Taxonomic Study of Wild Plant in Bu-Ayad Area , Gharyan City , during Spring 2025

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ABSTRACT

This study aimed to survey and classify the wild plant species found in the Bu-Ayad area of Gharyan, Libya Plant specimens were collected during the spring season ,from March 15 to May 25, 2025 through several field visits. The results revealed the presence of 33 plant species belonging to 31 genera and 27 families .of these 5 species were classifled as monocotyledonous plants ,representing 15.2% of the total , while 28 species were identifled as dicotyledonous plants, accounting for 84.8% . The findings indicated that the family Asteraceae was the most represented family in terms of species diversity compared with the other recorded families. The study also documented rare plant species recorded for the first time in the study area, belonging to the families Asteraceae and Boraginaceae .Furthermore, endangered plant species belonging to the families Ephedraceae and Globulariaceae were identifled ,in addition to several medicinal plant species distributed among different botanical families .Overall. this study contributes to documenting the floristic diversity of the Bu-Ayad area and provides valuable baseline information for future taxonomic studies and the conservation of wild plant species in the region.

الملخص .

هدفت هذه الدراسة الى حصر وتصنييف الأنواع النباتية البرية الموجودة بمنطقة بوعياد بمدينة غريان , ليبيا وقد جمعت العينات النباتية خلال فصل الربيع , في الفترة الممتدة من 15 مارس الى 25 مايو 2025 , وذلك من خلال عدة زيارات ميدانية . أظهرت النتائج وجود 33 نوعا نباتيا ينتمي الى 31 جنسا و27 فصيلة نباتية ومن بين هذه الأنواع صنف 5 أنواع ضمن النباتات أحادية الفلقة , بنسبة بلغت 15.2 % من إجمالي الأنواع , في حين صنف 28 نوعا ضمن النباتات تنائية الفلقة . بنسبة بلغت 84.8%. وأوضحت النتائج أن الفصيلة المركبة (Asteraceae) كانت الأكثر تمثيلا من حيث التنوع مقارنة ببقية الفصائل النباتية المسجلة . وثقت الدراسة أنواعا نباتية نادرة سجلت لأول مرة في منطقة الدراسة , وتنتمي الى الفصيلة المركبة (Asteraceae) والبوراجية (Boraginaceae) علاوة على ذلك تم التعرف على أنواع نباتية مهددة بالانقراض تنتمي الى فصيلتي

الإفيدرية (Ephedraceae) والزريقية (Globulariaceae) بالإضافة إلى عدد من النباتات الطبية التي تتوزع على فصائل نباتية مختلفة . وبوجه عام تسهم هذه الدراسة في توثيق التنوع النباتي في منطقة بوعياد , وتوفر معلومات أساسية قيمة يمكن الاستفادة منها في الدراسات التصنيفية المستقبلية وجهود المحافظة على الأنواع النباتية البرية في المنطقة .

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Keywords: Wild Plants, Taxonomic Study, Floristic Diversity , Bu-Ayad, Gharyan ,Libya

الكلمات المفتاحية: النباتات البرية ,الدراسة التصنيفية, التنوع النباتي , بوعياد , غريان , ليبيا .

Introduction

The Bu-Ayad area in Gharyan city is a region rich in plant diversity, characterized by a unique environment that contributes to the growth of a variety of wild plant species of economic and environmental importance ,the area is a tourist destination for Gharyan city However ,the lack of taxonomic studies in this region may lead to a lack of understanding of this diversity and the degradation of local plant species ,this study focuses on conducting a taxonomic evaluation of the plants in the Bu-Ayad area through field surveys and taxonomic analysis to identify plant species assess their distribution ,and determine their ecological characteristics ,As this study contributes to providing scientific data that supports efforts to conserve plant diversity in the region , the study area is located at latitude 32°07′25" N and longitude 12°58′14"E, with an elevation ranging from 500/ 700 meters above sea level , temperatures vary from 5.5 °C to 38 °C, with rainfall amounts of 5- 10 mm in March , which is considered good for plant distribution and diversity at this time of the year , The presence of highlands intersected by deep and shallow valleys ,as well as water springs contribute the area an important characteristic in increasing the water table with the rainfall amounts in the region , The soil type also increases plant diversity and flourishing , especially during this time of the year , in March ,April ,and May .plant taxonomy depends on studying a set of characteristic and traits that help in identifying plants and distinguishing different spices and families (Stace,1991)The process of identifying plant spices is a fundamental step in taxonomic studies and depends on a set of distinctive plant characteristics to accurately determine the plant species (Waldchen & Mader (2018) Global plant databases represent an important source for updating plant names and verifying the scientific classification of spices , which help researchers to unify scientific names and classify plant more accurately (Borsch,2020)

Research Problem

1- The problem of the study is the lack of taxonomy information about wild plants in the Bu-Ayad area in Gharyan city ,which hinders understanding plant diversity , assessing environmental impact , and planning species protection .

