



CHECKLIST FOR IRIDACEAE FAMILY AND ITS GEOGRAPHICAL DISTRIBUTION IN IRAQ

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Abstract

A total of 300 samples of the National Herbarium (BAG), Baghdad University Herbarium (BUH) and field survey were collected as (22) species of (5) genus belonging to Iridaceae family were distinguished. A distribution maps have been created to illustrate species abundance as it was observed that *Iris* species were distributed in different regions of Iraq, since *Iris aucheri* and *Iris persica* have been dispersed in the northern districts of Iraq in-MAM-MSU-MRO-districts in addition to *Iris persica* showed prevalence in -FUJ-district too. On the other hand, *Iris postii* has been scattered in west of middle and south districts of Iraq in DWD-FUJ-DLJ districts, while *Iris reticulata* has been distributed in DWD-MRO-MAM-districts. The dispersal of *Iris pallida* is limited in LEA district, *Iris germanica* in MSU-district and *Iris xiphium* in LCA district, moreover, *Iris sisyrinchium* is found in most of Iraqi districts as FPF-FKI-DLJ-DGA-FAR-FNI-LCA-LEA-DWD-DSD-FUJ-LSM-MRO-MAM-M. The rare species *Iris bakeriana* distributed in-MRO-district besides *Iris maculata* have been distributed in-FUJ-district. An unidentifiable *Iris* has been observed in different districts of Iraq in-FAR-LCA-LEA-DWD-DSD-MRO-FUJ-MAM-MSU-districts. *Gladiolus atrovioleaceus* has been distributed in the north of Iraq in-MAM-MJS-FUJ-districts, while *Gladiolus kotschyanus* has been distributed in-FPF-FUJ-FAR-MRO-districts, in addition to *Gladiolus italicus* which has been distributed in-MJS-FPF-FKI-districts. *Crocus concellatus* has been observed in the north of Iraq in-MAM-MSU-MRO-MJS-FAR-FPF-districts, while the distribution of *Crocus biflorus* is limited in-MAM-district, *Crocus sativus* in-FUJ-district and *Crocus pallasii* in-MRO-district. An unidentifiable *Crocus* were observed in miscellaneous districts of Iraq in -LEA-FAR-FKI-districts. *Moraea sisyrinchium* has wide diversity in most districts of Iraq (DLJ-FKI-FPF-DGA-FAR-MJS-FNI-LBA-LCA-DJA-LEA-DWD-DSD-MRO-MAM-MSU-FUJ-LSM). On the contrast, the *Freesia hybrida* richness is poor in southern districts. Also, it has been found that Iridaceae family can inhabit wide range of soils from sandy to gravy type specially in mountain regions.

Introduction

The idea of plant diversity is an important criteria in determining floristic richness in any geographic unit like country, state or district, many studies have shown the relation between plant distribution and ecosystem process, the majority of these researches are focused on the effect of plant species on ecology as the first evaluation for this family has been implanted in Iraq since 1985 by Brian Mathew so, new data have to be added to enrich this family with informations (Guest and Townsend, 1985, Villaseñor, 2016). Iridaceae is a family encompasses many species of great ornamental value for their highly-colored flowers. *Iris germanica* q.v., which is naturalized in Iraq, has been much used for the “tall-bearded” irises so popular in horticulture. The large-flowered *Gladiolus* hybrids

have been raised from S. African species, the smaller less colorful species of the northern hemisphere being rarely cultivated. *Crocus* are widely cultivated for their showy autumn or spring flowers (Guest and Townsend, 1985, Dykes, 1997, Evans *et al.*, 2002). About 70 genera with worldwide distribution, but particularly well represented in the N. and S. temperate regions, 4 genera occur in Iraq (Linnaeus, 1753, Geoff, 1984, Rasoul, 1992).

