Pak. J. Bot., 40(4): 1783-1791, 2008.

A CONTRIBUTION TO SOME ETHNOBOTANICAL ASPECTS OF BIRJAND FLORA (IRAN)

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Abstract

Birjand is located near the Afghanistan border in eastern part Iran at the 57° 45´ to 50° 60´ latitude and 10° 31´ to 33° 15´ northern longitude with an altitude of 1419 m, and a surface area of 31704 Km. In this contribution some floristic and ethnobotanical aspects of the area are given according to the conventional methods used in taxonomical and ethnobotanical studies. All collected plants were identified using available flora. A total of 37 families, 128 genera and 160 species were identified from the area. The largest family is Asteraceae with 16 genera and 22 species and the largest genera are Salsola and Acanthophyllum with 4 species. About 40% of plants are used as medicinal plants, 47/8% pastural, 8/3% poisonous and 4% with industrial uses. The life form of plant species was determined using the Raunkier's method. Phanerophytes comprised 11/45%, chamaephytes 20%, hemicryptophytes 27%, chryptophytes 5/7% and therophytes 33% of the flora of the area. The most important medicinal plants of the area are: *Achillea tenuifolia* (Asteraceae), *Berberis vulgaris* (Berberidaceae), *Ephedra procera*(Ephedraceae), *Crocus sativus* (Iridaceae), *Hymenocrater calycinus, Teucrium polium, Ziziphora clinipodiodes* (Lamiaceae), *Ziziphus jojoba* (Rhamnaceae) and *Pistacia atlantica* (Anacardiaceae). The most important industrial species are: *Ferula assa-foetida* and *Dorema ammoniacum* (Apiaceae).

Introduction:

The local plants identification and introduction of an area is very important because it can show: specific species of the local area and their occurrence, growing season, species hardness, distinct species, finding new species and the effect of climatic conditions like drought and over-grazing on vegetation (Ahmad *et al*., 2008, Ali, 2008).

On the other hand plant biodiversity represents the primary source for food, feed, shelter, medicine and many other products and means that make life on earth possible and enjoyable. The yield of many crops has reached a plateau due to the narrow genetic base of these crops. To widen the genetic base for further improvement, it is necessary to collect, characterize, evaluate and conserve plant biodiversity, particularly in local, underutilized and neglected crop (Koshbakht, 2006).

Collecting information about how people deal with their natural surroundings is not only important for the recording of local cultural traditions and the richness of this heritage, but also gives us some of the information necessary to protect our natural habitat in the long term.

If we consider that the number of Iran endemics is about 1400 (Davis *et al*, 1997) and the number of known species is about 7100 (Akhani, 2005) we can see the urgency of this kind of ethnobotanical research. We must remember not only plants are endemic, but also the local knowledge is equally endemic (Khoshbakht, 2006).

The beginning of floristic studies in Iran can be dated to 1684 when the German Physician and traveller Engelbert Kaempfer (1651-1716) coming via the southern

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Caucasus, visited Rasht, Shiraz and Persian Golf coast. Upon this return to Europe, he took with him a large collection of exotic plants gathered in the said areas. After him, until 1977, about 41 European botanists or amateur plant collectors, collected Iranian plant species.

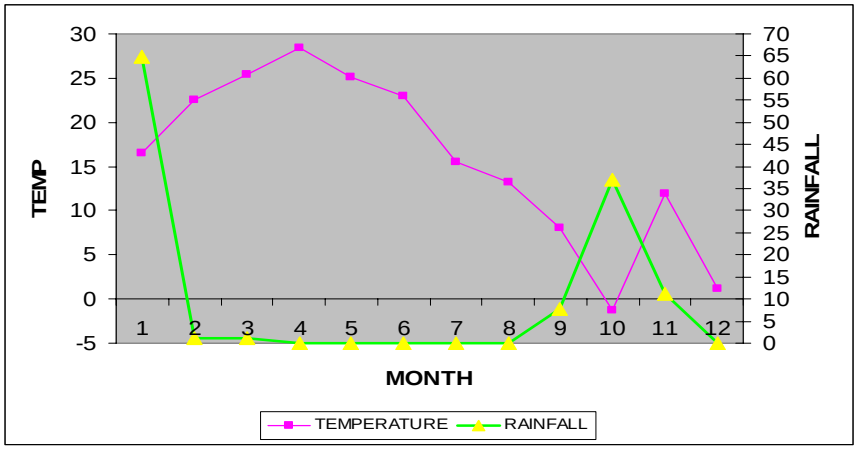
In the 20th century, Rechinger has studied the flora of Iran and the results of this work have been published under the title of flora Iranian since 1963 (Khoshbakht, 2006). Very little has been published on the plant communities of this area. Pooyan (1989) and Rashed Mohassel (1992) worked on vegetation.