2- Absence of updated taxonomic lists for plant species in Bu-Ayad

Objective of the Study

- Identify the plant species present in the Bu-Auyad area
- Study the distribution and characteristics of plants in the area
- Preparing taxonomic lists of plants to support conservation efforts and serve as a reference

Importance of the Study

1- Providing data to help protect local plant species

2- Enriching the scientific library with studies on the plants of the Bu-Ayad area in Gharyan city

Study Hypothesis

- There is a rich plant diversity in the Bu-Ayad Area of Gharyan city , which can be classified into seseral plant species of economic ,environmental and medicinal importance.

Previous Studies

- Al-Ahmir ,(2008) A Taxonomic Study of wild Flowering Plant in the Northern part of Gharyan District, the study aimed to identify and classify the wild flowering plants in the northern part of Gharyan , field surveys were conducted during 2006-2007 .
- El-Ahmir et al (2020) Floristic Study of Sedrores Mountains in Gharyan District , Libya the study investigated the plant flora of Sedrores Mountains in Gharyan District during two successive geowing seasons , 2018-2019
- Mahklouf & El-Ahmir (2023) Floristic Study of Al-Orban Area in Gharyan District , Libya the study aimed to investigate and analyzing the floristic composition of the Al-Orban area in Gharyan District

Taxonomic Study of Wadi Al-Yageep , Gharyan City During Spring 2024

Chapter Two ; Study Area and Previous Studies

Section one ; Study Area

Location

- Sampling Duration – March 15 to May 25, 2025
- Location : Bu-Ayad in Gharyan Jabal Al-Gharbi.Libya

Bu-Ayad is located in the northeast part of Gharyan ,about 88 km south of Tripoli .The area follows a Mediterranean climate , characterized by hot and dry summers with high summer temperatures . The average annual temperature is 18°C and rainfall. on average between 100-300 mm annually.

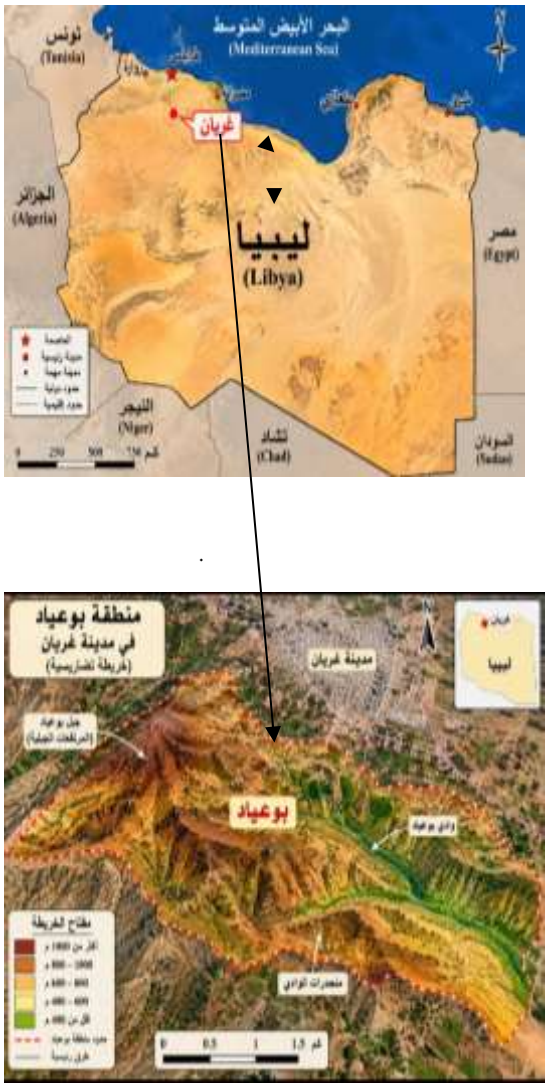


Fig (1) : Location of Bu-Ayad area in Gharyan .Libya

Table (1): Climatic condition and soil characteristics of Bu-Ayad area during the study period (March-May 2025)

