recorded in the weather station Halvan(Tabas) and Emamgholi 4075 and 913 mm, respectively.

Climatic classification based on the method developed Diomarton seven climatic floor (Hyper arid, arid, semi arid, semi-humid, humid, very humid and Mediterranean) and three sub floor (usually cold and hyper cold and sometimes mild) in the province has total of 15 different climatic category identified in Khorasan Province and has been introduced. Desert regions include the number seven climatic areas.

METHODOLOGY

Data collection phase

At this stage, using internal and external sources and if possible, optimizes them; the action needed information was collected. Major activities carried out in this phase include:

1. Collecting and studying reports, articles and maps of vegetation on Iran, Khorasan Province, especially vegetation.
2. Collecting maps and study weather reports, including climatic classification, isohyte, isothermal and evaporated in Khorasan.
3. Collecting and study of geological reports and maps of soils, land resource evaluation and geological features related to the study area.
4. Field visits and field measuring in desert areas of Khorasan province.

Integrating the second stage of data

Acquired information about vegetation cover information in the same field together, and compliance was finally extracted from them the desired results and were presented. Generally, this stage includes:

1. Identify plant species by means of flora and botanist professionals.
2. determination about desert and semi-desert areas, based on two main factors affecting and influencing the distribution and adaptation of plants with their environment, i.e. climatic factors (using expanded Diomarton method) and earth surface factors (Edaphically and topography conditions).
3. Classification and introduction of plant communities and units based on vegetation classification Frey and Probst (1986), the highest compatibility and harmony with nature the region has been
4. Vegetation mapping using Geographic Information System (GIS).
5. Mapping all vegetation units were identified.

RESULTS AND DISCUSSION

Vegetation units identified in the study area is about 12089394 ha that in the following only the tree and shrub existed in Khorasan desert areas have been described (Diagram 1).

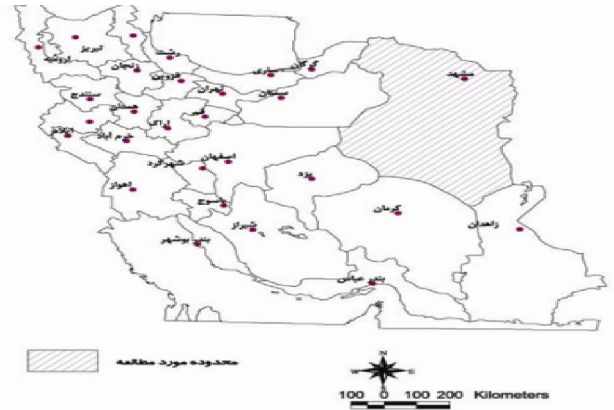


Figure-1. Map of study area

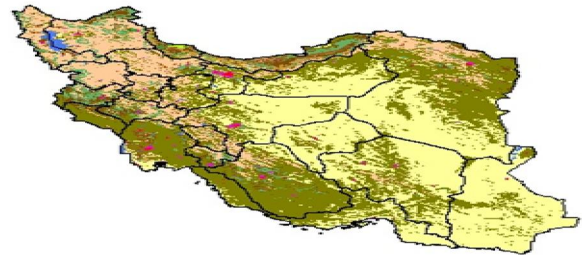


Figure-2. Iranian vegetation map



Figure-3. Community of pistachio vera

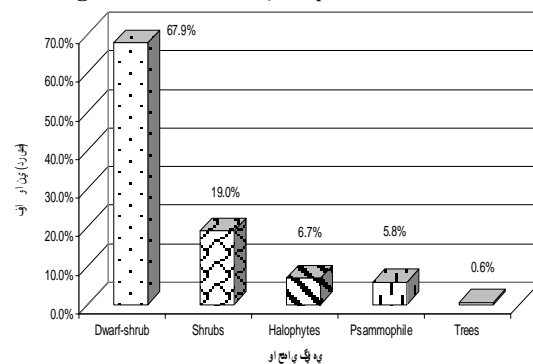


Chart 1: Comparison of frequency of vegetation units in desert regions of Khorasan

TREES

Although comprehensive and detailed studies of the floristic composition and distribution trees wide range of mountain areas has been reported by others in history, but instead referred to ecological studies in these areas is still empty. Tree habitats in the Khorasan which is composed of several sub area is 70,602 hectares of which about 6.0 percent of total vegetation cover the study area.

Sparse evergreen trees with needle leaf resistance to cold (*Juniperus*)

The structure of needle-leaf forests continue *Juniperus* or *Juniperus excelsa* in Iran or the Kopetdag mountains along the basin of Qarehgum extended to Mashhad in North East Bazngan. Its area is 2113 hectares of which about 3 percent of forest vegetation in the study area forms. Altitudinal range from 1500-2000 meters above sea level, at least 250 mm annual precipitation and the semi-arid climate is cold.

