

GEOPHYTES OF SULDUZ REGION, WEST AZERBAIJAN PROVINCE, IRAN AND THEIR CHARACTERISTICS

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Abstract

Iran is very rich in terms of plant diversity. Sulduz region (36:57° E, 45:22 °N), West Azerbaijan Province, Iran; occupies an area of over 1050 km², which is more than 2.5 percent of the total area of West Azerbaijan province. The altitude of region is between 1000–2100 m. The systematic study of flora especially in virgin regions has its own special challenges and excitement. Commercial collection and trade represents principle threat to individual species. The present research is concerned with the geophytes floristic investigation of Nemat, Baba Hasan, Sultan Yaghub valleys which are located 15 Km south west of Sulduz region and cover about 320 hectares. The study aimed to find the diversity of geophytes in this region and their features. Plant specimens were collected 25 times during 2008 – 2010 and were prepared for identification according to methods used in systematic studies. The study helped to identify 49 geophytes species belonging to 33 genus and 10 families. After identification the specimens were also studied for life form, chorotype, altitude of growth and consumption type (drug, food and industry)..

Keywords: Chorotype; Geophytes; Azerbaijan

Introduction

The local plants identification and introduction of an area is very important because it 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 [1, 2]. On the other hand plant biodiversity represents primary source for food, feed, shelter, medicine, 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 crops [3].

Geophytes, which stay dormant underground for greater part of year, are important parts of this richness. "Geophyte" is the name given to herbs that have specialized food-storing underground stems such as bulbs, tubers, rhizomes and corms. While some geophytes are used as ornamental plants, others are used in medicine and as food. So, vegetation of a research area is negatively affected by anthropogenic effects. One way of conservation for rare and endangered species is studying introduction and climate adaptation of decorative, medicinal and other prospective species in order to enrich raw material bases of plant resources [4].

Geographically, Iran is located in southwestern Asia between 25-40° North latitude and 45-63° East longitude. The area of Iran is 1,648,195 km². Variations in climate and presence of numerous mountains, lakes, rivers, and natural springs have created a unique country [5]. This country is situated among three main phytochoria including Euro-Siberian (boreal), Irano-Turanian and Saharo-Sindian [6] or Saharo-Arabian [7, 8] and influenced by the introgression of Somalia-Masaei and Mediterranean species [7-9].

The number of Iran's endemic plants is about 1400 [10] and the number of known species is about 7100 [11]. The beginning of floristic studies in Iran can be dated to 1684 when the German Physician and traveler Engelbert Kaempfer (1651-1716) coming via the southern Caucasus, visited Rasht, Shiraz and Persian Gulf coast. Upon return to Europe, he took with him a large collection of Iranian 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, Rechingher studied the flora of Iran and the results are published under the title of FLORA IRANIAN since 1963. Very little has been published on the plant communities of this area. Pooyan [12] and Rashed Mohassel [13] worked on vegetation.

Administratively, the Islamic Republic of Iran (IRI) consists of 31 provinces and West Azerbaijan is one of them [5]. West Azerbaijan province is principally a mountainous region with a continental climate, but mild because of its proximity to sea [14]. Very few papers have been written about the geophytes in West Azerbaijan province, probably because the greater part of that population does not live far from the cities. It is believed that this study will be a good source for future studies and contribute to the Flora of West Azerbaijan province, Iran. The main objectives of the submitted work were to study the taxonomical structure, life form, chorotype, altitude of growth and consumption type (drug, food and industry).

Study Area

Location and Topography

Our research area, Sulduz (36:57° E , 45:22° N), is a district of West Azerbaijan province that is located on the north west of Iran. Sulduz is surrounded by Urmia city and Urmia Lake from the north, Mahabad city from the south, Miyandoab (ghoshachay) city from the east, Piranshahr from the west, and Oshnaviyeh city (Bordering Turkey and Iraq) from North West. Sulduz takes its name from watery and flat in azery. Sulduz region occupies an area of over 1050 km², which is more than 2.5 percent of the total area of West Azerbaijan province. The altitude is 1000 m at the foot and 2100 m at the summit of the mountain. The present research is concerned with the geophytes floristic investigation of Nemat, Baba Hasan, Sultan Yaghub valleys which are located 15 Km south west of Sulduz region and cover about 320 hectares (Fig-1). This region is phytochorially located in Irano-Turanian [1].

