

Notes on the Distribution, Climate and Flora of the Oil Field Areas, South-West of Iran

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Abstract

The extensive lowland of Khuzistan in SW. Iran has been studied floristically. A brief information on the climate, habitat and lithology of area is presented. The hot desert of lowland along the persian Gulf area, with complex floristic situation is indicated. Their phytogeographical and taxonomic relationships are discussed in detail and attempts are made to relate the distributional patterns to certain ecological factors. 25.5% of the species are Irano - Turanian & Saharo - sindian, 22% saharo - sindian, 15.1% Irano - Turanian, 1.5% Mediterranean, 1.9% endemics, mostly derivatives of Saharo - sindian species, 6.4% cosmopolitan and 27.7% bi - or pluriregional. The highest number of endemics are found in the northern parts of the oil field areas, where they have a wetter climate than most of coastal plains.

Keywords: *SW. Iran, Floristic composition, Saharo - Sindian region, Plant geography*

Introduction

Up till now, information about the ecology, flora, and vegetation of the oil field areas in south–west Iran has been very scanty, as can be judged from the small entries in the voluminous work of Zohary (1973). Even the remarkable progress of the Flora Iranica project (Rechinger 1963 – 1999) has not altered the situation very much, as it includes only few data about the ecology of the species deal with, therefore, it my seems some what premature to discuss significant plant distributions in these

areas when our knowledge of its flora ecological situation is still very far from complete. The final picture will not be clear until all the distributional patterns of species have been accurately classified, but, this is certainly many years ahead (White, 1983; Breckle, 1986). The provisional account presented here is based on the author's own experience from field works carried out during three years in all seasons. The detailed floristic data on the oil field areas in southwest Iran is highly incomplete, being limited to some earlier authors who have considered aspects of plant distribution and phytogeography in Iran such as Rechinger (1963-99), Bobek (1951), Wendelbo (1971), Zohary (1973) and Leonard (1951- 89). The voluminous work of Zohary (1973), contains a great deal of basic information about plant life in southwest Asia, including Iran, and is a major source of reference. It must be that the flora of oil field areas is very fragmentarily known; this is particularly true for the southernmost area in Khuzistan.

Terrain and climatological conditions

The oil field areas which cover about 20000 km² is situated in southwest Iran. This region extends at lower altitudes with extensive lowland in a belt of varying width all the way along the Persian Gulf from the border of Iraq (Khuzistan) to that of Buschir and Kohgiluyeh (Alaie, 1999; Leonard, 1989). This area comprises the coastal land around the Persian Gulf, a rather flat alluvial plain at 0–20m elevation to where the terrain rises gradually to form a small chain of mountains at about 850m elevation. The coastal land is fairly narrow and is featured by salines, sand dunes and alluvial plains; further inward the somewhat elevated terraces of the tertiary chalks and marls in the margin of Zagros system (Fig. 1). Although, there is a fairly large body of information available on the soils of most areas under review, there is so far no conclusive treaties on the relations between the soil and the vegetation of this area. For the purpose of classification most of the areas can be categorized as heavy saline and solonchak soils in coastal plains, alluvial - colluvial variety of soil that are usually cultivated and calcareous - gypseous lithosols and marls over the higher terrain, also moving sand dunes are present in the north of the coastal plains. The coastal belt of Persian Gulf and the salt lands of Khuzistan are dominated mostly by

deserts, but occasionally with more extreme maxima and minima (Zohary, 1973). For instance, the absolute minimum and maximum temperature of Ahwaz is -0.6°C and 50.4°C . The mean minimum of January is 7.5°C and the mean maximum of July 47.1°C . Gachsaran (margin of Zagros system) has an extreme maximum of 47°C and a minimum of -3.6°C . Bander-Imam (Persian Gulf) has 4°C as its extreme minimum and 47.7°C as its extreme maximum, while its mean maximum (July) and its mean minimum (January) are 41.5°C and 9°C respectively. Aghajari (medium altitude) has an extreme maximum of 51°C and a minimum of 0.9°C ; the mean minimum of January is 8.3°C and the mean maximum of July 45.5°C (Fig. 2). Annual precipitation ranges in southwest Iran from over 430 mm (Masjed-soleyman) to 184mm or less (Abadan). One of the most important factors in rain climate of this areas appears to be the seasonal rain distribution, and the bulk of areas receives its rains in autumn, winter and spring. Despite, there are very few rainfall records for the gulf region, but from the occurrence of arboreal components in the vegetation cover of this area it is evident that the amount of rainfall is greater there than in the central plateau, although it does probably not exceed 150-450mm (Ghahreman, 1974-1990; Zohary, 1973). The coast land around the Persian Gulf is fairly narrow and is featured by local sand dunes and salines; further inward the somewhat elevated terraces of tertiary chalks and marls support a very poor savanna and pseudo - savanna vegetation. The relative humidity is not different in any part of areas, and shows a mean of 48% (Alaie, 1999; Sabeti, 1971; Tregubov, 1970). Therefore, hot desert climate is characterized by high temperature and erratic, often scanty rainfall (Fig. 2).

