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A Survey of Rare and Endangered Dicotyledonous Wild Plants

Nisreen Sabbar Hashim	College of Education For Pure Sciences, University of Diyala
Ghofran Ali Hussein	College of Agriculture , University of Diyala
Hisham Tawfiq Jameel	College of Education for Human Sciences,University of Diyala
Kian Sabbar Hashim	University of Diyala
Omar Mohammed Shadhan	University of Diyala

General background: Biodiversity loss is accelerating worldwide, with wild plants particularly vulnerable to climate change, urban expansion, and unsustainable exploitation. **Specific background:** In Iraq, especially Diyala Province, the scarcity of studies on rare and endangered dicotyledonous plants limits conservation planning and sustainable use. **Knowledge gap:** Despite the ecological and socio-economic importance of these plants, systematic documentation of their taxonomy, distribution, and local uses remains insufficient. **Aims:** This study aimed to conduct a comprehensive field survey to identify, classify, and assess rare and endangered dicotyledonous plants across Diyala Province. **Results:** Over three years (2021–2023), 300 species from 176 genera and 45 families were collected; among them, 20 rare and highly threatened species belonging to 19 genera and 10 families were recorded, with documentation of their growth forms, geographic distribution, and multiple local uses. **Novelty:** This is the first extensive, seasonally based survey providing detailed taxonomic classification and ethnobotanical insights into rare wild dicotyledons in Diyala. **Implications:** The findings highlight the urgent need for conservation measures to sustain plant biodiversity, safeguard genetic resources, and ensure continued ecological and community benefits.

Highlights:

- Comprehensive survey of 300 wild dicotyledonous species across Diyala.
- Identification of 20 rare and threatened species with documented uses.
- First detailed seasonal assessment supporting biodiversity conservation.

Keywords: Rare plants, Endangered species, Biodiversity, Conservation

Introduction

Global estimates suggest that more than a third of wild plants are threatened with extinction [1], either due to climate change or invasive plants that threaten 55%of local plant communities and unsustainable overuse commercial, industrial, therapeutic, overgrazing ,urban sprawl or ill–considered land use, etc. therefore protecting important areas for plant diversity is an essential element of plant conservation activities in all countries as a basis for providing ecosystem services and conserving biodiversity that supports sustainable livelihoods. Conserving wild plants on the basis of local (in situ) is the most successful way to preserve plant diversity and protect it from the

effects of climate change and other factors [2],and identifying rare highly rare and endangered species contributes to their assessment, protection, conservation and preservation of their genetic resources, and ensuring optimal investment in this vital and important aspect of biodiversity [3].

Materials and Methods

A. Materials

1. Protective gloves with a shovel for plants uproot, a high-resolution digital camera,a foldable metric scale, a color bar (2m) and scissors for cutting branches.

2.Geographical Information Systems (GPS) to determine sampling locations at sea level.

3. Specially sealed bags for collecting samples,and labels with the place and date of sample collection written on them.

4.Carton packages, newspaper paper, wooden presses, herbal scales, carton packages, and paper adhesive.

5.Thermal fans, in which succulent plants were dried that could not be dried in the usual way.

B. Methods

1. Field Visits

The various field trips were carried out at the rate of three field trips per month for almost every study area at regular times as much as possible, as the samples were photographed and collected in clear weather (not windy or rainy), and they were carefully selected to be free from diseases and fungal infections.

2. Pressing the Plant Samples

The samples were pressed after being shaken and washed from the dust between newspapers and regular cardboard, and packed between the wooden presses, taking into account opening them and moving them daily until they dried. Then, they were transferred to the herbaceous-size cardboard and fixed with paper tape, and their information patch was pasted on the lower right side of the sample. Written on it are the sample number, the local name, the area and place of collection, the name of the collector or collectors, and the date of collection[4]

3. Scientific Classification of Plants

The plants were classified scientifically, mentioned its permanenceand its various uses based on the Iraqi flora [5], the lowland flora in Iraq [6], the first part of the updated lowland flora in Iraq [7], the second part of the updated lowland flora in Iraq [8], the geographical distribution of Iraqi wild plants [9],the poisoning plant in Iraq [10] plant wealth in Iraq[11];Desert pastures in Iraq[12];Taxonomic ranksof wild dicotyledons in Sodoor region-Diyala[4];Asurvey of wild dicot plants in Diyala province [3]; Medicinal herbs in the Kingdom of Saudia Arabia[13];Poisonous plants and their uses in the manufacture of medicines [14]; Medicinal plants and herbs and herbal medicine[15]; Flora of Iraq Vol:5 including (Apiaceae) [16]; Flora of Iraq, Vol :6:1 including (Composite) [17]; Plant Taxonomy [18]; Acomparative taxonomic study of some wild species of the Cruciferous family in Diyala Governorate[19].