Climate

The annual average temperature is 11.3-13.71°C, the summer average is 22.76°C, and the winter average is 2.45°C. The coldest months are December-January (-0/3°C) and the warmest are July-August (24.21°C). Average precipitation is 326.43 mm [1].

Materials and Methods

Five numbers of any species were collected 25 times, during 2008 – 2010 and were prepared for identification according to methods used in systematic studies. The altitudes have been determined using GPS. The dried plant specimens have been transferred to laboratory and after providing herbarium labels were identified in the Herbariums of Biology Department, Urmia University, Iran and Marand Islamic Azad University, Iran using available literature such as the Colored Flora of Iran [15], Flora of Turkey and the East Aegean Island [16], Flora Iranica [17] and Flora of Iran [18, 19] and comparing with identical specimens in herbarium. The identification was also checked in the herbarium of Urmia Research Institute of Forest & Rangelands, Ministry of Agriculture. The chorology of each species was determined using published data [7, 11, 20]. Nomenclature follows mostly after Flora Iranica and Flora of the Golestan National [2, 11, 17]. The life forms were determined using Raunkier's method (1934) and the chorology of species is based on Zohary (1973) and Takhtajan (1986). Threatened categories were proposed according to the categories of Iran's Red data book [21].

Results and Discussion

In this study the total of 49 species of geophytes has been identified from the valleys of Sulduz region which belongs to 33 genus and 10 families; After identification the specimens were also studied life form, chorotype and altitude of growth (Table-I).

Liliaceae with 14 species is the most abundant family in the area, followed by families of Ranunculaceae, Iridaceae, and Geraniaceae with 11, 7, and 6 species, respectively. The list of all species collected in the area is shown in (Table-II). Similar type study is conducted in various parts of the world [22].

Life Form

Cryptophytes make up 63.26% of the vegetation and are the dominant 1 in the studied area, followed by therophytes, hemicryptophytes and phanerophytes with 28.57%, 6.13% and 2.04% respectively (Fig-2). With increasing in altitude in the mountainous parts hemicryptophytes become more abundant. These results are in the agreement of the other researchers [6, 16].

Chorology

Irano-Turanian elements compose 77.55% of the geophytes growing on the valleys of Sulduz region. They are the dominant chorology in the region followed by Irano-Turanian & Euro-Siberian, Irano-Turanian & Mediterranean, Mediterranean & Euro-Siberian and Endemic with 14.29%, 4.1%, 2.04% and 2.04% respectively. Similar studies supported the results [6, 22].

Endemism

Among 49 geophytes species distributed in the studied area, 1 species is endemic to Iran. They compose about 2.04% of the total number of species. The taxa endemic to area is *Corydalis verticillaris* DC. (Fumariaceae). Ali, [2] study the flora of Pakistan.

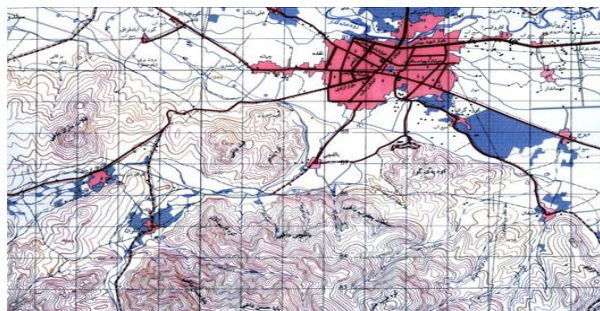


Figure1 The topography map of Nemat, Baba Hasan, Sultan Yaghub valleys of Sulduz rigen

Table- 1: Geophytes Floristic list in the valleys of Sulduz region. Abbreviation of the chorology: IT) Irano-Turanian, Med) Mediterranean, ES) Euro Siberian. Life Form: Cr) Cryptophyte, Th) Therophyte, Hem) Hemicryptophyte and Ph) Phanerophyte

