



ENVIRONMENTAL AND GEOGRAPHICAL DISTRIBUTION FOR SOME SPECIES OF RUBIACEAE IN IRAQ

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Article history:	Abstract:
<p>Received: 4th July 2023 Accepted: 6th August 2023 Published: 8th September 2023</p>	<p>The present study was collected the plant samples from the areas of their spread directly and during the field trips carried out by the researcher, as well as the samples deposited in the various Iraqi herbariums. In Iraq, and among the Iraqi provinces to which field trips were conducted</p> <p>After collecting the samples, a patch (identity) was placed for each collection, on which was indicated the scientific name of the plant, the place of its collection, the date of collection of the sample, the soil type, the altitude of the area above sea level, the altitude, and some other information that was observed during the collection process. Dry deposited in the grasslands.</p> <p>After that, the data was arranged and tabulated, and the species were distributed on geographical distribution maps,</p>

Keywords: Environmental, Geographical, Rubiaceae.

INTRODUCTION

The ecological factors and the geographical differences have a great influence on the phenotypical characteristics of plants, their anatomical characteristics, and their chemical components (Al-Mashhadani, 1992). Among these factors are the type of soil, the height above sea level, the intensity of light, and the humidity. The plant taxonomist must identify these factors. Which will explain to him the origin, migration, spread and evolution of species (Al-Rawi, 2010), and thus it became possible for the researcher to determine the spread of plant species in geographical environments and how to distribute and identify them (Stace, 1980).

The environment is the basis for plant classification in understanding the distribution of taxonomic ranks, the composition of plant encyclopedias Floras, and understanding the evolutionary relationships of taxonomic ranks, variations in populations, and evolutionary adaptations of plant species (Al-Mashhadani, 1992).

The location of Iraq in the southern part of the northern temperate zone had a significant impact on the diversity of vegetation on its surface, as it is located within the Middle Sharo-Sindian-subregion, while its northern part is located within the Irano-Turanian region. Specifically, within the two secondary regions, the first is the Mesopotamia subregion, and the second is the Irano-Anatolian subregion (Guest, 1966), which made Iraq the focus of attention of those interested in scientific research.

The aim of the current study is to identify the areas of distribution of species belonging to the genera *Asperula*, *Crucianella*, *Sherardia* and *Wendlandia* in Iraq, as well as to identify the common and rare species belonging to these genera with an explanation of the environment in which they live and the type of plants that grow around them with the development of maps showing the geographical distribution of these species, and due to the absence of a previous study of the species under study with regard to their number, geographical distribution and areas of their spread, some lists and some publications and studies were used in which the species under study was mentioned, and from these studies: (Handel-Mazzetti, 1910) and (Rechinger, 1964) And (Zohary, 1946) and (Al-Rawi, 1988).

MATERIALS AND METHODS OF WORK

The basic material for the plant taxonomist is the plant samples that are collected from the areas of their spread directly and during the field trips carried out by the researcher, as well as the samples deposited in the various Iraqi herbariums. In Iraq, and among the Iraqi provinces to which field trips were conducted are: (Erbil, Dohuk, Sulaymaniyah, Basra, and Dhi Qar), during which several species under study were obtained, while the regions of the provinces in which no plant species was obtained was due to the expansion of the area of buildings which led to the decline of the agricultural area in those governorates.

After collecting the samples, a patch (identity) was placed for each collection, on which was indicated the scientific name of the plant, the place of its collection, the date of collection of the sample, the soil type, the altitude of the area above sea level, the altitude, and some other information that was observed during the collection process. Dry deposited in the grasslands.

After that, the data was arranged and tabulated, and the species were distributed on geographical distribution maps, and reliance was placed on the symbols of the natural provinces that were mentioned by (Guest, 1966) in Iraqi Flora, and my agencies:

1. Mountainous area (M)
2. High Plains and Highlands (F)
3. Desert plateau region (D)
4. Lower Mesopotamia (L)

5-3 results

First: the ecological study

Individuals of the species *A. arvensis* grow in groups of small number on low mountains, hills, small low mountain slopes, valleys and in lime loam and at an altitude of 900-1100 meters.