About 90 species, distributed throughout the Mediterranean and W. Asia-especially abundant in the Balkans and western Turkey. 3 species are native in Iraq and although no specimen has yet been seen, it is possible that of north species *C. sativus*, q.v., which is grown in neighboring countries as a minor commercial crop) may be in cultivation in our territory (Werckmeister, 1963,

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Mathew, 1989, Watts *et al.*, 2012, Al Maarri, 2016). Approximately 80 species of the genus *Crocus* have been identified in monographic treatment for this genus (Linnaeus, 1753) was published by Mathew (Uzunhisarcıkl *et al.*, 2013, Manning and Goldblatt, 1996, Mathew, 1982) in this revision this genus into two subgenera, two sections and 15 series. Recently many authors and variety of new species have been recognized according to morphological, molecular and karyological work. Turkey is a center of *Crocus* diversity in Asia and is represented by 132 taxa, of which 108 are endemic to the country (Mathew, 1982). *Iris* is the largest and the most complicated genus of Iridaceae, which includes over 300 species Moutrde, 1966, Rasoul, 1984, Evans *et al.*, 2002, Ismail and Hasan, 2008). *Iris* is subjected to strict protection, through *Iris* grows naturally in many regions of Middle East. It presents some 9 species grown in Iraq (Werckmeister, 1963, Tan and Edmondson, 1984, Tan *et al.*, 2006).

Gladiolus L., with more than 260 species, is one of the largest genera of the petaloid monocot plant families, and is the largest genus in Africa and Eurasia. Large as *Gladiolus* is in tropical Africa the genus is substantially eclipsed in southern Africa, where there are estimated to be at least 150 species. There are just 8 species of this genus in Madagascar and probably no more than 10 in all of North Africa, southern Europe, Turkey and the Middle East, excluding southern Arabia (Goldblatt, 1996, Averyanov *et al.*, 2016).

Materials and Methods

The study relied on the information compiled from field survey through summer 2016 till 2017 and from dry samples deposited in the main herbaria table 1, collected at previous times for study and conservation as well as the use of some reviewed, maps showing the distribution of species were drawn up in the geographical regions below by using software. The data for this research were drawn in tables encompass the environment, the height and the ecological distributions of the species. In addition, nomenclature of species have been tested in Kew plant list website whether is accepted or synonym.

Districts of Iraq

Iraq has been divided phyto-geographically to 16 districts included the following:

- Mountain Region (M) subdivided to Amadiya District (MAM), Rowanduz District (MRO), Sulaimaniya District (MSU) and Jabal Sinjar District (MJS).
- Upper Plains and Foothills Regions sub-classified into Nineveh District (FNI), Arbil District (FAR), Kirkuk District (FKI) and Persian Foothills District (FPF).

- Desert Plateau Region (D) subdivided into Lower Jazira District (DLJ), Ghurfa-Adhaim District (DGA), Western Desert District (DWD) and Southern Desert District (DSD).

- Lower Mesopotamian Region (L) subdivided into Eastern Alluvial Plain District (LEA), Central Alluvial Plain District (LCA), Southern Marsh District (LSM) and Basra Estuarine District (LBA).

Result and Discussion

Field survey revealed 3 genera with 6 species as *Iris* included *I. pallida*, *I. susaina*, *I. persica* and *I. xiphium* while one species in *Crocus* (*C. sativus*) and one species in *Freesia* (*F. hybrida*) respectively moreover, data are compiled from herbarium specimen sheets (4 genera, 22 species) belonging to the family Iridaceae. Besides that, ecological distribution have been illustrated in table 2 for studied species while their ecological distributions are shown in fig. 1, 2 and 3. In addition some specimen images have been indicated in fig. 4.

The genus *Iris* is widely distributed in different region of Iraq as in desert plateau region, lower Mesopotamian region with the presence of some species of *Iris* in the upper plains, foothills region and mountain region of Iraq.

Iris sisyrrinchium L. has been distributed in mountain region in little number, Haj umran) MRO (in pines plantation and Zawita near old palace (MAM (at a height of 2300m. 1.5km from the new bridge on Horaman valley) MSU (but in desert plateau region has been distributed in large number as in Gaara) DWD (grown on sandy gravelly soil, 100km. east of Rutba) DWD (in road side at a height of 440m. grown in gravelly soil, 16km. west of Fallujah grown in salty soil in low depression, Ukhadhir) DWD (at a height of 55m. above sea level in sandy clay soil, 65km. north of Rutba (DWD) at a height of 530m. in rocky hill, 2km. west of Ramadi grown in sandy gravelly soil, 60km. north Rutba at a height of 500m. in sandy soil, 20km. west to Ramadi on the way to Rutba in cultivated depression on the road side, 2km. of Qaim (DWD) in rocky sandy valley, 3km. north of Nukhaib in sandy gravelly soil, 10km. north of Rutba at a height of 640m. in rocky hill, 3km. west of Shabicha (DWD) at a height of 320m. in sandy rocky soil, 3km. south of Rahaillya (DWD) at a height of 70m. in road side, Ukhaidhir-Karbala (DWD) in gypsum, 30-40km. from Najaf to Shabicha (DSD) grown in sandy gravelly soil, Ruhaba between Najaf and Shabicha (DSD) in sandy gravelly soil, Salman at a height of 210m. in clay soil barely field, 28km. south of Nukhiula (DSD) in sandy gravelly soil, 6km. north of Maaniya (DSD) at a height of 380m. in sandy soil, AL-Nihadain 50km. south of

Table 1: The herbarium specimens data numbers.