Rainfall mm	Relative Humidity	Daily Mean Temp	Average Min . Temp	Average Max . Temp	Month - 2025
22.9	45%	19.6°C	10.0°C	20.0°C	March
12.7	40%	24.9°C	14.0°C	29.5°C	April
7.1	38%	28.9°C	17.0°C	33.3°C	May
42.7	41%	24.5°C	13.7°C	27.6°C	Average for study period

Value in Bu-Ayad	Property
Calcareous, gravelly ,sandy –clay subsoil ,with kaolinitic clays	Soil type
Sandy clay	Soil texture
8.0-8.4 (moderately alkaline)	pH
100-300 mm /year	Annual rainfall

It is clear from Table (2) that the sandy area in Bu-Ayad is characteristics by calcareous ,gravelly soil with sandy – clay texture and moderately alkaline (8.0-8.4) The annual rainfall is low , ranging between 100-300 mm/ year, which reflects the semi- arid nature of the Jabal Al-Gharbi region .These environmental conditions explain the dominance of drought-tolerant families such as Asteraceae and Lamiaceae in the study area ,which are well adapted to calcareous ,alkaline soils and low rainfall.

- Geographical Location of the Bu-Ayad Area

Topography of the Study Area and its Relation to the Study Design The Bu-Ayad area in Gharyan city is characterized by a mountainous nature with varying surface features , ranging between highlands ,slopes , valleys ,and relatively low – flying areas ,this variation is reflected in the prevailing environmental conditions of

the area , particularly soil depth , the degree of moisture retention , and the available water quantity , which may lead to differences in vegetation density and diversity from one site to another based on this , the study design took into account the representation of the different topographic units in the study area this was done by selecting sampling sites for plant specimens that include highland areas , slopes , and valley floors , ensuring the collection of samples that more comprehensively represent the plant diversity in the region the location of each sample collection was aiso recorded, along with the topographic environment in which it was found , and linking the recorded plant species to the specific topographic unit where they grow , this design helpsin understanding the extent of variation in plant species distribution among highlands the taxonomic accuracy of the study through documenting plant species and their habitats . regarding the geomorphology of the Gharyan area , forms part of the western mountain (Jabal al Gharbi) highlands extending from the Tunisian border to Al-Khums with a length of 500 km (كلم,2021)

- Climate and its Relation to the Study

The Bu-Ayad area Gharyan city is characterized by a temperate semi-arid climate it is marked by high temperatures during the summer season and a relative decrease during the winter season , with most of the rainfall concentrated in winter and at the beginning of spring , while the amount of rainfall decreases during the summer , climate affects vegetation both directly and in directiy ,as temperature and rainfall , along with moisture availability , control plant growth , distribution , and the formation of plant communities , in addition to differences in topography , may lead to variation in climatic conditions, in addition to differences in topography , may lead to variations in the distribution of plant species within the study area based on this, the study design took into account the selection of sites representing the different environmental and topographic conditions in the Bu-Ayad area plant specimens were collected during the study period from more than one site , aiming to record the largest possible number of plant species , classify them , and determine the extent of their distribution across different habitats , the prevailing climatic conditions during the sampling climatic conditions during the sampling period were also considered when interpreting the study results and the variation in plant species distribution ,the cold and moderate months are October and May in the Gharyan region (مرقب,2025)