The species *A. asterocephala* was found in limestone crags and in pine and oak forests at 500-2500 meters above sea level. It has also been observed in small groups on rocky slopes and roadsides.

While *A. comosa* species grow on mountain tops and low rocky slopes in small and sporadic Populations at an altitude of about 1100-1400 meters above sea level.

The species *A. friabilis* (which is considered one of the very rare species in Iraq) grows in the mountainous forest areas singly or in small and limited groups and among the rocky crevices on the mountain slopes and at an altitude of 1000-1500 meters.

The species *A. glomerata* grows on rocky mountains and rocky slopes, among the ruins of limestone in open oak and pine forests, as well as in valleys that contain red clay, at an altitude of 500-1800 meters.

While the type *A. insignis* grows on the slopes of rocky mountains and among the ruins of limestone stones, it was noted that it is widespread on clay slopes and between stones, in the form of groups of large numbers in the same area, and it is found growing at an altitude of 600-1400 meters.

The species *A. laxiflora* was found on high mountain peaks, high rocky slopes, and between rocky cracks. It is present in the form of groups of medium number, at an altitude of 1700-3800 meters.

As for the species *A. xylorrhiza*, it is found as short grasses and in large groups on mountains and among oak trees, *Quercus* sp. , It was also observed on mountain slopes on the side of the main road and near plants of the family Poaceae close to a water source and at an altitude of 1500-1700 meters.

C. ciliata individuals grow on the mountain peaks of the desert rocky mountains, rarely and very rarely, in the form of single or small population groups, at an altitude of 500-700 meters above sea level.

The type *C. chlorostachys* grows on mountain limestone stones, as it was observed between mountain gravel and valley gravel, and near water sources. The height at which this type was found ranges between 100-250 meters.

C. exasperata grows on mountain slopes and on cleared lands in mountain forests and in cultivated lands near hills with a water source and is found rarely at an altitude of 600-1500 meters above sea level.

C. gilanica was found on rocky mountain slopes and among crevices of mountain limestone and was also observed in open oak forests at an altitude of 900-2400 meters above sea level.

C. kurdistanica grows on rocky mountain slopes and in oak forests with cleared lands. It was also found rarely and in a few individuals among mountain limestone rocks, at an altitude of 500-1400 meters.

While individuals of the type *C. parviflora* grow on dry, rocky mountain slopes far from the source of water and on limestone rocks and between their cracks in the form of a few individuals, as well as it was found in the middle of oak forests and among oak trees at an altitude of 400-1400 meters.

As for the type *S. arvensis*, it grows on low mountains, and it was also observed in pastures, on grassy slopes, in fields, as well as on loose soil, sometimes between oak trees, and in limestone rocks and between their cracks. It was found from time to time on the plains, and at an altitude of 300-1300 meters.

The species *W. ligustroides* grows in narrow valleys on limestone rocks and on limestone slopes, and is sometimes found among oak and pine trees, at an altitude of 450-1500 meters above sea level.

Second: Geographical distribution

Individuals of the type *A. arvensis* were spread in Amadiya MAM district in Jabal Zawita, as well as in Suwara Tuka and Shaikh Adi areas. This species was also observed near Shaqlawa, 5 km away, and Shaqlawa as well, 5 km west of Diyana area within Rawanduz district. MRO, as well as in the Mercasur region, and the Sakri Sakran region within the same province. As for the MSU province, it was found 6 km east of the Qaranjir region, and it was also found on the road between the Halabja region and Tawila in the Dara Tri region on Mount Avroman.

The presence of individuals of the type *A. asterocephala* in the district of Amadiya MAM in the Sulaf area, 7 km from the resort of Sulaf, was also observed in the Amadiya area on the side of the highway in a small number (single individuals spaced apart) and in the Jabal Zawita area east of the city of Dohuk, as well as in the Sharansh area on 25 km northeast of Zakho city at an altitude of 1100 meters, in addition to its presence in Rawanduz MRO district near the Shaqlawa area, and the presence of the species was also recorded on Izmar Mountain in Sulaymaniyah MSU district.