Families and Species	Altitude (m)	Life Form	Chorology
Alliaceae			
<i>Allium akaka</i> Gmel.	1500	Cr	IT
Amaryllidaceae			
<i>Ixioliron tataricum</i> (pall) Herb.	1550	Cr	IT, ES
Araceae			
<i>Arum italicum</i> Stev.	1750	Cr	IT, ES
Colchicaceae			
<i>Colchicum koteschi</i> Boiss	1520	Cr	IT
<i>Colchicum halophillum</i> Freyn & Bornm	1500	Cr	IT
<i>Merendera sobulifera</i> Fisch & C.A. Mey	1550	Cr	IT
<i>Merendera kurdicum</i> Bornm.	1600	Cr	IT
Fumariaceae			
<i>Corydalis integra</i> L.	1450	Cr	IT
<i>Corydalis verticillaris</i> DC.	1550	Cr	Endm
<i>Fumaria parviflora</i> Lam	1500	Th	IT
Geraniaceae			
<i>Biebersteinia multifida</i> DC.	1510	Cr	IT, ES
<i>Erodium ciconium</i> (Jusl.) L, Her.	1560	Th	IT
<i>Erodium deserti</i> (Eig) Eig, palest.	1550	Th	IT
<i>Geranium divaricatum</i> Eneh., Beitr. Naturk.	1420	Th	IT, ES
<i>Geranium persicum</i> Schonbeck temesy..	1520	Th	IT
<i>Geranium tuberosum</i> L. Subsp. micranthum.	1310	Th	IT, ES
Iridaceae			
<i>Crocus biflorus</i> Miller.	1380	Cr	IT, Med
<i>Crocus Cancellatus</i> Herb.	1650	Cr	IT
<i>Crocus haussknechtii</i> Boiss.	1450	Cr	IT
<i>Iris aucheri</i> (Bajer) Sealy	1600	Cr	IT
<i>Iris caucasica</i> Hoffm.	1740	Cr	IT
<i>Iris reticulata</i> M. B.	1760	Cr	IT, ES
<i>Gladiolus atroviolaceus</i> Boiss.	1470	Cr	IT
Liliaceae			
<i>Allium eriophyllum</i> Boiss. Var. laceratum (Boiss. et Noe) Wendelbo	1650	Cr	IT
<i>Allium stamineum</i> Boiss.	1640	Cr	Med, ES
<i>Bellevalia longistyla</i> (Misch.) Grossheim	1760	Cr	IT
<i>Fritillaria imperialis</i> L.	1850	Cr	IT
<i>Fritillaria persica</i> L.	1850	Cr	IT
<i>Fritillaria zagrica</i> Stapf.	1730	Cr	IT
<i>Gagea confusa</i> A. Terr.	1630	Cr	IT
<i>Muscari neglectum</i> Guss.	1450	Cr	IT
<i>Ornithogallum narbonensis</i> L.	1800	Cr	IT
<i>Ornithogallum orthophyllum</i> Ten.	1750	Cr	IT

<i>Puschkinia hyacinthoides</i> Bak.	1600	Cr	IT
<i>Scilla sibirica</i> Haw subsp. Caucasic (Miscz) Mordak	1650	Cr	IT
<i>Scilla persica</i> Hausskn.	1730	Cr	IT
<i>Tulipa montana</i> Lind, var. Montana	1460	Cr	IT, ES
Primulaceae			
<i>Androsace maxima</i> L.	1400	Ph	IT
Ranunculaceae			
<i>Adonis aestivalis</i> L.	1500	Th	IT
<i>Anemone biflora</i> DC.	1400	Th	IT
<i>Cerathocephalus falcatus</i> (L.) pers.	1450	Th	IT, ES
<i>Consolida orientalis</i> (Gay.) Schrod.	1550	Th	IT
<i>Delphinium speciosum</i> M.B.	1610	Th	IT
<i>Ficaria ficaroides</i> Adans.	1630	Hem	IT
<i>Nigella oxypetal</i> Boiss.	1500	Th	IT
<i>Ranunculus arvensis</i> L.	1680	Th	IT
<i>Ranunculus elbursensis</i> var. auchere	1650	Th	IT
<i>Romeria hybrida</i> (L.) DC.	1670	Hem	IT
<i>Talicticum minus</i> L.	1700	Hem	IT