4. Preservation of Plant Specimens

The samples, after their complete information was written down, were placed inside plastic bags, and the bags were well closed in order to preserve the samples from breakage and damage and were kept in the herb.

Results and Discussion

A. Results

The botanical survey of the areas of Diyala Governorate during the research period (2021–2022-2023) showed the presence of 20 wild rare and endangered species organized into 19 genera, whose taxonomic ranks belong to the 10 family , and it is clear from Table (1) that all of collected plants are herbaceous plants, 14 species of which are annual, 6 types of which are perennial.

Family	No	The scientific name	Common name	The nature of growth
APIACEAE	1	Caropodium platycarpum (B&H)S	Daghal	Perennial
	2	Eryngium creticum Lam.	Ksoob	Perennial
ASTERACEAE	3	Andryala sp.	Daghal	Annual
	4	Artimesia scoparia Waldst.et Kit.	Salmas	Perennial
	5	Centaurea solstitialis L.	Mirrar	Annual
	6	Chondrilla juncea L.	Daghal	Perennial
	7	Gamochaeta pensylvanica (W.)C.	Daghal	Annual
	8	Scolymus maculatus L.	Likhlakh,Ksoob	Annual
BALANOPHORACEAE	9	Cynomorium coccineum L	Tartuth	Perennial
BRASSICACEAE	10	Brassica deflexa Boiss.	Khardal barri	Annual
	11	Cardamin hirsute L.	Rashad Murr	Annual
	12	Diplotaxis acris (Forssk.)Boiss.	Yahq,Kafsha	Annual
	13	Diplotaxis tenuifolia (L.).	Khaffaj	Annual
	14	Rapistrum ragosum (L.) All.	Fajal barri	Annual
CAPRIFOLIACEAE	15	Lomelosia palaestina (L.) Raf.	Zahrat aljarab	Annual
CUCURBITACEAE	16	Cucumis melo L.	Butush	Annual
FABIACEAE	17	Hippocrepis multisiliquosa L.	Hudwat alhisan	Annual
MALVACEAE	18	Hibiscus trionum L	Jinjil	Annual
MARTYNIACEAE	19	Ibicella lutea (Lindl.)Van Eselt.	Kurun alghazal	Annual
ZYGOPHYLLACEAE	20	Zygophyllum fabago L.	Khanaag aldajaj	Perennial

Table 1. *The local names and growth nature of rare and endangered plants in study area.*

From Table 2 Shows the location of rare and endangered plants within the five provinces in which the research area is located according to the Guest map of Iraqi plant provinces [19],as well as their its various uses in the study area.

Family	No	The scientific name	Distribution in the study area districts	Usese

APIACEAE	1	Caropodium platycarpum (B&H)S	FPF-Baldruz	Food, Industrial
	2	Eryngium creticum Lam.	LEA-Muqdadiyah	Food, Medical, Ornamental
ASTERACEAE	3	Andryala sp.	LEA-Baqubah	Weed
	4	Artimesia scoparia Wal.et Kit.	LEA-Muqdadiyah	Medical, Aromatic
	5	Centaurea solstitialis L.	LEA-Muqdadiyah	Weed
	6	Chondrilla juncea L.	LEA-Baqubah	Weed
	7	Gamochaeta pensylvanica (W.)C.	LEA-Baqubah	Weed
	8	Scolymus maculatus L.	LEA-Muqdadiyah	Medical, Fodder
BALANOPHORACEAE	9	Cynomorium coccineum L	FPF-Baldruz-Mandali	Medical, Food, Industrial
BRASSICACEAE	10	Brassica deflexa Boiss	LEA-Abo Jasra	Medical
	11	Cardamin hirsute L.	LEA –Abu Ssida	Food
	12	Diplotaxis acris (Forssk.)Boiss.	DGA-Dalli Abbas	Food
	13	Diplotaxis tenuifolia(L.).	LCA-Khan Bani Saad	Food, Medical, Industrial
	14	Rapistrum ragosum (L.)All.	LEA-Baqubah	Food, Medical, Toxic
CAPRIFOLIACEAE	15	Lomelosia palaestina (L.)Raf.	LCA-Hamrin Mountains ,Khanaqin	Medical, Ornamental, Industrial
CUCURBITACEAE	16	Cucumis melo L.	LEA-Muqdadiyah	Food, Fodder, Medical, Toxic
FABIACEAE	17	Hippocrepis multisiliquosa L.	FPF-Imam Weiss	Fodder
MALVACEAE	18	Hibiscus trionum L	LEA-Muqdadiyah	Ornamental
MARTYNIACEAE	19	Ibicella lutea (Lindl.)Van Eselt.	FPF,Mandali,LEA-Baqubah	Medical
ZYGOPHYLLACEAE	20	Zygophyllum fabago L.	LEA-Baqubah	Medical, Toxic