Notes on the Flora

There are several striking general characteristics of plant life in these lands. As everywhere in severe habitats, plant species growing in the oil field areas, of SW. Iran are highly adapted to their special environment. The particular stresses are dying off of seedlings by rapid exsiccation of upper soil layer or by extremely high temperatures, desiccation by outblow roots, burial by sand, alkalinity and salinity of soils, etc (Freitag, 1986; Ghahreman, 1994). Much less known are the

presented in Table 1. It is evident that the highest number of endemics (8=88.9%) are found in the northern part of the area. These areas have a wetter climate than most of coastal plains (Fig. 2). Altogether 5 species (55.6%) of the endemics are found in the marls and gypseous habitats, and 1 species (11.1%) in sandy dunes, 3 species in mountainous lithosols. The two endemic genera of Umbelliferae, *Dicyclophora* and *Ergocarpon* (Hedge & Lamond, 1973) and one endemic species of Caryophyllaceae, *Silene wendelboi* (Assadi, 1977) are curious members, whereas the other genera are widely dispersed in subtropical Persian Gulf region (Alaie, 1999; Ghahreman, 1999), (Fig. 3). *Silene wendelboi* is a rare endemic of the oil field areas. It occurs at elevation about 35-50m on the sand dunes. It has been found so far in the following places ; Albaji, Khalfabad (ca.50m, Alaie 1998). *Centaurea khuzistanica* was described as a new and rare species from southwest Iran (Mozaffarian, 1992). It has been found in Dezful to Shahion, after Bishebozan, Aghajari to Gachsaran (Alaie, 1998).

Table 1 - The endemic species of the oil field area, Iran

Life - forms: Ch chamaephyte; T therophyte; Hm hemicryptophyte

Chorotype: IT Irano - Turanian; SS Saharo - Sindian

Species	District	Chorotype	Habitat	Life - form
<i>Acanthophyllum khuzistanicum</i> Rech.f.	Khuzistan	SS	Marls and gypsum places	Ch
<i>Achillea eriophora</i> DC.	E.khuzistan, Fars, Baluchistan	SS	Sandy soil, wadi beds	Hm
<i>Astragalus gypsocolus</i> Maassoumi.ex Mozaffarian	Khuzistan	SS	Gypseous soil	Hm
<i>Centaurea khuzistanica</i> Mozaffarian	Khuzistan	SS	Smooth rocks	Hm
<i>Dicyclophora persica</i> Boiss.	Khuzistan, Fars, Buschir, Hormozgan	SS	Marls, heavy soil	T
<i>Ergocarpon cryptanthum</i> C.C.Townsend	Khuzistan, S.Fars	SS	Calcareous places	T
<i>Physorrhynchus chamaerapistrum</i> (Boiss.) Boiss.	Khuzistan, Buschir, Hormozgan	SS	Gypsum places	Ch
<i>Platychaete mucronifolia</i> (Boiss.)& Hausskn.	Khuzistan, Fars	SS, IT	Marls and gypseous soil	Ch
<i>Silene wendelboi</i> Assadi	Khuzistan	SS	Sandy dunes	T