A. comosa is a very rare species in Iraq, as it was found on the Turkish-Iraqi border within the Amadiyah district (MAM) on Mount Khantur, as well as 25 km northeast of the city of Zakho within the same district, and in the Masis area within the same district, and in the Sharanish area. 35 km northeast of Zakho.

The type *A.friabilis* is considered one of the very rare species in Iraq, as it was found in Sulaymaniyah MSU province only, specifically in the Gobi Qara Dagh region.

As for the type *A.glomerata*, it is considered one of the common species in the northern forest area of Iraq, as it was found in the province of Mount Sinjar MJS in the Kursi region and in Mount Sinjar, as well as it was spread in the province of Amadiya MAM, 23 km north-east of the city of Zakho, and 25 km south of the region Sharanish and in the city of Dohuk, as well as in the Zawita region within the same province, and in the Spandar region near the Swara Toka region, as well as in the village of Atrush, while in the Rawanduz MRO province, it was found in the Shaqlawa region, specifically in the village of Kohi Safen, as well as between the regions of Harir and Baba Cecjakan And 5 km north of the village of Jenaruk, it also spread within the Heybet Sultan area near the north of the Koy Sanjak area. In the province of Sulaymaniyah MUS, it was found in the village of Darbandi Bazian, as well as 20 km northwest of the city of Sulaymaniyah on the highway of Dokan Dam and on Mt. Pyramakron, as well as in the Waziara region to the north of Gobi Qara Dagh, and the presence of this species was recorded for the first time in the village of Arbat near an old cemetery within an area with wide vegetation and near a helicopter airport in the same area, The subspecies was also found in the village of Mila Kawa on the road to Mount Penguin, as well as on Mount Penguin itself, in a rocky area with high vegetation.

The species *A.insignis* was found in three provinces and was widely spread in them, as it was recorded in the Aqrah region within the Amadiyah province of MAM, as well as the species was found in the Shaqlawa region within the Rawanduz MRO province, in the Harir region and the Darband region, and between the regions of Karukh and Dirkala, and in Qandil region within the province itself, as well as the species was found in the province of Sulaymaniyah MSU, 29 km west of the city of Sulaymaniyah on the road coming from Kirkuk, as well as in the Qualca Dagh region above the city of Sulaymaniyah, on Mount Pyramakron, in the village of Melakao, in the Nalbaraz region and the Kajan region, and it has been recorded The presence of the species for the first time in Iraq within the same province on Izmar Mountain.

A.laxiflora individuals were spread in Sulaymaniyah Province, MSU, in Algurd Dagh region, in Gia Mandu region, in Kudu village, near Rania village, and in Qandil region above Kumi Kemomusuran lake within MRO province.

Individuals of the type *A.xylorrhiza* were observed very rarely in Iraq, as it was observed only once in the Iraqi-Turkish border in the Amadiyah district of MAM to the northwest of its corner within the northern forest area, specifically on Mount Khantur within the Sharanish area.

Individuals of the type *C.ciliata* are rare in Iraq, as they were found once in the northwest of the desert region of Iraq and within the province of the Western Desert Region (DWD) in the Ajarmia region.

C.exasperata is considered one of the rare species in Iraq, as it was found in two districts, the first within the Amadiya district (MAM) in the Mar Yaqoub area above the Simil region, and the second within the Sulaymaniyah district (MSU) in Jabal Penjwin.

The type *C.chlorostachys* spread very rarely in Iraq, as it was found in Sinjar Province MJS in Mount Sinjar, as well as in Upper Jazeera Province FUJ near the Shirqat region.

As for the type *C.gilanica*, it was found in Amadiyah district, MAM, in the Zawateh district, near the Sharansh district, and it was also found in the Rawanduz district, MRO, in the Mercasur district, in the Bradost district, near the Diana district, and in the Handrin district, north of the Jundiyan district, and this subspecies was found in the Halkurd district. , and the Haji Omran area within the same district, as well as in the village of Sukari Sakran near the Iranian-Iraqi border, As well as in the Pushtashan region and in the region between Pushtashan and the Surad region and to the north of the Pushtashan region within the Qandil region and it was also found in the Baski Hawaran region, as well as to the north of the Shahdan project and in the Saran region near the village of Kani Kawan. And within the Zalam area within the same province, and in the MSU province of Sulaymaniyah, this subspecies was found in Penjwin Mountain, as well as in the Avroman region near the Tawila region, as well as in the Avroman region to the north of the Bayara region and on the Iraqi-Iranian border within the same province.