- Soil and its Relation to the Study

- Soil properties in the Bu-Ayad area of Gharyan city vary depending on differences in topography , the nature of the parent rock , the degree of slope , and drainage , Medium –textured and semi- dry soils are widespread in the area , with variations in soil depth , organic matter content , and water retention capacity between highlands , slopes , and valley floors , soil plays a significant role in determining the distribution and growth of plant species , as plants differ in their requirements regarding soil type ,depth , moisture level , and nutrient content some sites may be more suitable for the growth of certain plant species , while soil characteristics in other sites may limit the spread of some species , therefore the study design took into account the slection of different sites representing the variation in soil and topographic properties within the Bu-Ayad area , plant specimens were collected form these sittes with the aim of inventorying and classifying species and linking thir presence to the habitats in which they grow , this helps to provide a more comprehensive picture of plant diversity and species distribution in the study area ,the soil of Bu-Aaid Aerea is characterized by gravels with sandy clay subsolis and kaolintic clays (Salem ,Busrewil,1980)
- Vegetation Cover and its Relation to the Study
- The Vegetation Cover in the Bu-Ayad area of Gharyan city is characterized by relative diversity is linked to the prevailing environmental conditions in the area , particularly the nature of topography , soil type , and climatic factors , vegetation appears in varying forms in terms of density and distribution , as plant communities differ according to the variation in sites and natural habitats , valleys and depression contribute to providing more suitable conditions for the growth of some species due to the accumulation of rainwater and relatively higher soil moisture in contrast , highlands and slopes may be characterized by plant species that are more capable of tolerating drought and high temperatures Based on this variation in vegetation cover , the study design relied on selecting a number sites representing the Bu-Ayad area the topographies in the Bu-Ayad area the aim was to inventory the wild plant species present , classify them , and document their characteristics and distribution sites plant species were also recorded at each study site

- taking into account the variation in natural habitats , this helps in determining plant type and its relationship to the distribution of species in relation to the environmental and topographic conditions of the area

(2024 , ميلاد , حليمة)



Fig (2) : Topography and vegetation cover in the study area

Chapter There ; Tools and Methods of Studing

Field tools

Map of the study area 2- Digital camera 3- Hand lens 4- Field notebook 5- Digging tools 6- Pruning scissors 7- Field press 8- Small bags

Laboratory tools

1-Laboratory press 2- Blotting paper 3- Dissecting microscope 4- Glue 5- Data label

Practical Part

Collection of Samples :

- Plant samples were collected periodically and regularly from the study area during the period from March 15 to May 25, 2025 , The site was visited about 48 times , The samples were pressed using special presses and placed on blotting paper in well- ventilated area , After ten days , the data label was attached to the lower right side of the sheet, the samples were studied morphologically, examined under a microscope ,and classified into their taxonomic , ranks using references , the Libyan Flora Encyclopedia , and keys such as " Guide to plant Families "(Al-Ratib ,1994) "Grasses in Libya " by(Al-Sharif .1995) The collected plant specimens were identified ,pressed, dried

- Chapter Four : Results and Discussion

Data analysis and results:

- The results revealed that the study area contained 27 plant families , comprising 21 dicotyledonous families and 6 monocotyledonous families These families included 31 genera. of which 35 belonged to dicotyledonous plants and 5 to monocotyledonous plants . Regarding species , a total of 33 species were recorded including 28 dicotyledonous species , and 5 monocotyledonous species Table (3)

Plant groups	Number of families	Number of genera	Number of species
Dicotyledons	24	26	**28**
Monocotyledons	3	5	**5**
Total	27	31	**33**

Table 3. Number of plant families , genera ,and species recorded in the study area

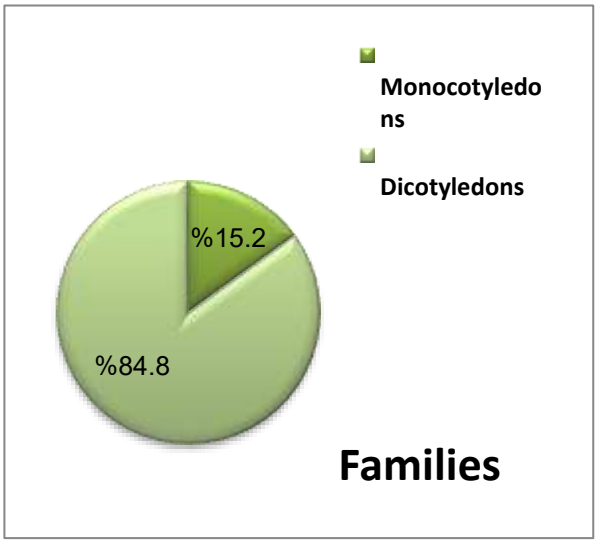


Fig (3): **Percentage of the collected groups from the study area**

- The percentage is shown in Figure (3) The wild monocotyledonous plants represent 15.2% of the families compared to dicotyledonous plants , which is a significant , and this is consistent with some previous taxonomic studies of Bu-Ayad area The reason is that wild monocotyledonous plant are used as main food for sheep grazing in the area