Materials and Methods

Birjand is located near the Afghanistan border in E Iran at the 57° 45´ to 50° 60´ eastern latitude and 10° 31´ to 33° 15´ northern longitude with an altitude of 1419 m, and a surface area of 31704 Km^2. The climate is arid and semiarid, the average rainfall is 150mm (Graph 1) and the soil is lcalcareous (limes) (Ahmadian, 1995). This area belongs to Irano-Turanian region and the primary division of this area is including two regions:

Mountain region: The main mountain chain is Bagheran whit 2500 meters height in south and stony land comprising lithosols; phanerophytes and chamaephytes mainly grow here.

Foothill and plateau region: This is a wide area in north and north –west and mainly formed by sedimentation of fluviatile material and mostly belongs to the category of Arid-Alluvial soils. They are rich in light calcareous silt, normally hemicryptophytes and geophytes can be seen here and toward the north-west (Dasht-e Kavire) the salinity increase, barren saline patches appear and halophytes grow. Plants were collected from April and identified using available flora (Asadi, 1998-2002), (Townsend et al 1965-1985), (Zargari, 1991), (Parsa, 1986-1960), (Ghahraman, 1979-1998). The life form of plant species was determined using the Raunkier's method (Raunkier, 1934) and IUCN categories were identified (Jalili, 1999)



Graph 1-Emberiothermic curve (from Birjand Synoptic Station, 2008)

Some useful medical plants

Ziziphus jujuba: A common edible fruit for area and contains the active ingredients and decrease cholesterol.

***Ferula galbanum*:** Number of schizogenous ducts are in the cortex containing the resinous gum, it has been used in hysteria, chronic rheumatism, suppressed menstruation, leucorrhoea and chronic mucous affections of the air passages; and the tincture has been efficient in irritability or weakness of the eyes (Ross, 2005) (Thomsen, 2004). It is occasionally used in the making of modern perfume and special glue abroad of Iran and local people export it mainly to France and Germany.

Dorema ammoniacum: Taken internally, it acts by facilitating expectoration and is of value in chronic bronchitis, especially in the aged when the secretion is tough and viscid. The resin has a mild diuretic action. It is antispasmodic and stimulant and is given sometimes as a diaphoretic and emmenagogue.

***Crocus sativus*:** Traditional healing, Anticarcinogenic (cancer-suppressing), Anti-mutagenic and is known as the most expensive spice in the world (Petros & Polissiou, 1997).

***Ephedra procera*:** Treatment of asthma, hay fever and cold, the alkaloids are ephedrine and pseudoephedrine, sympathomimetics with stimulant and decongestant qualities and are chemically related to the amphetamines (Abourashed, *et al* 2003).

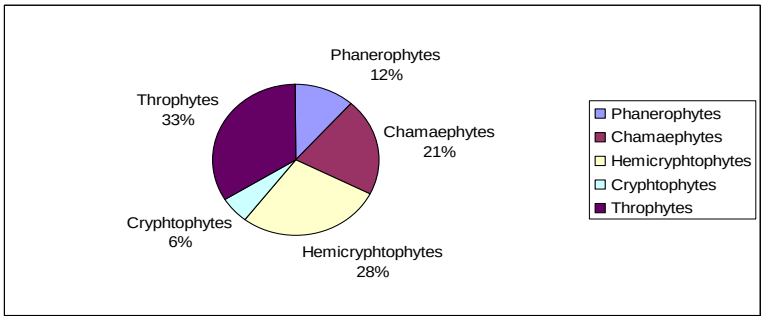
***Berberis vulgaris*:** The root bark is a rich source of the alkaloid berberine (about 6%) in which universally present in rhizomes of Berberis species and has marked as antibacterial effects. Since it is not appreciably absorbed by the body, it is used orally in the treatment of various enteric infections, especially bacterial dysentery (Duke & Ayensu, 1985) and rich in vitamin C, appetizer, antirheumatic and has also shown antitumour activity (Foster & Duke, 1990).