The species *C.kurdistanica* was found in a few individuals within Amadiya MAM district on Mount Bekhair near the city of Zakho, as well as on Mount Khantour, in the city of Dohuk, 5 km south of the city of Zakho, as well as 8 km from the city of Zakho, as well as in the Apendari Sadli area Close to Swara Toca district and also in Atrush district within the same province.

As well as the type *C.parviflora*, it is also considered one of the very rare species in Iraq, as this species was found only twice, the first within Sinjar Province MJS within Mount Sinjar to the north of Balad Sinjar city, and the second time was within Sulaymaniyah Province MSU and within the Avroman region to the north from Bayara area.

While the species *S.arvensis* had a very wide spread in the areas in which it was found, as this species was found in the Amadiya district (MAM) in the Zakho Valley region, as well as in the Takza region and in the Sharifa region near the Amadiya region, near the village of Sheikh Adi and in the region Aqrah within the same district, while in the Rawanduz MRO district, this species was found in the Shaqlawa area, 5 km north of the Shaqlawa area towards the city of Harir, as well as in the Rawanduz Mountain area, in the Bradost area, and near the Shani Dar area, As well as in the Nabri Dan region, and in the Hebet Sultan region to the north of the Koysanjak region, as well as on Mount Zanetah between the Rania region and the Shaqlawa region and within the same province, while in the MSU province of Sulaymaniyah this species was found in the Dokan Dam area and near Surdash on the highway Between Sulaymaniyah and Dukan, the presence of this species was also recorded for the first time in the province of Sulaymaniyah in several areas, including the Shah Rabbu Zir region towards Mount Izmar, where the plant diversity

was great in this region, and the presence of this species was recorded on Mount Izmar as well, and in the Ziwi area on the road permicron mountain, Likewise, in the Khalkan Kani and Taman area and the Kani Jok area to the north of the Dokan area, the spread of the species was very large in it, as well as the Konde Tamar area within the Cuttack area on the Dukan road and on the side of the highway, the spread of the type was large, and it was recorded for the first time in that area as well, and it spread The species is also within Nineveh Province (FNI) in Eski Kalak region, as well as in Erbil Province (FAR) and within Pastora Jay region.

The species *W.ligustroides* was found in the district of Amadiya MAM in the Mar Yaqoub district to the north of the district of Simil, as well as in the district of Bekhair near the city of Zakho, and its presence was also recorded in and near Zawiya and on Zawiya mountain, and on the road between Dohuk and Amadiya and to the northeast From the city of Amadiya, the presence of the species was also recorded in the Sheikh Adi region, in the Malatai region, as well as on Bkasar Mountain, in the Zinta region, as well as in the Bikma region within the same province. The species was also found within the Qara Dagħ region in Sulaymaniyah Province MSU, and the species was found within the Nineveh Province FNI in the Hinnis region near the Anisifni region.

Table 15: Natural areas and provinces in Iraq, according to KIST (2013).

	M-Mountain Region
MAM	Amadiyah County
MRO	Rounduz County
MSU	Sulaymaniyah Province
MJS	Mount Sinjar Province
	F-Upper plain and fast hills Region
FUJ	Upper Island Province
FNI	Nineveh Province
FAR	Erbil Province
FKI	Kirkuk Province
FPF	Eastern Foothills County
	D-Desert plateu Region
DLJ	Lower Island Province
DGA	County of el-grfa and el-adem
DWD	Western Desert province
DSD	Southern Desert Province
	L-Lower Mesopotamia Region
LEA	Eastern Alluvial Plain Province
LCA	Central alluvial plain province
LSM	Southern Marshes Province
LBA	Basra Creek Province

.Table (16): Geographical distribution of the studied species and altitude ranges