Bagdad, Iraq: The University Herbarium. College of Science, University of Baghdad.	Bagdad, Iraq: National Herbarium of Iraq, Ministry of Agriculture and Agrarian Reform	Genus
0004558-0004563-0004575-0004554-0004572 0004562-0004557-0004546-0004547-0042671 0042624-0042929-0042122-0042929-0026209 0030643	10790-12203-271	<i>Iris</i>
0004566-0004567-0004581-0027730-0031163 0031153-0031434-0031373-0030976-0032225 0031162-0031304-0031117-0004568-0004569 0004570-0004571-0024366-0004586-0004587 0004588-0004579-0004577-0004578-0027081 0004548-0004544-0004545-0004565-0028233 0025636-0033816-0033310-0032922-0032713 0032352-0029385-0023438-0033772-0032654 0004599-0004584-0038802	15782-14601-14719-14630-16996-17501-17027-1686- 17369-18814-17460-19066-18971-18840-25518-29796- 29852-29855-29925-19521-29953-54681-43023-43671- 44051-38768-39541-29953-30109-30288-30800-31563- 32251-32312-32503-32828-33281-33571-33596-34083- 34326-35410-35418-36482-33598-41971-41980-42001- 41743-42060-42166-42221-42241-42378-36240-36536- 36727-36990-38580-39696-39878-39964-40125-40181- 40269-41386-41695-13179-13311-13935-14060-14127- 14336-0128-0118-424-6021-6303-8979-12758	<i>I. sisyrinchium</i>
0042839	10426-10438-11157-10428-33623-8973-41384-10437-721	<i>I.persica</i>
	29533-52849	<i>I.germanica</i>
0004573-0004555-0004552-0004551-0004580	25252	<i>I.reticulata</i>
	17471	<i>I.xiphium</i>
	2072-7652-43125-28243-579-1221	<i>I.aucheri</i>
	3597-8526-12203-8566	<i>I.sasiana</i>
	32388-32348-33230-33664-41384-41811-49014-50452- 54683-32368-32179-32222-49943	<i>I.postii</i>
	13475	<i>I.palida</i>
	23716-23747-25183-25279-48964-46520-48103-48990- 44610-44989-49090-46591-48166-49268-44639-45041- 49900-44824-47460-48300-49936-44739-45061-46330- 47823-48374-44591-52022-53036-51416-52679-49983- 51521-52979-51537-44824-49983-48015-48525-44595- 44973-51945-53019-50430-41642-41663-35498-48995- 42100-42182-42303-48964-41958-32186-44056-44065- 44405-44436-44525-44558-48103-42527-44009-42536- 42866-39620-13263-54759-55308-56302	<i>M.sisyrinchium</i>
	54363	<i>Crocus</i>
0036904-0040913-0036905-0004517	10353-13605-46326-57819-51148-51198-51188	<i>C.concellatus</i>
	1268	<i>C.biflorus</i>
	55622	<i>C.sativus</i>
	15096	<i>C.pallasii</i>
0004623		<i>C.heuffelianus</i>
	18497	<i>F.hybrida</i>
0042272-0031603-0029691-0004532- 0029346-0004534-0004536-0004537	37176-39366-40744-44058-46498-52899-40244-28280- 28939-29817-35932-36143-36143-36217-36399-36513- 5551-7286-8458-8629-8978-13262-14401-17712-24844	<i>Gladiolus</i>
	36445-43327-43352-44103-2176-15368-33134-36396- 54283-49332-54246-49264-49070	<i>Gatroviolaceas</i>
0037055-0035588-0035589-0035590-0004531	0169-1748-7658-40511-42770	<i>G.kotschyanus</i>
0004556		<i>I. bakeriana</i>
49977		<i>I.korolkovii</i>
0025637		<i>I.maculata</i>
00355870004541-0004540-0004539-0004538- 0028739-0031730-0031368-0032697-0031638	1438-1763-11122-18125-18541-8854-27216-6675-7752- 46980-33702-36217-40906-42558-4477-46379-46450	<i>G.italicus</i>