Table 2. *Geographical distribution and usese of the studied plants in the districts of the study area.*

The results of the botanical survey of the study area during the research period showed that these plants are rarly distributed in terms of the number of samples collected and their distribution areas, this may be attributed to climate changes such as high temperatures, drought,low rainfall or urban expansion at the expense of pastures and agricultural lands,Given the nutritional, therapeutic, medicinal, fodder and other local uses of these plants ,so its necessary to continue botanical surveys for the purposes of preserving and sustaining them, as well as sustaining the vegetation cover and biodiversity [20].

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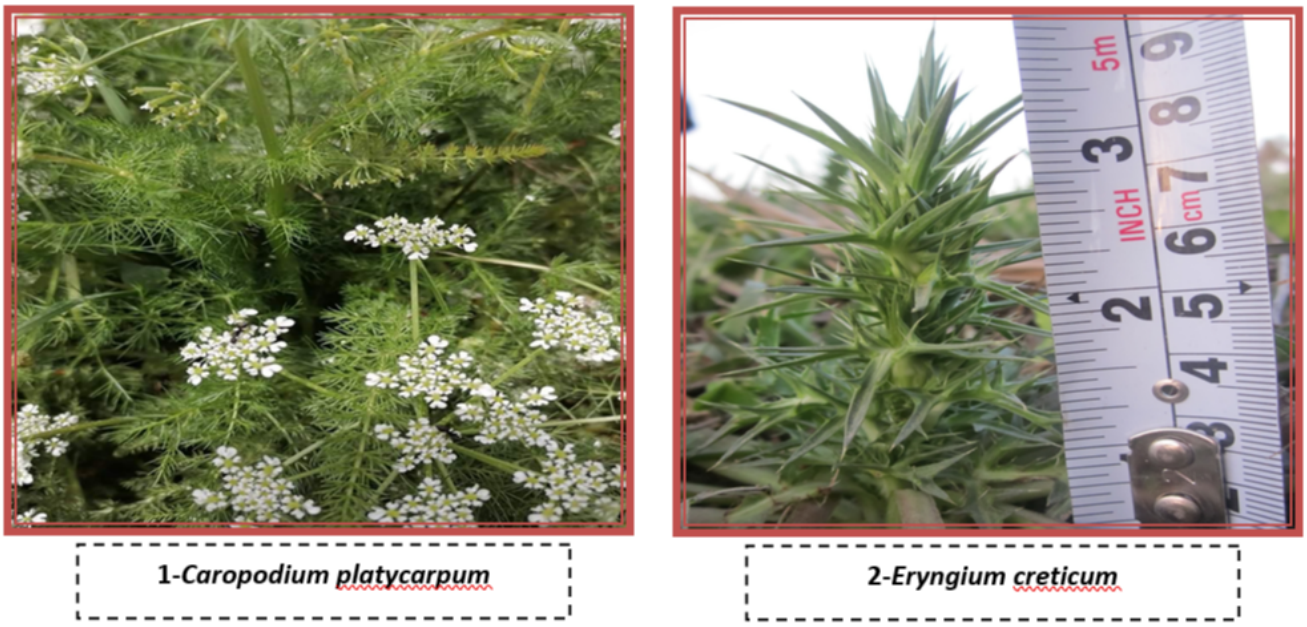