oo

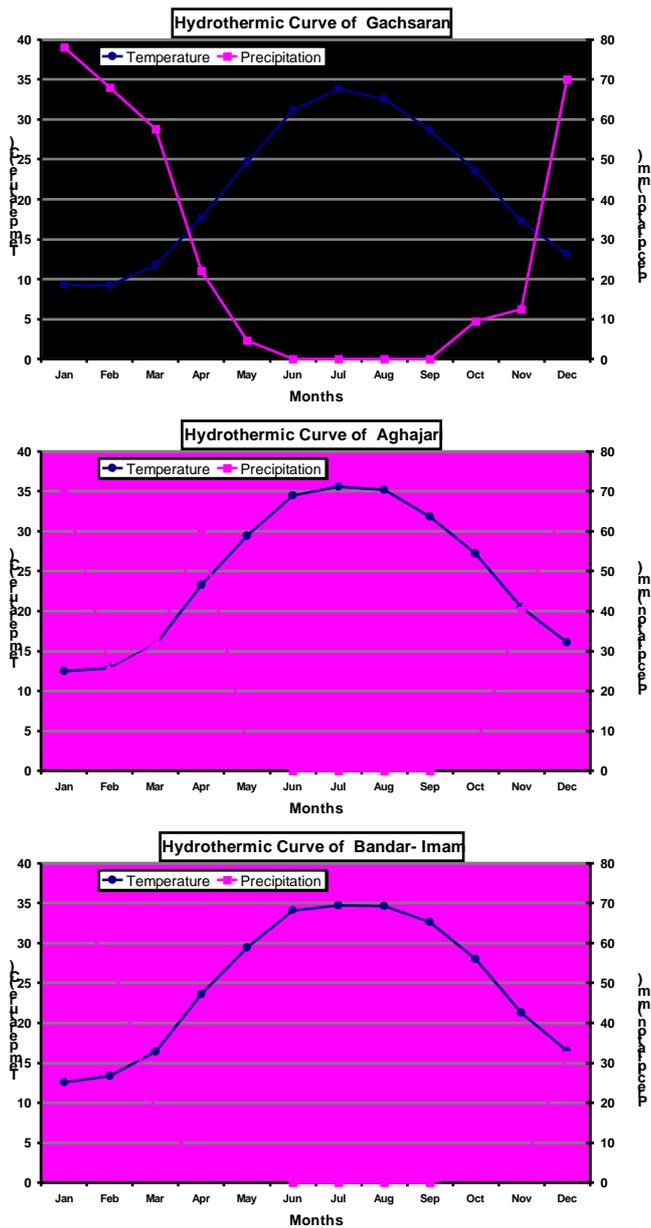


Figure 2 – Hydrothermic curves for selected sites of the oil fields area, south west Iran.

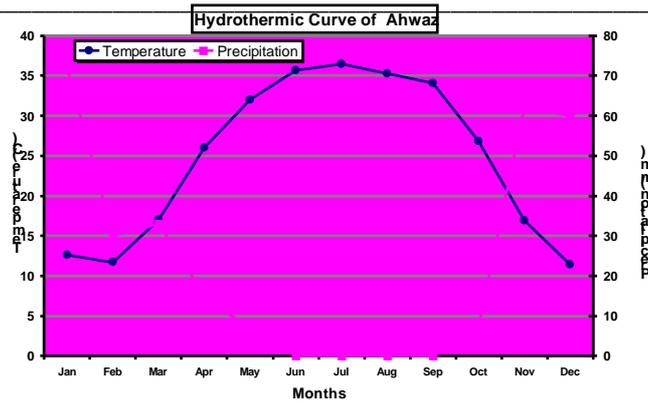


Figure 2 – Continued.

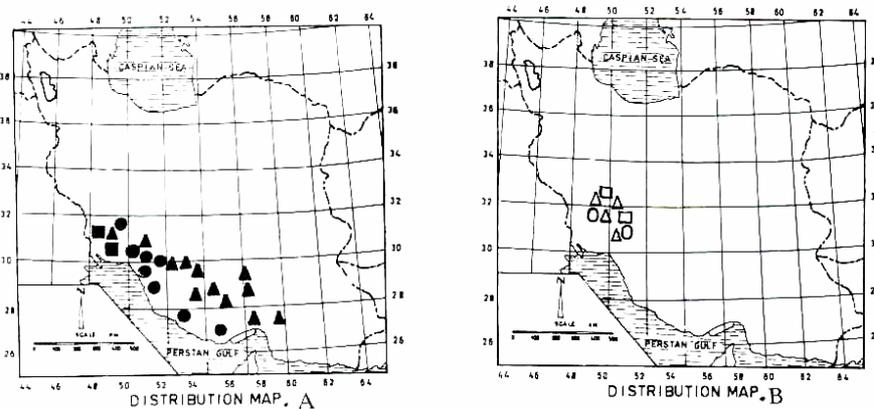


Figure 3 - Total ranges of A) *Physorrhyncus chamaerapistrum* (Cruciferae) and *Dicyclophora persica* (Umbelliferae) and *Silene wendelboi* (Caryophyllaceae) B) *Centaurea khuzistanica* (Compositae) and *Acanthophyllum khuzistanicum* (Caryophyllaceae), and *Astragalus gypsocolus* (Papilionaceae).