Shabicha (DSD) at a height of 250m. Al-Rkhamya 41km. north of Samah (DSD) at a height of 230m. in sandy rocky hill soil, AL-Samah at a height of 290m. in sandy gravelly soil, 50km. south of Salman at a height of 280m. in sandy rocky soil, 17km. north of Busaiya at a height of 180m. in clay soil in plain, 22km. east of Shabicha (DSD) at a height of 320m. in sand stone land, western side of Jabal sanam (DSD) grown in sandy valley, 30km. south west of Jabal sanam at a height of 25-150m. in sandy stony slopes facing, Zubair at a height of 10m. in sandy gravelly desert, 10km. south west of Zubair at a height of 100m. in sandy gravelly soil. And has been distributed in Fallujah (LSA) grown in gypsum soil, Al-Tib (LEA) in cultivated field, 3km. east of shahraban in Diyala liwa (LEA) and near Kirkuk (FKI) between Kut and Badra (FBF) and in Adhaim, 7km. from high way to Kirkuk (FKI/DGA) Makdadiya and Hamrin hills at Soudour (LEA/LCA/FPF/FKI) 450km. of Baghdad near Baji (DLJ) 100km before Baji (DLJ) 6km north west of Hatra (FUJ) in protected area, Amara (LSM) at a height of 25m. above sea level, Fakka (LEA) near Mosul (FUJ) Hashmmia (LCA) 70km. north Amara (LSM) at a height of 70m.

Iris pallida has been distributed in Abu ghraib (LCA) at a height of 40m. planted in garden.

Iris germanica L. has been distributed in Ahmed Awa (MSU) at a height of 700m. in clay rich with organic material in grove place and in Tawila at a height of 1280m. in gravelly yard.

Iris Susiana f. (ker) has been distributed in Amadiya (MAM) at a height of 1300m. and in Penjwin (in sulaimaniya) (MSU) at a height of 1800m. above sea level cultivated in garden.

Iris persica L. has been distributed in Salahaddin (MRO) at a height of 1100m. in clay soil, Shaqlawa (MRO) at a height of 950m. in loamy stone, Rawonduz (MRO),Zawita (MAM), Mosul FUJ, 20km. west of Dokan dam in Sulaimaniya (MSU).

Iris reticulate M. (Bieb) has been distributed in Haj Umran (MRO) at a height of 1780m. in the mountain side and Saqlawa at a height of (4000ft-5000ft) in coppiced oak, 8km. south west of Schithatha in Ramadi (DWD) in sandy gravelly soil, Sefin dag at a height of 5000ft. in earthy places and among boulders.

Iris postii mousterde is distributed in Salahaddin (MRO) at a height of 1100m. Haj umran (MRO) in pines plantation, 5km. north of Managif (DLJ) at a height of 270m. in sandy soil, 40km. south west of Hatra (FUJ) at a height of 310m. in sandy soil, 8km. north west of K2 (oil-pumping station 6km.w.s.w of Baiji) FUJ, 15km. north