The climate of *Juniperus* habitats is continental that the distinctive features of particular hard frost of winter (-25 degrees) without decreasing summer temperatures and humidity is low. (Frey and Probst, 1986).

This growth is widespread in land types, including mountains with peaks extracted consists of dolomitic limestone rocks and soils lithic leptosols. This plant structure consists of a plan type named *Ar. kopetdaghensis-Juniperus excelsa* which the important species associated with it are:

Lonicera nummularifolia, *Pistacia vera*, *Amygdalus spinosissima*, *Agropyron trichophorum*, *Crataegus sp.*, *Cotoneaster*, *Astragalus spp*, *Acantholimon spp.*, *Eremurus spp.*, *Prunus*, *Colutea buhsei*, *Berberis integrima*, *Ferula spp.*

Sparse erymophyte edible pistachio (*pistacia vera*)

Although pistachio trees can be seen in the form of physiognomy, but most of these shrubs are the association and hence Frey & Probst classified them in units of eremophytes plant that widely located margins of forests (Fig. 3).

Bubak (1951) is called open and sparse erymophyte forests of pistachio and almond. Zohary(1973) has been named them as Steppian juniper, pistachio and almond (*Junipero-pistacieta*). Cramer (1984) is divided them into three categories:

1. *Amygdalus spinosissima* & *a. lysioides*
2. *Amygdalus scoparia*
3. *Lonicera nummularifolia*.

Pistachio trees in Iran distributed in Khorasan province on the Garehgum basin. Dry violent climate on the current point in such a way as the dry hot summer and very cold in winter. Its area is 27,079 ha, equivalent to 38.4 percent tree cover in the study area makes. The plant *Artemisia diffusa* and often dominant *Poa bulbosa* covers form the basis and scattered around the line, Kalat, and along it towards the East in the Saraks region and is extended to the East Saleh- Abad. Elevation changes 600-1500 m from sea level, slope lands in it ranges 1-100 percent and generally to 40 percent, average annual precipitation over the general structure of 200 mm and semi-arid climate of the cold.

Khinjuk communities (*pistacia atlantica* and *P. khinjuk*)

Area of this vegetation is 41,410 ha equivalent 58.6 percent of tree cover is included which is located in Torbate-jam and Cain regions. But this community plant dominated with *Artemisia* in the region Torbate-jam and be seen with the dominant form of *Astragalus* in Gaien. Habitat characteristics of the plant unit area in Torbat included: Average annual precipitation 100 to 200 mm. cold semi-arid climates, elevation 900-1300 meters above sea level, slope lands to 30 percent. Habitat characteristics of the vegetation units in the region of Ghaen is: Average annual precipitation 250 mm, semi-arid climate, elevation 1800-2800 m above sea level and slope land more than 30 percent. In mountain and hill lands and calcareous soils and Lptvsol Rigosol rock is spread.

VERY SPARSE ERYMOPHYTES (semi-desert shrubs)

In areas of low rainfall sparse erymophyte moorland to the very popular open land into which species represents the highly drought-resistant plant can be named *Amygdalus spp.* and *Zygophyllum eurypterum*. This structure of the study area is an area of 2125488 hectares of which about 17.6 percent of the total vegetation forms and is composed of several floor.

Community of *Hammada salicornica*

The area of this community is about 866,471 hectares that is about 40.8 percent of the shrub vegetation are included. This plant community scattered on the southern provinces such as Khor of Birjand, Birjand & Tabas. Besides, this unit plant has expanded on lands with pure sand or salty and calcareous and gypsum lands. Amount of precipitation where typically less than 50 to 150 mm. Land sources mainly contained hillside land, plateau, and sand dunes. Slope is less than 30 percent, elevation is 600 to 1500 m above sea level, hyper arid (cold) and hyper arid (temperate) provides favorable conditions for growth of this unit plant. J. Leonard (1989) knows species (*Hammada salicornica*) as an exclusive species for sahara-syndi on Arabic – Syndi habitates.

Important species associated with this community is: *Artemisia sieberi*, *Ephedra*, *Haloxylon ammodendron*, *Fortuynia bungei*, *Calligonum*, *Cornulaca monacantha*, *Pteropyrum aucheri*, *Zygophyllum atriplicoides*.