Distributional Types of the Flora in the Oil Field Areas

As already mentioned, the flora of the oil field areas is made up of two phytogeographical categories. These are: 1) The uniregional groups or the elements i.e. the endemic or sub-endemic taxa, 2) The bi- and pluri-regional groups. These are mostly considerable in number and various combinations. The percentage of these groups in the composition of total flora of the area clearly reflects the phytogeographical nature of the area. It will be shown in the following table that each habitat has a

e.g. edaphic, thermal and biotic within the areas under concern. Most of them do not extend further S or SW of Iran but are widespread in the oil field areas. They are mostly representative of the Irano - Turanian and Saharo - Sindian floristic elements, and include at least large parts of the oil field areas as the eastern sector of the Saharo-Sindian florestic region (Table 2).

Table 2 - Widespread thermophilous species (mostly Irano-Turanian and Saharo-Sindian elements: bi-and pluri- regional elements are marked with +)

Shrubs, dwarf shrubs
+ <i>Lycium shawii</i> Roemer & Schultes
<i>Pergularia tomentosa</i> L.
<i>Periploca aphylla</i> Dcne.
+ <i>Prosopis farcta</i> (Banks & Soland.) Macbr.
<i>Ziziphus nummularia</i> (Burm.f) Wight. Arn
<i>Ziziphus spina-christi</i> (L.) Wild.
<i>Zygophyllum eurypterum</i> subsp. <i>Gontsharowii</i> (Boiss.) Hadidi
Other perenials
<i>Acanthophyllum khuzistanicum</i> Rech.f.
+ <i>Alhagi mannifera</i> Desv.
+ <i>Astragalus fasciculifolius</i> Boiss. Subsp. <i>arbusculus</i> Bornm.
<i>Astragalus talimansurensis</i> Rech.f.
<i>Capparis spinosa</i> L.
<i>Convolvulus oxyphyllus</i> Boiss..
<i>Erodium glaucophyllum</i> (L.) Aiton
+ <i>Halocnemum strobilaceum</i> (Pall.) M.B.
+ <i>Scrophularia deserti</i> Del.
+ <i>Suaeda fruticosa</i> Forssk. ex J.F.Gmel.
+ <i>Teucrium polium</i> L.
Annuals (and biennials)
+ <i>Anagallis arvensis</i> L.
+ <i>Centaurea bruguierana</i> (DC.)
<i>Cornulaca leucacantha</i> Aell.
<i>Diplotaxis eruroides</i> (L.) DC. Hand.-Maz.
<i>Diplotaxis harra</i> (Forssk.) Boiss.
+ <i>Erucaria hispanica</i> (L.) Miller.
+ <i>Heliotropium lasiocarpum</i> Ledeb.
<i>Matthiola longipetala</i> (Vent.) DC.
+ <i>Parentucellia latifolia</i> Viv.
+ <i>Plantago ovata</i> Forssk.
+ <i>Pteranthus dichotomus</i> Forssk.
<i>Rumex vesicarius</i> L.
+ <i>Salsola incanescens</i> C.A.Mey.
<i>Salsola jordanicola</i> Eig
+ <i>Spergula fallax</i> (Lowe) E.H.L.Krause
+ <i>Stipa capensis</i> Thunb.
<i>Suaeda aegyptiaca</i> (Hasselq.) Zoh.
<i>Trifolium tomentosum</i> L.

Table 3 – Continued.

<i>Moricandia sinaica</i> (Boiss.) Boiss.
<i>Neurada procumbens</i> L.
<i>Onosma dasytrichum</i> Boiss
<i>Schimpera arabica</i> Hochst.
<i>Stipagrostis penneta</i> (Trin.) De Winter
<i>Tamarix passerinoides</i> Del.
<i>Tricholaena teneriffae</i> (L.f.) Link

2. East - west - tropical African / Arabian. This is a very important part of the floristic make – up of the Saharo - Sindian region in south – west Iran. It corresponds largely with Zohary’s “Sudanian” region (Ghahreman, 1994; Leonard, 1989). Many of the species within this, tropical Africa element extend, or have clear connections, much further to the south sometimes to S or SW Africa and many also grow in peninsular India. In the oil field they grow quite intermixed with the species of the previous N African / Arabian element. A very large number of species come within this element and Table 4 shows a selection of them.