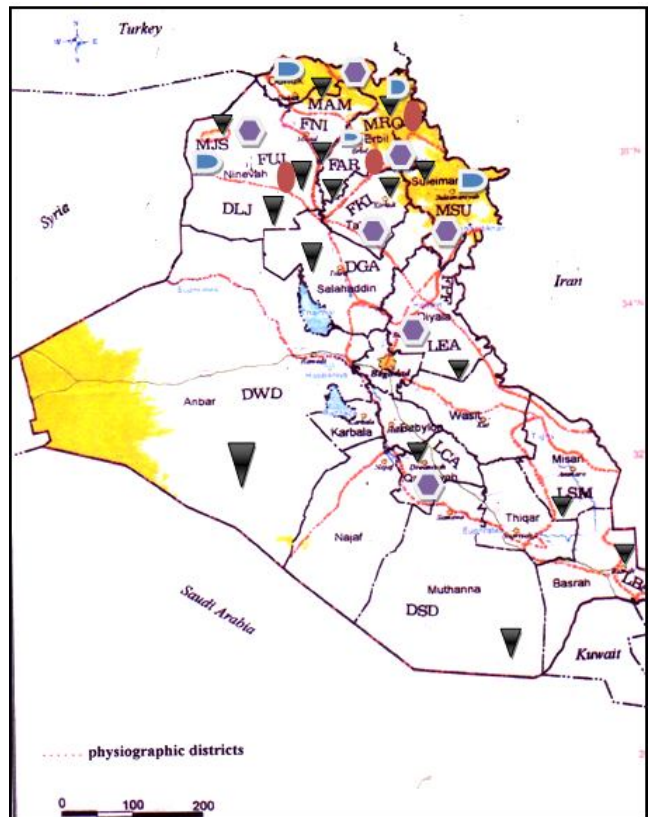


Fig. 1: Distribution maps of Iridaceae species.

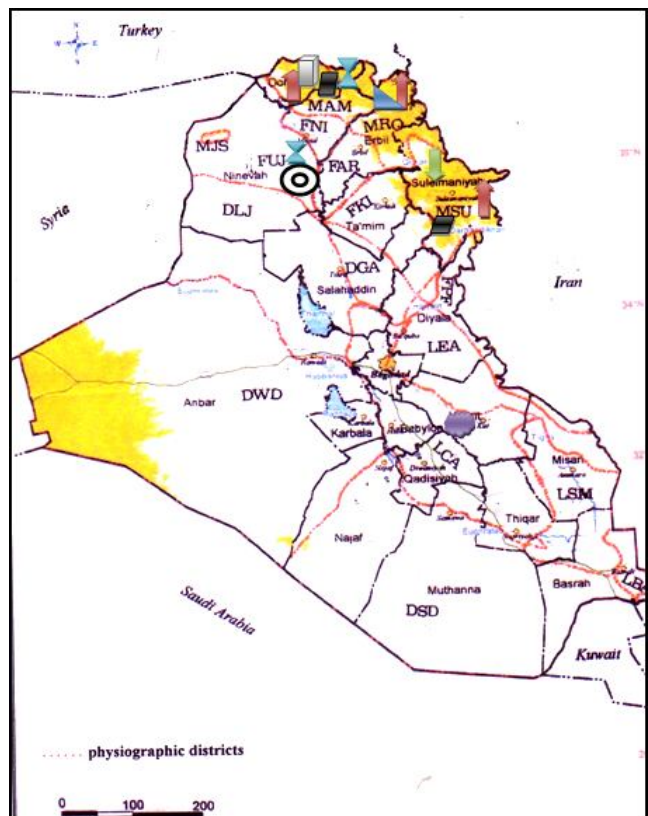


Fig. 2: Distribution maps of Iridaceae species.

of Rutba at a height of 620m. and 20km. of Rutba at a height of 400m. 80km. north of Rutba (DWD) grown in

gravelly soil and sandy up land, Wadi hauran, 37km. west of Rutba dam at a height of 720m. in gravelly sandy soil with rocks and 60km. from Rutba to Ramadi DWD in sandy clay soil.

Iris aucheri Bak. is restricted in mountain region as in Haibat Sultan (MRO) 80 km. south west Haji Umran (MRO) at a height of 550m. above sea level grown in deep loamy soil, north Koi Sanjak at a height of 950m. in red brownish mountain slope.

Iris xiphium is noticed in Abu ghriab (LCA) at a height of 40m. above sea level cultivated in garden.

Iris bakeriana Foster have been distributed in Haji Umran (MRO) in Erbil liwa at a height of 6500ft. in earthy slopes. While *Iris hylandiana* have been distributed between Tall Abta and Hatra (FUJ) in about 42km.N. as cultivated field of cereals. *Gynandiris sisyrinchium* L. (parl.) has been widely dispersed in different regions of Iraq specially in desert plateau region, since it found in Rutba DWD (48km. from Rutba at a height of 680m. above sea level grown in rocky hill side, 135km. from Ramadi to Rutba (DWD) at a height of 350m. grown in sandy stony soil, 205km. from Ramadi to Rutba (DWD) at a height of 450m. grown in loamy sandy soil, 5km. of Ana (DWD) at a height of 210m. in clay soil plain, 16km. south of Ana (DWD) at a height of 225m. grown in clay rocky soil, 20km. east of Ana to Al-Qaim (DWD) at a