Figure 1. ***1. Caropodium platycarpum, 2. Eryngium creticum***

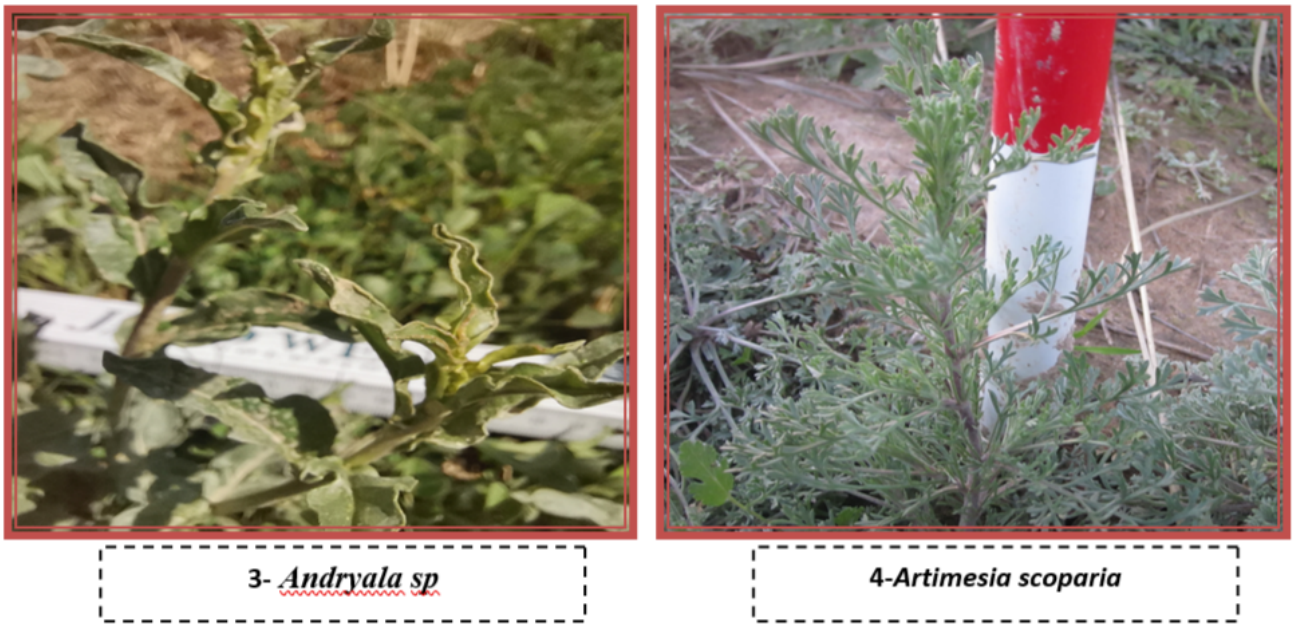

Figure 2. ***3. Andryala sp , 4. Artimesia scoparia***

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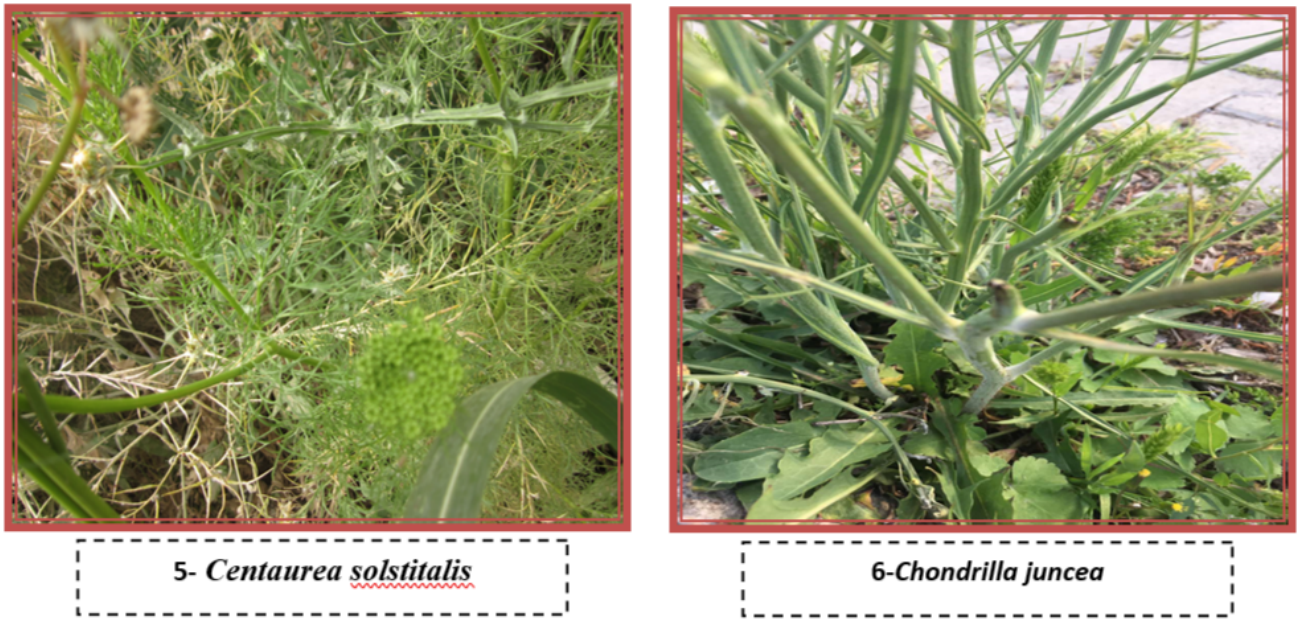