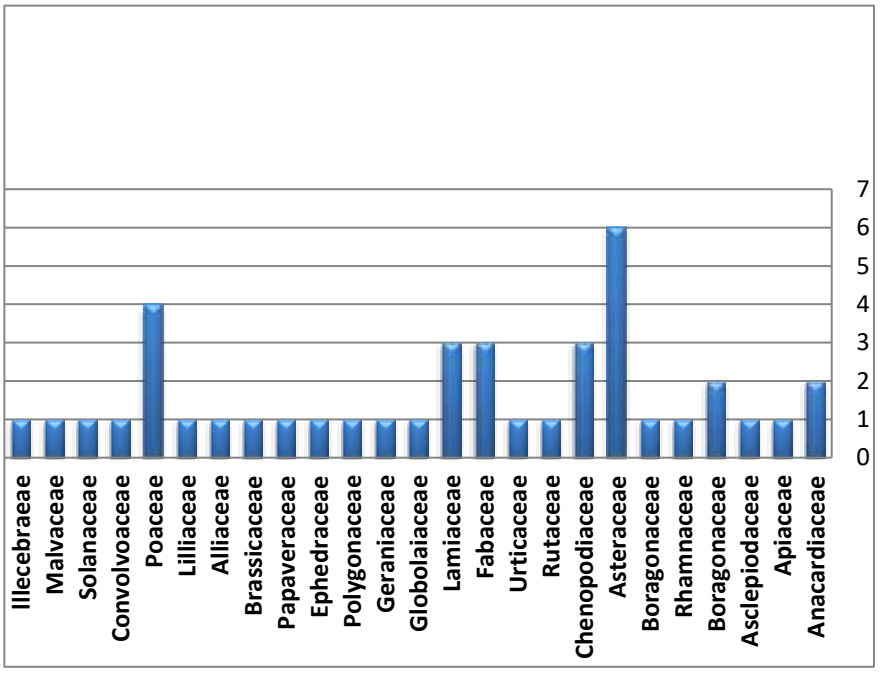


Fig (4): **Number of Plant Families**

- It was evident from this study that there was a clear variation in the number of genera for the families collected from Bu-Ayad the composite family Asteraceae contained the largest number of genera(6), the Lamiaceae family comprised(3), (3) genera for the Liliaceae Family, (1) genera for the Poaceae Family (3) genera for the Alliaceae Family (1) Fabaceae, and (3) genera for the Anacardiaceae Family while the rest of the families had only one genus each, thus the study showed the dominance of the composite family in terms of the number of genera in the study area, as shown in Fig(4).

- Plants collected for the first time

1- The plant(Alavi) Viv (Amberboa libyca) belongs to the Asteraceae family and is an endemic plant species in Libya . it collected from Yafran and Gharyan in 1974,and from Misrata in 1977 by Al-Rabiei . it was recently collected from AL-Nuqaza area in 2025according to a previous study , and now it has been collcted from the Bu-Ayad area in this study.

2- The plant(Bomm) Alkanna tinctoria ssp belongs to the Boraginaceae family , it was collected from Gharyan and Zintan by Alva etal. In (Qaiser. 1979,) 1977and is currently collected from the study area of Bu-Ayad

- Endangered plants

1- -The Ephedra plant" Al-alanda "belongs to the Ephedraceae family , it was collected from Tarhuna , Bu Ghilan .and Nalut bypampanini 1913, (Sherif and El-Taife(1986) and its presence has been confrmed in Bu-Ayad

2- Sherif and El-Taife, 1986) its presence has been confrmed in Bu-Ayad

3- Plant Al-Zariqa Globularia alypum Linn belongs to the Globulariaceae Medicinal plant used in folk Medicine