The number of spreading counties	Height(m)	geographical provinces													taxonomic ranks	N											
		LBA	LSM	LCA	LEA	DSD	DWD	DLJ	FPF	FKI	FAR	FNI	FUJ	MJS			MSU	MRO	MAM								
3	1100-900																								<i>A. arvensis</i>	1	
3	2500-500																									<i>A. asterocephala</i>	2
1	1400-1100																									<i>A. comosa</i>	3
1	1500-1000																									<i>A. friabilis</i>	4
4	3300-500																									<i>A. glomerata</i>	5
3	1400-600																									<i>A. insignis</i>	6
2	3800-1700																									<i>A. laxiflora</i>	7
1	1700-1500																									<i>A. xylorrhiza</i>	8
1	700-500																									<i>C. ciliate</i>	9
2	1000-250																									<i>C.chlorostachys</i>	10
2	1500-600																									<i>C. exasperata</i>	11
3	2400-900																									<i>C. gilanica</i>	12
1	1400-500																									<i>C. kurdistanica</i>	13
2	1400-400																									<i>C. parviflora</i>	14
5	1300-300																									<i>Sarvensis</i>	15
3	1500-450																									<i>W.ligustrroides</i>	16



Figure 6: Geographical distribution of some species of the genus Asperula

Δ *A. arvensis* \circ *A. astrocephala* \oplus *A. comosa* \blacklozenge *A. friabilis* s

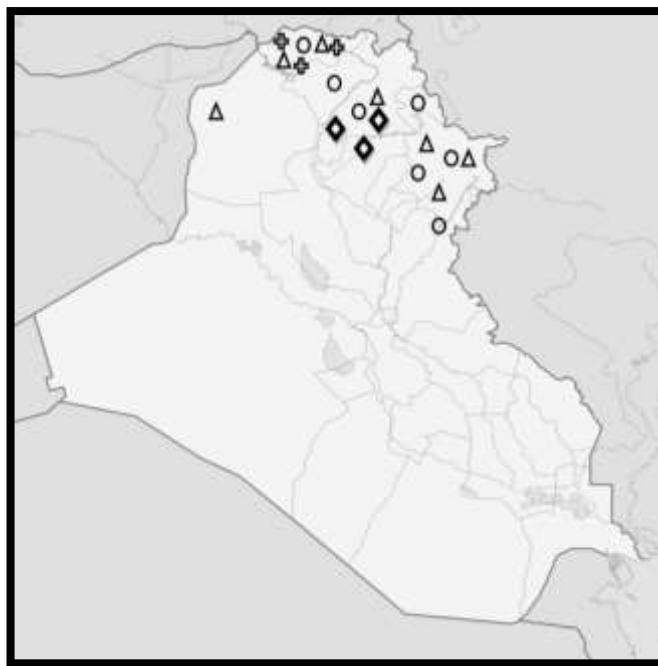


Figure 6: Geographical distribution of some species of the genus Asperula

Δ *A. glomerata* *A. xylorrhiza* \oplus *A. laxiflora* \blacklozenge *insignis* \circ



Figure 8: Geographical distribution of some species of the genus Crucianella

Δ *C.ciliata* \circ *C.chlorostachys* \oplus *C.exasperata* *C.gilanica* \blacklozenge