Figure 3. ***5. Centaurea solstitalis , 6. Chondrilla juncea***

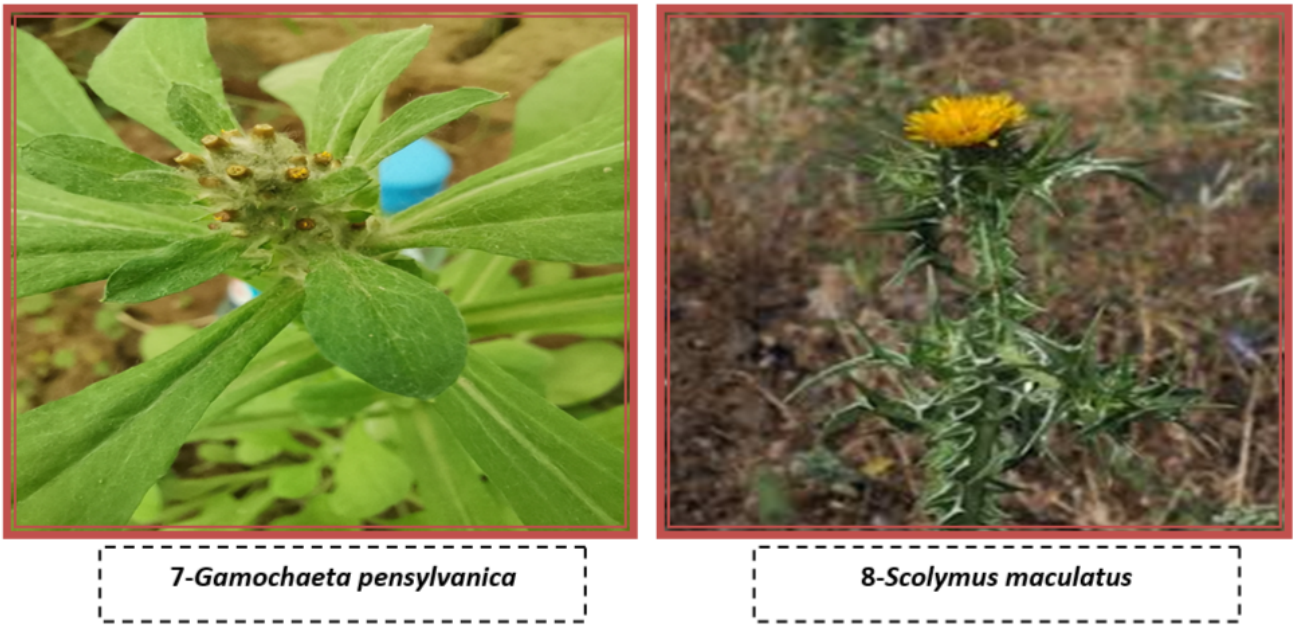

Figure 4. ***7. Gamochaeta pensylvanica , 8. Scolymus maculatus***

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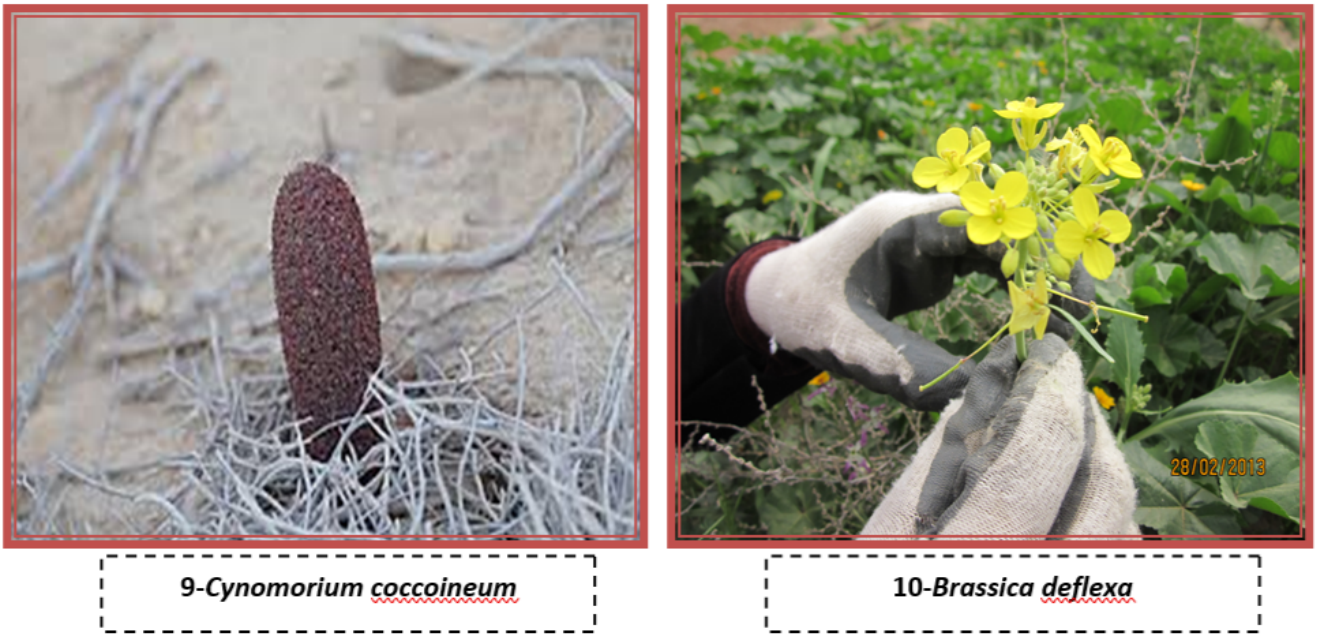