***Citrullus colocynthis*:** It is a powerful drastic hydragogue cathartic producing, when given in large doses, violent griping with sometimes bloody discharges.Death has resulted from a dose of 1 1/2 teaspoonsful of the powder. According to Hartwell the plant figures into remedies for cancer and carcinoma. It is interesting to note that this folk cancer "remedy" contains three antitumor ingredients: cucurbitacin B, ucurbitacin E and glucoside of beta-sitosterol. Roots may also be used as purgative against ascites, for jaundice, urinary diseases, rheumatism, and for snake-poison (Sawaya, *et al*. 1983).

***Pistacia atlantica*:** The fruits found to be rich in protein, oil, fiber, and unsaturated fatty acids, valuable for food uses (Benhassani, *et al*. 2007).

Results and Discussion

A total of 37 families, 128 genera and 160 species were identified from the area and as well as species status on the basis of IUCN categories, relevant information about life form are given (Table 1). The largest family is Asteraceae with 16 genera and 21 species and the largest genera are Salsola and Acanthophyllum with 4 species. About 40% of plants are used as medical plants, 47/8% pastural, 8/3% poisonous and 4% with industrial uses. Phanerophytes comprised 11/45%, chamaephytes 20%, hemicryptophytes 27%, geophytes 5/7% and therophytes 33% of the flora of the area (Graph 2). The big families are: Asteraceae (22 species), Chenopodiaceae (16 species), Brassicaceae (11 species), Lamiaceae (10 species), Caryophyllaceae (9 species), Poaceae (8 species), Fabaceae (8 species) and Boraginaceae (8 species).



Graph 2- The percentages of life forms

Table 1-Total number of listed taxa based on defined life form and IUCN categories

Family	Species	Life Form	IUCN categories
Adianthaceae	*Adianthum capillus-veneris*	H	
Amaryllidaceae	*Ixiolirion tataricum*	Cr	
Anacardiaceae	*Pistacia vera*	Ph	
Apiaceae	*Dorema ammoniacum*	Ch	LR
Apiaceae	*Eryngium bunge*	Ch	
Apiaceae	*Ferula assa foetida*	Ch	EN
Apiaceae	*Ferula ovina*	Ch	
Asteraceae	*Achillea tenuifolia*	Ch	
Asteraceae	*Achillea wilhelmsii*	T	
Asteraceae	*Acroptilon repens*	T	
Asteraceae	*Artemisia acherui*	Ch	
Asteraceae	*Artemisia sieberi*	Ch	
Asteraceae	*Carthamus oxyacantha*	T	
Asteraceae	*Centaurea bruguieriana*	T	
Asteraceae	*Centaurea virgata*	Ch	
Asteraceae	*Cichorium intybus*	Ch	
Asteraceae	*Cirsium congestum*	Ch	
Asteraceae	*Cousinia eryngioides*	Ch	
Asteraceae	*Cousinia lasiolepis*	Ch	DD
Asteraceae	*Echinops ilicifolius*	Ch	
Asteraceae	*Echinops lalesarensis*	Ch	
Asteraceae	*Echinops leucographus*	Ch	
Asteraceae	*Erigeron acer*	T	
Asteraceae	*Gundelia tournefortii*	T	
Asteraceae	*Launaea acanthodes*	T	
Asteraceae	*Onopordon heteracanthum*	Ch	
Asteraceae	*Scariola orientalis*	H	
Asteraceae	*Taraxacum vugum*	T	
Asteraceae	*Tragopogon graminifolius*	T	
Berberidaceae	*Berberis integrrima*	Ph	
Boraginaceae	*Anchusa italica*	H	
Boraginaceae	*Asperugo procumbens*	T	
Boraginaceae	*Heliotropium aucheri*	Ch	
Boraginaceae	*Heliotropium transoxanum*	Ch	
Boraginaceae	*Lappula myosotis*	T	
Boraginaceae	*Nonnea caspica*	Ch	
Boraginaceae	*Onosma stenosiphon*	H	
Boraginaceae	*Paracaryum rugulosum*	H	
Brassicaceae	*Alyssum minus*	T	
Brassicaceae	*Capsella bursa*	T	
Brassicaceae	*Cardaria draba*	T	
Brassicaceae	*Descurainia sophia*	T	
Brassicaceae	*Erysimum crassicaule*	T	LR
Brassicaceae	*Isatis miniam*	T	
Brassicaceae	*Lepidium latifolium*	T	
Brassicaceae	*Malcolmia strigosa*	T	
Brassicaceae	*Matthiola chenopodiifolia*	H	
Brassicaceae	*Sisymbrium irio*	T	
Brassicaceae	*Sterigmostemum longistylum*	T	LR