Community of *Ephedra spp.*

Its area is 531,636 ha, is equivalent to 25 percent shrub vegetation. This unit plant distributed in Kashmar, Gonabad, Gzyk, Caen, Khor and Birjand. Dominant Species are *Ephedra strobilacea*, *E. intermedia* and *E. major*. This type of vegetation has expanded on the mountains, hills and plateau with Litosol, calcareous and Haplic Rigosol. Land slope changes from 10 to 50 percent, elevation range is 1400 to 2600 m above sea level, dry desert climate with cold and hyper arid cold, average rainfall 150-250 mm per year. Important species along the main species are seen in areas including: *Artemisia sieberi*, *A. diffusa*, *Astragalus spp.*, *Cousinia spp.*

Sexual community (*Haloxylon ammodenderon*)

Total Area is about 476,545 hectares, which occupies 22.4 percent of the shrub vegetation. Distribution of this unit plant is central areas of Iran like this Sabzevar and around Taibad and southern parts like Ferdows, Gonabad, Gaien,

Madne, Birjand, khor, Gezik and Tabas regions. Average annual precipitation in this unit is less than 50 mm to 250 mm is fluctuating.

This type of vegetation can be seen in the land of salt and sand that separately in this report will be named. Endemic and planted *Haloxylon* species are seen above regions. Important species associated with include: *Salsola tomentosa*, *Astragalus squarrosus*, *Zygophyllum atriplicoides*, *Seidlitzia rosmarinus*, *Hammada salicornica*, *Convolvulus*

Almond Community (*Amygdalus* spp.) & (*Amygdalus scoparia*)

The area of this community is about 165,225 hectares that contained about 7.8 percentage of shrub vegetation formed. The dominant species in this community in Ferdows, Tabas, Chahsorb, Khor and Birjand located southern province is *Amygdalus scoparia*. Habitat characteristics include:

Mountain and hillside land, the general slope of 15 to 50 percent, Rigosol, calcareous soil and rock Litosol, average annual precipitation changes from 75 to 200 mm, height range 850-2150 m above sea level with dry desert, arid cold and Hyper arid cold climate.

Associated species include: *Gymnocarpus decander*, *Artemisia sieberi*, *Zygophyllum atriplicoides*, *Pistacia atlantica*, *Ephedra intermedia*.

But in other areas *A. spinosissima* or *A. lycioides* or sometimes *A. ebornea* is the dominant species. Beside, *Artemisia* is the main compaining plant as well *A. sieberi* *A. deserti* species is the most abundant in this community. Distribution of this vegetation across the Khorasan area including Torbate-jam, Caenin, Gyzik and Taibad. Habitat characteristics that include:

Mountain and hillside land, the general slope of 10 to more than 30 percent, rock and Riggosol, Litosol calcareous soil, average annual precipitation of 100-160 mm, height range 900-2200 m above sea level and the dry cold desert.

Community of *Seidlitzia rosmarinus*

The area of this type is 52,252 hectares and about 2.5 percent shrub vegetation forms. In addition to salt and gypsic lands habitates, this community has also spread on pure sand and salted sands. This unit plant mainly is Arabic-syndi interface elements as well as considered Irano-Tourani vegetation. Thus the community in several plant unit was introduced. Mnjlmh in land salinity and Birjand with Sabzevar *Astragalus squarrosus* and *Hammada salicornica* be seen. General slope of land less than one percent elevation range 1200-840 m above sea level, dry desert climate cold and mean annual precipitation from 200 to 50 mm of the specifications of this unit is growing in these areas. Also, fan type and plateau lands Varyz-h Rygvsvl soils with gypsum and limestone are expanding.

Community of *Zygophyllum atriplicoides*

Area of this community plant is about 24,070 ha that includes 1.1 percent of sparse trees in dry lands. This unit plant which scattered in Gonabad & Geain regions is composed two different types. *Zygophyllum atriplicoides* as a unique species in the Irano-tourani vegetative region which grows on plains rubble mixed with sand, significantly. In Gonabad region, *Astragalus squarrosus* and *salsola tomentosa* are as two associated species. In

the region of Gaenin two different vegetative types include: *Zygophyllum atriplicoides*-*Astragalus squarrosus*, *Z. atriplicoides*-*Salsola* sp. - *A. squarrosus*

Rainfall amounts in this habitat changes between 100 to 150 mm, public slope 3 to 30 percent, the arid climate, cold expression, heights range from 960 to 1200 meters above sea level and the type of growth soil is calcareous and Gypsic Rigosol temporary Haplic Calcisol and calcareous Flovisol .

Community of *Pteropyrum aucheri*

The area of this community plant is about 9289 hectares which is 0.4 percent shrub lands vegetation forms. This is only connector genus between Oman's – syndic and Irano –Tourani vegetative unit. Expanding of this community plant in the study area is Kashmar region, along with *Artemisia sieberi* on the hills, plateau and plains with calcareous and Gypsic Rigosol. The other characteristics of this community are changes in land elevation range 1100-1300 meters above sea level, slope 1-15 percent, dry & cold desert climate, and mean annual precipitation is 200 mm settlement.

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