Figure 5. ***9. Cynomorium coccoineum , 10. Brassica deflexa***

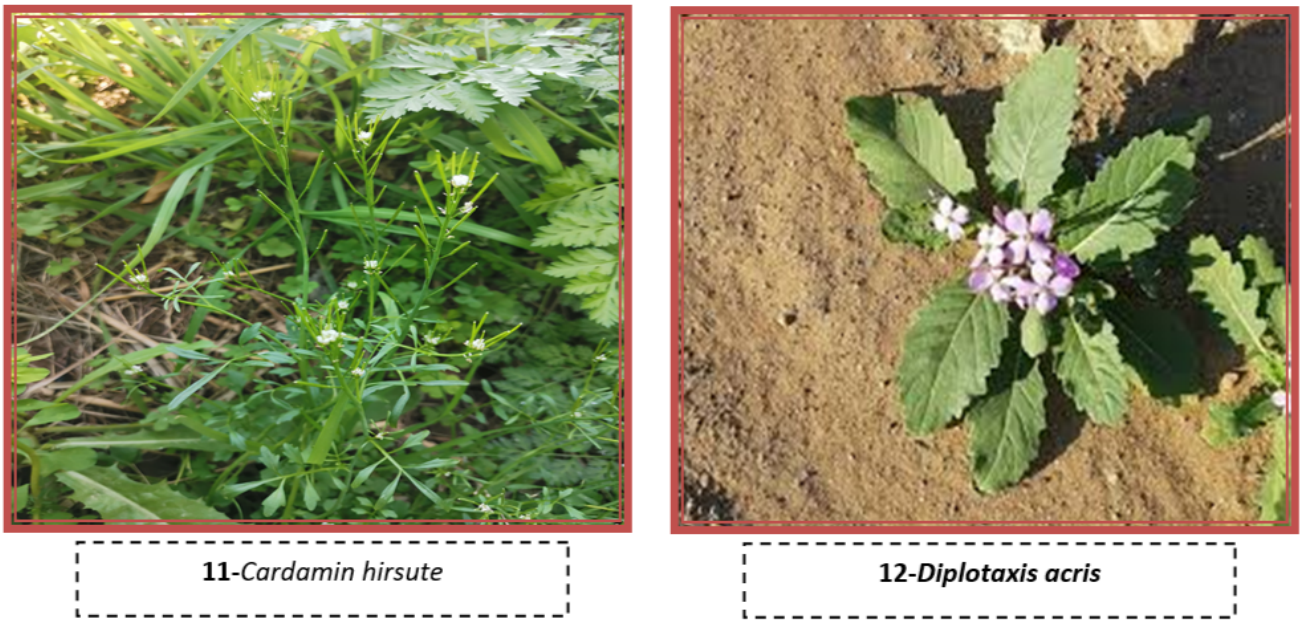

Figure 6. ***11.*** *Cardamin hirsute* ***, 12. Diplotaxis acris***

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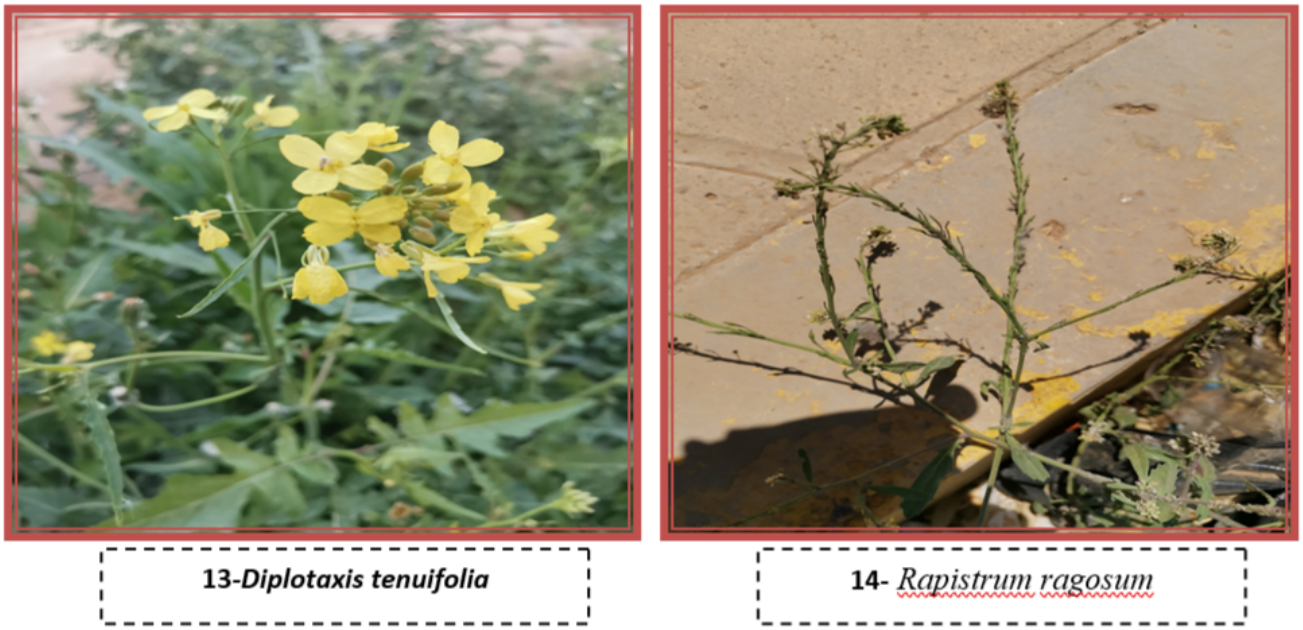