Table 4 - A selected of East-West-Tropical African/ Arabian elements with restricted areas of distribution in the oil field areas

<i>Aizoon hispanicum</i> L.
<i>Belepharis persica</i> Juss.
<i>Calotropis procera</i> (Willd.) R.Br.
<i>Cenchrus ciliaris</i> L.
<i>Cistanche tubulosa</i> (Schenb.) R.Wright
<i>Cymbopogon olivieri</i> (Boiss.) Bor
<i>Cyperus conglomeratus</i> Rottb.
<i>Dichanthium annulatum</i> (Forssk.) Stapf.
<i>Dipterygium glaucum</i> Dcne.
<i>Ebenus stellata</i> Boiss.
<i>Fagonia bruguieri</i> DC.
<i>Grantia aucheri</i> Boiss.
<i>Leptadenia pyrotechnica</i> DC.
<i>Pennisetum divisum</i> (Gmel.) Henrard
<i>Rumex crispus</i> L.
<i>Tamarix aphylla</i> (L.) Krast.
<i>Viola cinerea</i> Boiss.

Table 6 - Some of Irano – Turanian elements with restricted areas of distribution in the oil field areas

<i>Alcea aucheri</i> (Boiss.) Alef.
<i>Alkanna orientalis</i> (L.) Boiss.
<i>Amygdalus scoparia</i> Spach.
<i>Bunium paucifolium</i> DC.
<i>Centaurea luristanica</i> Rech. f
<i>Ducrosia flabellifolia</i> Boiss.
<i>Fumaria parviflora</i> Lam.
<i>Halocharis sulphurea</i> Moq
<i>Limonium thouinii</i> (Viv.) O.Kuntze
<i>Ornithogalum persicum</i> Hausskn. ex Bornm.
<i>Pistacia atlantica</i> Desf.
<i>Postia puberula</i> Boiss. & Hausskn.
<i>Psylliostachys spicata</i> (Willd.) Nevski
<i>Haplophyllum tuberculatum</i> (Forssk.) Juss.
<i>Reichardia orientalis</i> (L.) Hochreutiner
<i>Rubus anatolicus</i> (Focke) Focke ex Hausskn.
<i>Taeniatherum crinitum</i> (Schreb.) Nevski
<i>Teucrium olivieranum</i> Gingins
<i>Torularia torulosa</i> (Desf.) O.E.Schulz
<i>Tulipa clusiana</i> vent.

Results and Summation Remarks

According to present-day knowledge, the vegetation of the oil field areas contains 531 species (49 species is cultivated), 1 fern, 2 gymnosperms and 528 angiosperms. These species belong to 81 families and 351 genera. The largest family is Gramineae, that is completely dominating in vernal aspects of the flora and vegetation, but dominant aspects of the flora in autumn is chenopodiaceae. About 295 of the species, somewhat more than 45%, are annuals; 41 species, about 7.7% are phanerophytes; 92 species, about 17.3%, hemicryptophytes; 47 species, about 8.9% chamaephytes; 41 species, about 7.7% geophytes; whereas the rest are hydrophytes and helophytes and parasites.

Nine species can be expected to be endemic to the oil field areas. In order to the flora of the oil filed areas (SW Iran) are a complex nature, there occur present day distributions which, with our poor knowledge of geological past, are hard to understand. This is certainly true for a few of anomalies which are now listed without comment. A typical and are rare species in the oil field areas (SW of Iran) in Saharo – Sindian territory bordering Irano - Turanian stock are *Ebenus stellata*; *Postia*

Table 7 - Distributional types and life form in flora of the oil field areas, Iran.

Disributional types	Shrubs, dwarf shrubs	Other perennials	Geophytes	Annuals, biennials	Total	S.%
Irano-Turanian	7	21	10	33	71	15.1
Saharo-Sindian	20	30	4	50	104	22
Mediterranean	-	-	1	6	7	1.5
Ir.-Tur.& Saharo-Sinidian	12	27	9	72	120	25.5
Ir.-Tur. & Mediterranean	1	4	-	35	40	8.5
Sah.-Sin.& Mediterranean	2	1	-	9	12	2.5
Ir.-Tur.& Sah.-Sin.&Med.	3	7	5	37	52	11
Ir.-Tur. & Euro-Siberian	-	1	1	2	4	0.84
Ir.-Tur.& Med.& Euro-sib.	-	2	1	13	16	3.4
Ir.-Tur.& Sah.-Sin. & Euro-Sib.	-	1	-	6	7	1.5
Cosmopolitan	3	2	10	15	30	6.4
Endemics	2	4	-	3	9	1.9
Total	50=10.5%	100=21.2%	41=8.7%	281=59.5%	472=100%	

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