Table-II: List of geophyte families in the valleys of Sulduz region

Families	Genera	Species
Alliaceae	1	1
Amaryllidaceae	1	1
Araceae	1	1
Colchicaceae	2	4
Fumariaceae	2	3
Geraniaceae	3	6
Iridaceae	3	7
Liliaceae	9	14
Primulaceae	1	1
Ranunculaceae	10	11

Table-III: List of Geophytes with different usage in the region

Species and Genera	Drug	Food	Industry
<i>Allium akaka</i> Gmel.	*	*	-
<i>Ixioliron tataricum</i> (pall) Herb.	*	*	-
<i>Arum italicum</i> Stev.	*	*	-
<i>Colchicum koteschi</i> Boiss.	*	-	-
<i>Corydalis integra</i> L.	*	-	-
<i>Corydalis verticillaris</i> DC.	*	-	-
<i>Fumaria parviflora</i> Lam.	*	-	-
<i>Biebersteinia multifida</i> DC.	*	-	-
<i>Geranium persicum</i> Schonbeck temesy	*	-	-
<i>Geranium tuberosum</i> L. Subsp. micranthum.	*	-	-
<i>Crocus biflorus</i> Miller.	*	*	-
<i>Crocus cancellatus</i> Herb.	*	*	-
<i>Crocus haussknechtii</i> Boiss.	*	*	-
<i>Allium eriophyllum</i> Boiss. Var. laceratum (Boiss. et Noe) Wendelbo	*	*	-
<i>Bellevalia longistyla</i> (Miscz.) Grossheim	*	-	-
<i>Fritillaria imperialis</i> L.	*	-	-
<i>Muscari neglectum</i> Guss.	*	-	-
<i>Ornithogallum narbonensis</i> L.	*	*	-
<i>Puschkinia hyacinthoides</i>	*	*	-

Bak.			
<i>Scilla sibirica</i> Haw subsp. caucasic (Miscz) Mordak	*	*	-
<i>Scilla persica</i> Hausskn.	*	*	-
<i>Adonis aestivalis</i> L.	*	-	-
<i>Anemone biflora</i> DC.	*	-	-
<i>Consolida orientalis</i> (Eay.) Schrod.	*	-	-
<i>Delphinium speciosum</i> M.B.	*	-	-
<i>Nigella oxypetal</i> Boiss.	*	*	*
<i>Ranunculus elbursensis</i> var. auchere	*	-	-
<i>Talicticum minus</i> L.	*	-	-

Table-IV: Threatened categories of geophytes (Red book) in the valleys of Sulduz region. Abbreviation of the: LR (Low Risk Species, DD (Data Deficient) and VU(vulnerable) Species.

Species and Genera	Protective Value
<i>Arum italicum</i> Stev.	VU
<i>Corydalis verticillaris</i> DC.	LR
<i>Iris reticulata</i> M. B.	LR
<i>Fritillaria zagrica</i> Stapf.	LR
<i>Delphinium speciosum</i> M.B.	DD

Consumption type

Different consumption type (drug, food and industry) of geophytes was also investigated. Data was collected using personal interviews with local healers, experienced adults, and patients (Table-III). Various researchers reported the flora of the different area and their consumption [2, 6, 22].

Geophytes protection

Most of geophyte species with a narrow distribution are severely threatened; Therefore, the protection and management needs to be considered. Threatened categories of the region's geophytes were proposed according to the categories of Iran's Red data book (Table-IV).

Conclusions

The systematic study of flora especially in virgin regions has its own special challenges and excitement. Plant biodiversity represents primary source for food, feed, shelter, medicine, many other products and means that make life on earth possible and enjoyable. 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 crops. Geophytes, which stay dormant underground for greater part of year, are important parts of this richness. Commercial collection and trade represents principle threat to individual species. Most of geophyte species with a narrow distribution are severely threatened. One way of conservation for rare and endangered species is studying introduction and climate adaptation of decorative, medicinal and other prospective species in order to enrich raw material bases of plant resources.

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