Figure 7. ***13. Diplotaxis tenuifolia , 14. Rapistrum ragosum***

Figure 8. ***15.*** *Lomelosia palaestina* ***, 16. Cucumis melo***

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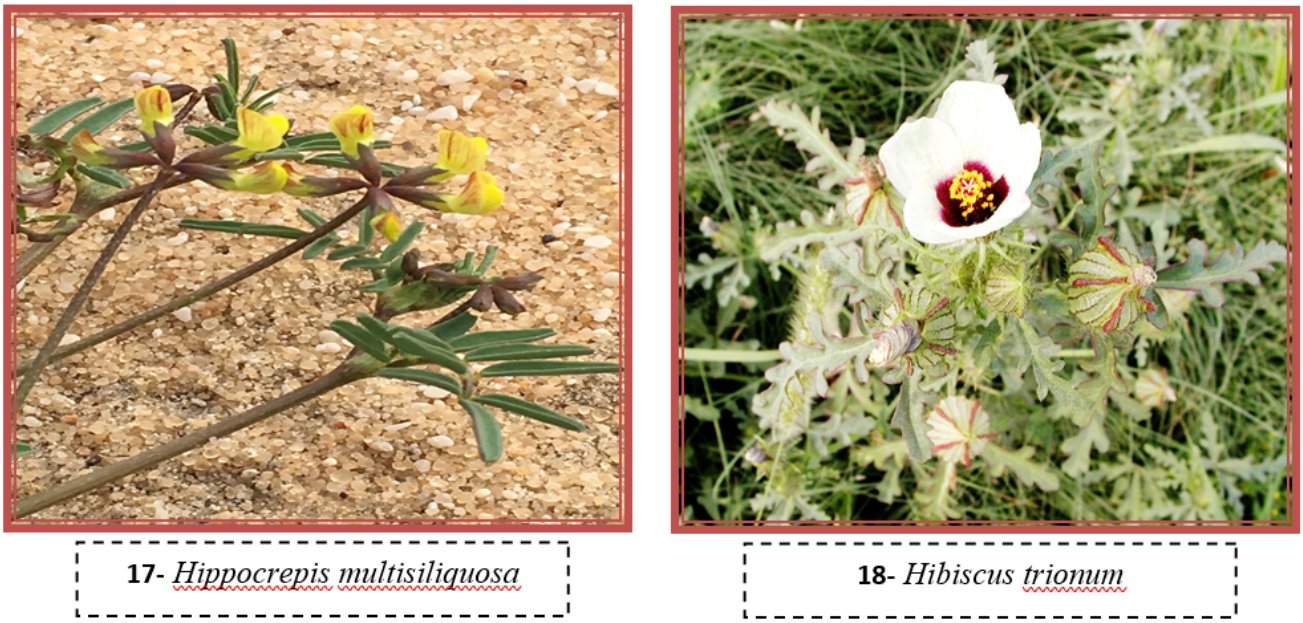