Ph: Phanerophyte Ch:Chamaephyte H: Hemicryptophyte Cr: Criptophyte T:Therophyte
LR: Lower risk EN: Endangered VU: Vulnerable DD: Data deficient

Table 1 continued

Family	Species	Life Form	IUCN categories
Capparidaceae	*Cleome coluteoides*	H	
Caryophyllaceae	*Acanthophyllum bracteatum*	H	
Caryophyllaceae	*Acanthophyllum herateens*	H	
Caryophyllaceae	*Acanthophyllum sordidum*	H	
Caryophyllaceae	*Acanthophyllum squarrosum*	H	
Caryophyllaceae	*Cerastium inflatum*	H	
Caryophyllaceae	*Gypsophila pilosa*	H	
Caryophyllaceae	*Holosteum glutinosum*	H	
Caryophyllaceae	*Lepyrodiclis holosteoides*	T	
Caryophyllaceae	*Silene conoidea*	T	
Chenopodiaceae	*Anabasis annua*	T	
Chenopodiaceae	*Atriplex aucheri*	T	
Chenopodiaceae	*Atriplex griffithii*	Ch	
Chenopodiaceae	*Chenopodium album*	T	
Chenopodiaceae	*Chenopodium botrys*	T	
Chenopodiaceae	*Girgensohnia oppositiflora*	H	
Chenopodiaceae	*Halothamnus subaphylloides*	Ch	
Chenopodiaceae	*Haloxylon ammodendron*	Ph	
Chenopodiaceae	*Kochia scoparia*	T	
Chenopodiaceae	*Noaea mucronata*	Ch	
Chenopodiaceae	*Salsola crassa*	T	
Chenopodiaceae	*Salsola imbricata*	H	
Chenopodiaceae	*Salsola incanescens*	H	
Chenopodiaceae	*Salsola kali*	T	
Chenopodiaceae	*Seidlitzia rosmarinus*	Ch	
Chenopodiaceae	*Suaeda aegyptica*	T	
Convolvulaceae	*Convolvulus arvensis*	H	
Convolvulaceae	*Cuscuta ampestris*	T	
Cucurbitaceae	*Citrullus colocynthis*	H	
Cyperaceae	*Carex physodes*	Ch	VU
Cyperaceae	*Cyperus rotundus*	Cr	
Ephedraceae	*Ephedra intermedia*	ph	
Ephedraceae	*Ephedra procera*	Ph	
Euphorbiaecea	*Chrozophora hierosolymitana*	T	
Euphorbiaecea	*Euphorbia helioscopia*	T	
Euphorbiaecea	*Euphorbia heteradenia*	H	
Fabaceae	*Alhagi persarum*	H	
Fabaceae	*Astargalus albispinus*	H	
Fabaceae	*Astargalus yasdianus*	H	
Fabaceae	*Onobrychis aucheri*	H	
Fabaceae	*Prosopis farcta*	Ph	
Fabaceae	*Sophora pachycarpa*	H	
Fabaceae	*Trifolium resupinatum*	H	
Fabaceae	*Vicia amphicarpa*	T	
Fumariaceae	*Fumaria parviflor*	T	
Fumariaceae	*Fumaria vaillantii*	T	
Geraniaceae	*Erodium oxyrrhynchum*	T	
Iridaceae	*Iris sisyrinchium*	Cr	
Iridaceae	*Iris songarica*	Cr	
Lamiaceae	*Eremostachys macrophylla*	H	
Lamiaceae	*Hymenocrater calycinus*	H	
Lamiaceae	*Hyssopus angustifolius*	H	LR