height of 1170m. in gravelly salty plain, 17km. south east of Haditha (DWD) at a height of 120m. and 23km east of Haditha (DWD) at a height grown in sandy orchard soil, 17km. south east of Haditha at a height of 120m. above sea level grown in sandy clay soil, 15km. east of Wadi hauran (DWD) at a height of 210m. in clay rocky soil, Wadi hauran near H2 at a height of 285m. above sea level in clay soil in wheat field, 15km. east of Rutba (DWD) at a height of 600m. Wadi hauran at a height of 160m. grown in salty soil, 10km. west of K3 (oil-pumping station on right bank of R. Euphrates c. 8km. south of Haditha) (DWD) at a height of 175m. in clay soil depression T1 (oil-pumping station c. 100km.w by n of Haditha) (DWD) at a height of 265m. in rocky clay soil, 30km. west of Khulna (DWD) at a height of 230m. in sandy rocky soil, Twebah (100km north east of Haditha) (DWD) at a height of 270m. in loamy soil, also distributed in Takhadid (DSD) at a height of 330m. in wide clay soil depression, 30km. south west of Ansab (DSD) at a height of 360m. in sandy hill side, Al-samah (DSD) at a height of 350m. in sandy gpsy soil, 55km. east of Al-zubair (DSD) at a height of 270m. in sandy soil, 30km. from Salman to Samawa (DSD) at a height of 210m. in sandy rocky soil, 25km. north of Busaiya to Salman (DSD) at a height of 170m. in sandy clay soil, 20km. from Salman to Takhadid (DSD) at a height of 260m. in clay gravelly plain of depression and 25km. north east of Samah (DSD) at a height of 360m. in salty soil depression near water. Also has been distributed in mountain region of Iraq, since it found in Amadia (MAM) grown in the hill soil, 10-15km. from Erbil to Darband (MRO) at a height of

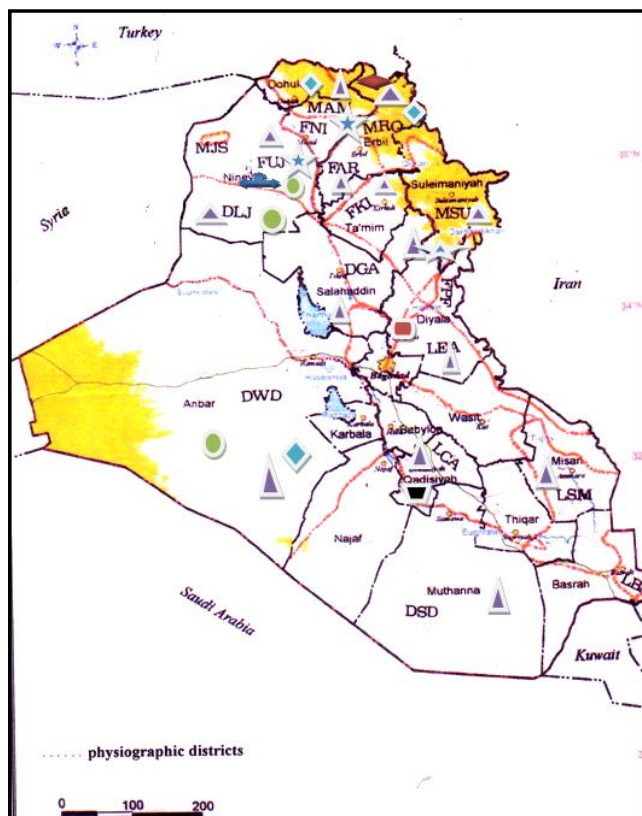


Fig. 3: Distribution maps of Iridaceae species.