Plants of pastoral importance in the region

	Local name	Scientific name	Family

1.	شندقورة	*Ajuga iva (L .) Schreber*	Lamiaceae
2.	الشيح	*Artemisia herba-alba Asso L*	Asteraceae
3.	الشعال	*Artemisia campestris L*	Asteraceae
4.	بلوز	*Asphodelus fistulosus L*	Liliaceae
5.	قطف	*Atriplex halimus L*	chenopodiaceae
6.	عسلوز	*Brassica tournefortii Gouan*	Brassicaceae
7.	قندول	*Calicotome villosa (Poir) Link*	Fabaceae
8.	ضرس العجوز	*Emex spinosus (L.) Campd*	Polygonaceae
9.	عليق	*Convolvulus arvensis L*	Convolvulaceae
10.	نجم	*Cynodon dactylon (L.) Pers*	Poaceae
11.	جرجير	*Diplotaxis harra (Forsk)Boiss*	Brassicaceae
12.	قجرود	*Gymnocarps decander Forsk*	Illecebraceae
13.	عضيضة	*Launaea resedifolia (L.).O.Kuntze*	Asteraceae
14.	عوجز	*Lycium europaeum L.*	Solanaceae
15.	خبيز	*Malva parviflora L.*	Malvaceae
16.	بقرعون	*Papaver hybridum L*	Papaveraceae
17.	حفان	*Pennisteum setaceum (Forsk) Chiov*	Poaceae
18.	قرضاب	*Polygonum equisetiforme Sibth & Sm.*	Polygonaceae
19.	رثم	*Retama raetem (Forsk.)Webb*	fabaceae
20.	قيز	*Scorzonera undulata Vahl*	Asteraceae
21.	جعدة	*Teucrium polium L.*	Lamiaceae
22.	سدر	*Ziziphus iotus (L) Lam*	Rhamnaceae
23.	زيوان	*Hordeum murinum Huds ssp.glaucum*	Poaceae
24.	بهمة	*Stipa capensis Thunb*	Poaceae
25.	بطوم	*Pistacia atlantica Desf*	Anacardiaceae

	Local name	Scientific name	Family	Medicinal uses
.1	عشبة الأرنب	*Helichrysum (L.) stoechas*	Aster aceae	تستعمل في تدويب حصوات الكلى وتسكين أوجاعها
.2	الشيح	*Artemisia herba-alba L Asso*	Aster aceae	علاج لديدان والطفيليات المعدية
.3	الحريق	*Urtica urens L*	Urtic aceae	علاج لفقر الدم والسل وبرد المفاصل
.4	الجعدة	*Teucrium polium L*	Lami aceae	علاج لضغط الدم والتخلص من حصى الكلى
.5	الروبيا	*Marrubium alysson L*	Lami aceae	خفض نسبة السكر وعلاج لمفاصل
.6	الزريقة	*Globularia alypum Linn*	Globulariaceae	علاج للمغص والاسهال الحاد
.7	الشندقورة	*Ajuga iva (L .) Schrebe*	Lami aceae	علاج للقي وعسر الهضم والاسهال
.8	الخزامة	*Lavandula multifida L*	Lamiaceae	مسكن الالم ومدره للبول والطمث
.9	الرثم	*Retama raetam (forsk) webb*	Faba ceae	علاج لحساسية ولوقف نزيف الجروح
.10	الفلية	*Chamomilla aurea (Loefl) Gay k*	Ast eraceae	علاج لالتهابات الجلدية والمغص المعوي
.11	القازول	*Allium roseum L..*	Alliac eae	علاج لالتهابات الصدرية المزمنة
.12	شبرم	*Atractylis serratuloides Bome L*	Aste raceae	علاج لروماتيزيوم عفينة
.13	شجرة الريح	*Heplophyllum tuberculatum (Forsk .)Juss*	Rutaceae	لطرد الغازات وعلاج الامساك
.14	العفينة	*Chenopodium ambrosioides*	Che nopodiaceae	الديدان وأميبيا الامعاء

Conclusion

This study aimed to investigate the plant diversity and taxonomic composition of the Bu-Ayad area in Gharyan City by surveying the plant species present in the study area , identifying their scientific names and botanical families , and examining some of their morphological and ecological characteristics the results showed that the Bu-Ayad area is characterized by considerable plant diversity that is strongly associated with its natural environmental conditions , particularly topography , soil characteristics , and prevailing climatic conditions , the variation environmental conditions within the area also contributed to differences in the distribution and abundance of plant species the findings of this study provide an important preliminary database for documenting the flora of the Bu-Ayad area and represent a useful basis for future studies in plant taxonomy, plant ecology and biodiversity the study also highlights the natural vegetation of the area , particularly plant spices of ecological , meducing human activities that may negatively affect plant diversity therefore , the taxonomic study of wild plants in the Bu-Ayad area represents an important step toward documenting the plant diversity of Gharyan city and providing scientific information that may contribute to future ecological and taxonomic studies and to the conservation of natural plant resources .