Figure 9. ***17.*** *Hippocrepis multisiliquosa ,* ***18.*** *Hibiscus trionum*

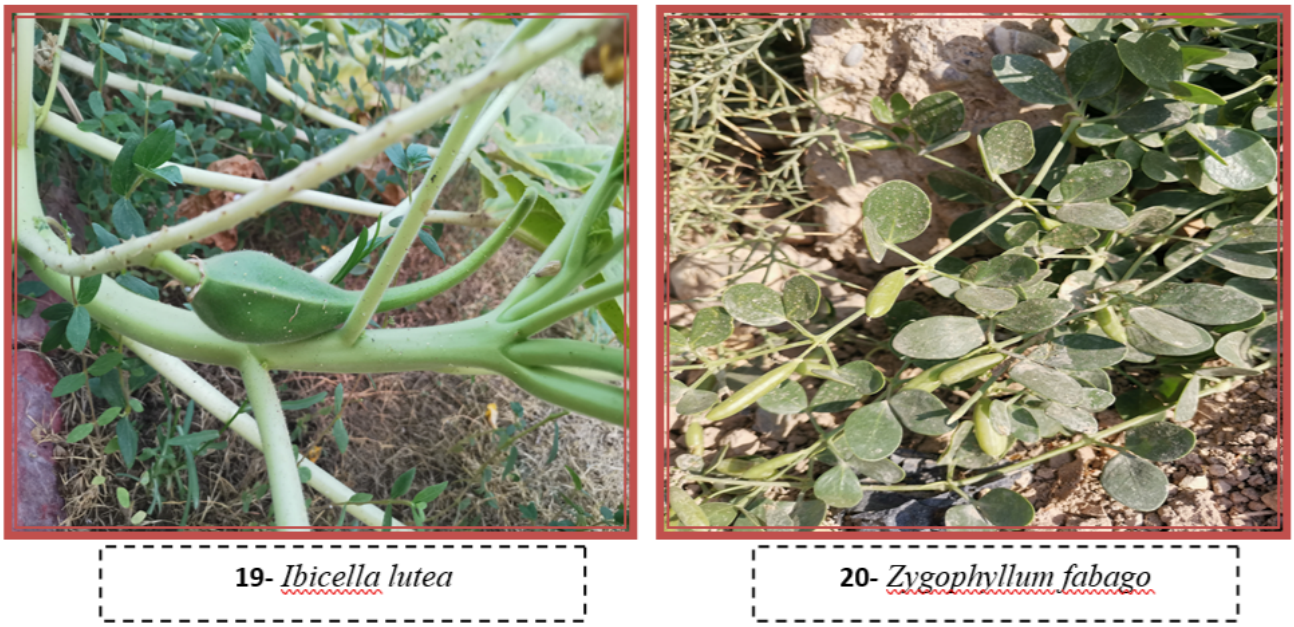

Figure 10. ***19.*** *Ibicella lutea ,* ***20.*** *Zygophyllum fabago*

Conclusion

This study documented 20 rare and endangered dicotyledonous plant species in Diyala Province, classified into 19 genera and 10 families, with varied ecological and socio-economic roles ranging from food and medicine to fodder and industry. The restricted distribution and low abundance of

these species underscore the severe pressures posed by drought, declining rainfall, and anthropogenic activities such as urban expansion and overgrazing. These findings highlight the urgent need for conservation strategies that prioritize in situ preservation, sustainable land use, and integration of traditional ecological knowledge to safeguard local biodiversity. Moreover, the results provide a foundational dataset for policymakers and conservationists seeking to design biodiversity management programs in Iraq. Further research should explore genetic diversity, climate resilience, and community-based conservation approaches to ensure the long-term sustainability of these valuable plant resources.

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