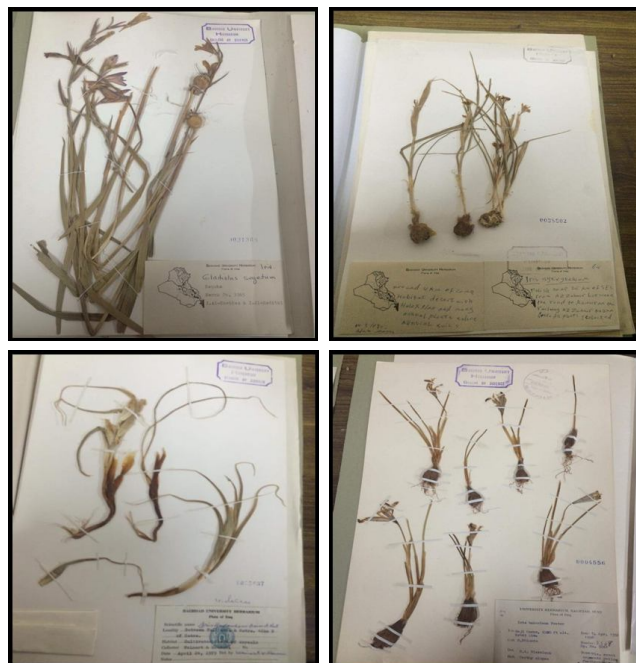


Fig. 4: Selected herbarium Iridaceae sheets.

Table 2: Ecological distribution of Iridaceae family in Iraq.

L S M	F U J	M S U	M A M	M R O	D S D	D W D	L E A	D A A	L A A	L B A	F N I	M J S	F P F	F A R	D G A	F G F	F K I	D L J	Alt.	Habitat	Genus		
	+	+	+	+	+	+	+		+					+					+	25_1000m	Sandy land Loam soil with stone Stony hill, heavy soil Hard floor of depression	<i>Iris</i>	
+	+	+	+	+	+	+	+		+	+			+	+	+	+	+	+	+	+	10_900m	Sandy rocky hill Sandy gravelly soil Clay soil in plain Sandy gravelly desert	<i>I.sisyrrinchium</i>
		+				+													+	270_720m	Gravelly sand with rocks Sandy soil, gravelly soil	<i>I.postii</i>	
	+	+	+	+																950_1100m	Gravelly hill, loam stone Lower mountain side	<i>I.persica</i>	
		+																		700_1280m	Gravelly yard	<i>I.germanica</i>	
							+													40m	Cultivated in garden	<i>I.pallida</i>	
		+	+																	1800_2000m	Cultivated in garden	<i>I.susiana</i>	
		+	+	+																550_3000m	Red brown mountain Loamy soil with rocks Deep loam in cleft in rock	<i>I.aucheri</i>	
			+	+		+														1000m_5000ft	Sandy gravelly soil Stony mountain side Plantation on hill side	<i>I.reticulata</i>	
									+											40m	Cultivated in garden	<i>I.xiphium</i>	
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	75_1170m	Clay soil wheat field, Sandy gravelly soil Rocky hill side	<i>M.sisyrrinchium</i>
	+							+														Cultivated area	<i>F.hybrid</i>
						+								+				+		200m_6500ft	Fine soil of hill top Dry sandy upland above river, stony ground Gravel and earth hills	<i>Crocus</i>	
		+	+	+									+	+	+					200_370m	Lime stone, clay soil, Gravelly stony soil, Clay rocky hill side	<i>C. concellatus</i>	
			+																	6000m	Mountain, in deep friable soil near melting snow	<i>C.biflorus</i>	
	+																			40m	Gypay soil	<i>C. sativus</i>	
				+																1100_1500m	On lower mountain slopes in degraded oak forest, on stony soil over lime stone	<i>C. pallasii</i>	
	+	+	+	+		+	+						+	+						70_1650m	Among open forest on clay mountain slope Wheat field Loam clay soil Low depression	<i>Gladioius</i>	
	+		+									+								250m_3000ft	Clay rocky soil Sandy clay soil in road side Clay soil wheat side Hill side in barley field	<i>G. atrovioleaceus</i>	

Table 2 Continue...

from Kirkuk to Sulaiymaniya (MSU). *G. italicus* Mill has been distributed in mountain region (MSU) also found in upper plains and foothills region (FBF) as in Bedra, 2km. of Bedra in salty non-cultivated land, 2km. north of Saadiya at a height of 85m. above sea level grown in clay soil in barley field, 1km. from Bedra in salty non-cult. Land and in Qizil robot (FBF) Dokhan (FPF) Mosul (FUJ) and spread in lower Mesopotamian region as in Baquba on road side and Aziziya, Diyala (LEA). *Moraea sisyrinchium* has wide diversity in most districts of Iraq (DLJ-FKI-FPF-DGA-FAR-MJS-FNI-LBA-LCA-DJA-LEA-DWD-DSD-MRO-MAM-MSU-FUJ-LSM). On the contrast, the *Freesia hybrida* richness is poor in southern districts.

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