Comparison of results with previous studies

The current study conducted in Bu-Ayad area , Gharyan City , recorded 33 plant species belonging to 31 genera and 27 families , Dicotyledonous plants represented the largest group , with 28 species belonging to 21 families and 35 genera ,while monocotyledonous plants included 5 species belonging to 6 families and 5 genera , these results indicate that Dicotyledonous plants constitute the dominant group in the study area

In comparison(2008. ابوهدرة,الأحمر) in a study of wild flowering plants in the northern part of Gharyan , recorded appropriately 387 plant species belonging to 260 genera and 58 families , the number of species recorded in Bu-Ayad (33 species) is therefore lower than that recorded in northern Gharyan (387) species similarly , the numbers of genera (31 compared with 260) and families 27 compared with 58) are lower in the current to differences in the geographical area , duration of the study , number of filed visits , and environmental and topographical conditions

Similarly , El-Ahmir and Mahklouf (2023) recorded 309 plant species beionging to 43 families in the Al-Urban area of Gharyan the study recorded 39 dicotyledonous families and 4 monocotyledonous families , with the family Asteraceae being the most represented , with 60 species in comparison the present study in Bu-Ayad recorded 33 species belonging to 27 families ,while dicotyledonous plants were also dominant

Overall , the current study indicates that Bu-Ayad has a lower recorded plant diversity than the large areas investigated in previous studies of Gharyan however .the results are consistent with previous studies in showing the dominance , of dicotyledonous plants and the significant representation of the Asteraceae family the differences in the number of recorded species can be explained by differences in the size and geographical extent of the study areas , sampling periods ,field survey intensity ,and local environmental conditions

Furthermore , El-Ahmer et al (2020) in their floristic study of the Sedroris Mountains in Al- Qawasim , Gharyan ,recorded 320 plant species belonging to 214 genera and 44 families of these ,276 species were dicotyledons distributed among 39 families , whereas 44 species were monocotyledons distributed among 5 families in comparison , the current study recorded 28 dicotyledonous species and 5 monocotyledons species . thus dicotyledonous plants were also more diverse than monocotyledons plants in both studies , although the total number of spices differed considerably

Recommendations

1- Continue taxonomic and floristic studies in the Bouyad area to complete the inventory and documentation of the plant species cocurring in the region

2- Preserve representative plant specimens of the recorded spices in recognized scientific herbaria , together with accurate information on their scientific names , collection sites , and collection dates .

3- Conduct seasonal studies in the study area to identify plant species that may appear during different seasons of the year , thereby providing a more comprehensive assessment of plant diversity ,

4- Investigate the relationship between plant distribution and environmental factors , particulariy topography , elevation , temperature , rainfall ,humidity , and soil characteristics

5- Pay particular attention to rare and threatened plant species recorded in the area and develop appropriate measures for their protection and conservation

6- Reduce uncontrolled human activities , particularly overgrazing and indiscriminate collection or uprooting of plant , which may contribute to the degradation of natural vegetation

7- Establish a botanical database for information on plant species , families , distribution sites , and flowering or growth periods

8- Conduct comparative studies beteen the Bouyad area and other areas of Gharyan city to identify similarities and differences in plant diversity and geographical distribution

9- Encourage futher research on medicinal and economically important plant spices occurring in the area and promote their sustainable use wityout threatening their natural populations

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Launaea nudicaulis	Plantago albicans	Scabiosa arenaria
		
Vicia sativa	Origanum majorana	Ornithogalum ssp
		

Marrubium alysson L	Papaver rhoesa L	Malva sylvestris

		
Matricaria aurea	Rumex vesicarius	Rumex vesicarius
		

		
Scorpiurus muricatus	Asphodeelus tenuifolius	Anchusa humilis
		
Scabiosa arenaria	Anthyllis tetraphylla	

		
Retama raetam	Glebionis coronaria	Erucaria rostrata
		
Salvia verbena aca	Achillea santolina	Tribulus terrestris

		
Lotus halophilus		Reseda lutea