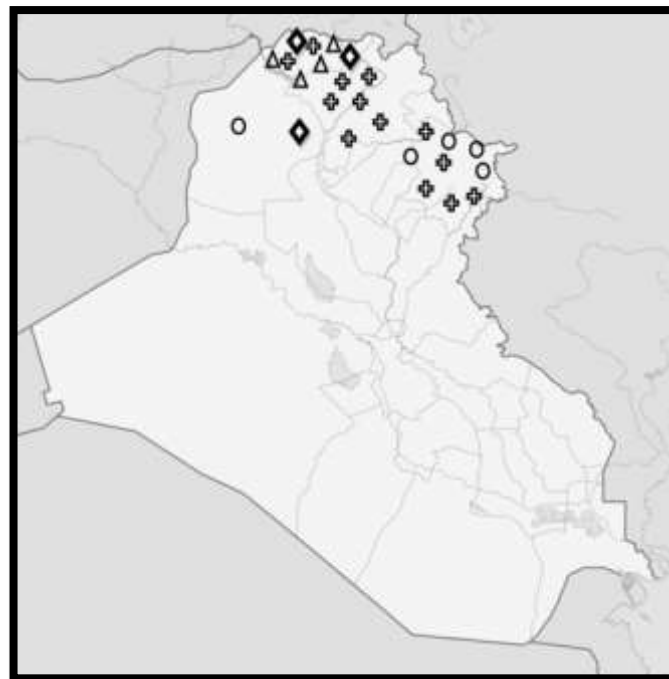


Figure 9: Geographical distribution of some genera (Crucianella, Sherardia, and Wendlandia)

C. kurdistanica \circ *C.parviflora* *S.arvensis* \oplus *W.ligustroides* \blacklozenge

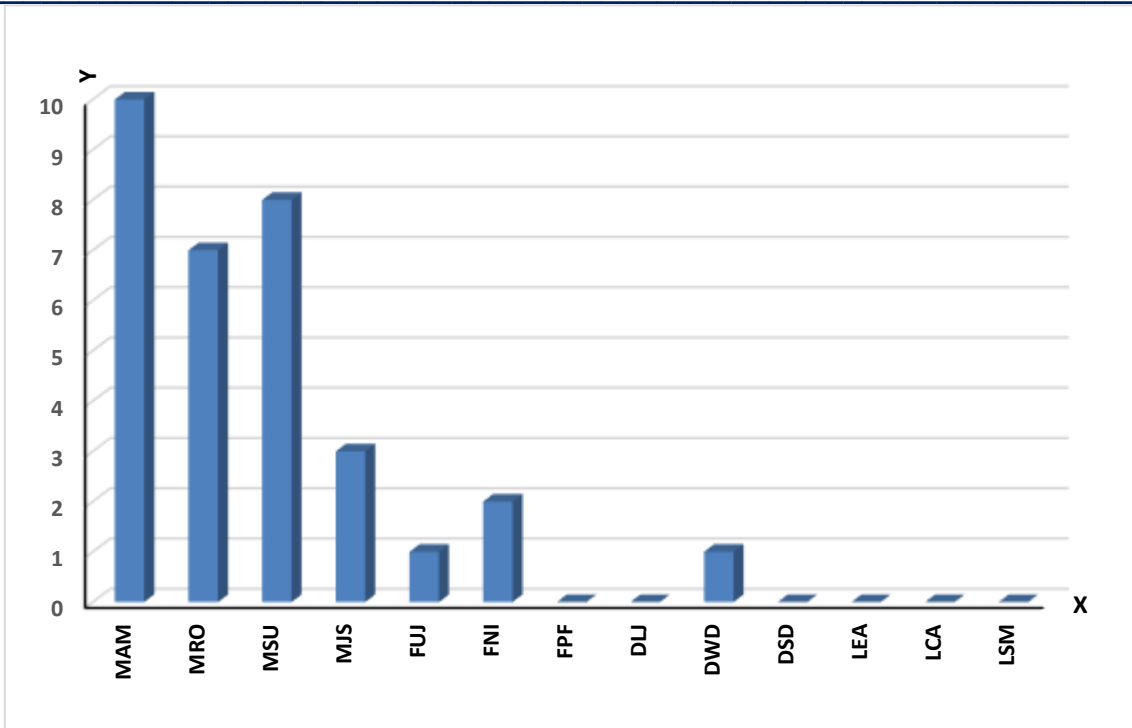


Figure (10): Number of species of genera (*Asperula*, *Crucianella*, *Sherardia* and *Wendlandia*) under study for each province. X = Iraqi provinces, Y = number of species.



A.arvensis



A.glomerata



A.asterocephala



A.comosa



A.friabilis



A.insignis

Plate (36): Field photos of the studied species of the genus *Asperula*



A.xylorrhiza



C.ciliata



C.exasperata



C.gilanica



C.parviflora



C.kurdistanica

Plate (37): Field photos of the studied species of the genera *Asperula* and *Crucianella*



S.arvensis



W.ligustroides

Plate (38): Field photographs of the studied species of the genera Sherardia and Wendlandia

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