Ph: Phanerophyte Ch:Chamaephyte H: Hemicryptophyte Cr: Criptophyte T:Therophyte
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Table 1 continued

Family	Species	Life Form	IUCN categories
Lamiaceae	*Marrubium vulgare*	H	
Lamiaceae	*Mentha longifolia*	H	LR
Lamiaceae	*Nepeta satureioides*	H	
Lamiaceae	*Salvia reuterana*	H	
Lamiaceae	*Teucrium polium*	Ch	
Lamiaceae	*Ziziphora clinopodioides*	Ch	VU
Lamiaceae	*Ziziphora tenuir*	T	
Liliaceae	*Allium umbilicatum*	Cr	
Liliaceae	*Eemurus stenophyllus*	Cr	
Liliaceae	*Muscari neglectum*	Cr	
Liliaceae	*Tulipa Montana*	Cr	
Malvaceae	*Alcea aucheri*	H	
Malvaceae	*Malva neglecta*	H	
Malvaceae	*Malva sylvestris*	H	
Orobanchaceae	*Orobanche vulgaris*	Parasite	
Papaveraceae	*Papaver dubium*	T	
Papaveraceae	*Papaver tenuifolium*	T	
Plantaginaceae	*Plantago lanceolata*	H	
Plantaginaceae	*Plantago major*	H	
Plumbaginaceae	*Acantholimon erinaceum*	H	
Plumbaginaceae	*Acantholimon incomptum*	H	DD
Poaceae	*Bromus tectorum*	T	
Poaceae	*Cynodon dactylon*	Cr	
Poaceae	*Echinochloa crus galli*	H	
Poaceae	*Melica persica*	Cr	
Poaceae	*Phragmites australis*	Cr	
Poaceae	*Pennisetum orientale*	H	
Poaceae	*Phalaris minor*	T	
Poaceae	*Stipagrostis plumose*	H	
Polygonaceae	*Atraphaxis spinosa*	ph	
Polygonaceae	*Calligonum bungei*	ph	LR
Polygonaceae	*Polygonum aviculare*	H	
Polygonaceae	*Pteropyrum aucheri*	ph	
Polygonaceae	*Pteropyrum olivieri*	Ph	
Polygonaceae	*Rheum persicum*	H	LR
Portulacaceae	*Portulaca oleracea*	T	
Ranunculaceae	*Anemone biflora*	T	
Rosaceae	*Amygdalus scoparia*	ph	
Rosaceae	*Rosa baggeriana*	Ph	
Rosaceae	*Sanguisorba minor*	H	
Scrophulariaceae	*Linaria michauxii*	T	
Scrophulariaceae	*Scrophularia striata*	H	
Scrophulariaceae	*Verbascum songaricum*	Ch	
Scrophulariaceae	*Veronica hispidula*	H	
Solanaceae	*Datura stramonium*	T	
Solanaceae	*Hyoscyamus pusillus*	H	
Solanaceae	*Solanum nigrum*	T	
Tamaricaceae	*Tamarix indica*	ph	
Tamaricaceae	*Tamarix ramoissima*	Ph	
Zygophyllaceae	*Peganum harmala*	H	
Zygophyllaceae	*Tribulus terrestris*	H	
Zygophyllaceae	*Zygophyllum fabago*	H	

Ph: Phanerophyte Ch:Chamaephyte H: Hemicryptophyte Cr: Criptophyte T:Therophyte
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In general, succession in this area has its climax with less species and does not have a rich flora. The useful perennial species become very scarce or disappeared and land degradation is very common in the area. Comparing to the other families, Asteraceae has been adapted to this arid and semiarid conditions with a wide diversity. Characteristics like: water storage, thick cuticle and other Xeromorphic changes have made Salsola and Acantophyllum to be adapted to this ecological conditions. Trophytes are the most common life form, because of low rainfall and continues drought, they finish their life cycle in a short time. In return Criptophytes are the least common life forms in the area because of having less tolerant with heat stress and drought.

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(Received for publication 21 April, 2008)