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Floristic Composition, Diversity Species and Vegetation Analysis of Benghazi Plain Region (Daryanah to Tokra) – Eastern Libya

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التركيب الفلوري وتنوع النباتات وتحليل الغطاء النباتى بمنطقة سهل بنغازى (دريانة الى توكرة) – شرق ليبيا

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Abstract:
The Floristic Analysis, life forms and chorology were conduct in Benghazi plain regions: Daryanah, Tansulukh, Al-Mabni, Brace and Tokra. The recorded of 138 species (64.49% annuals and 35.50% perennials) belonging to 32 families. In addition, results showed the absolute dominance of therophytes (66.68%), as well as the total chorological analysis of the served flora presented revealed that 82 species 65% of the total recorded species are mono-regional in being native to Mediterranean chorotype (77species). The results were based on the fact that the Tokra area is more diverse because of its proximity to the Green Mountain, of the depth of its soil and the abundance of rainfall, and that drought and human activities such as agricultural expansion and urban sprawl negatively affect the vegetation, so the vegetation must be preserved through the establishment of reserves and the restoration of environmental balance.

Keywords: Floristic composition, Vegetation analysis, Libya, Benghazi plain.

الملخص
تم إجراء تحليل الفلورى وأشكال الحياة والتوزيع الجغرافي لمناطق سهل بنغازي: دريانة، تنسلوخ، المبني، برسس وتوكرة . تم تسجيل 138نوعا (64.49٪ نباتات حولية و 35.5٪ نباتات معمرة) تنتمي إلى 32عائلة بالإضافة إلى ذلك أظهرت النتائج الهيمنة المطلقة النباتات الحولية (66.68٪) ، بالإضافة إلى التحليل التوزيع الجغرافي الكلي للنباتات المعروفة كشف أن 82 نوعا بنسبة 65٪ من إجمالي الأنواع المسجلة تعرف أحادية المنطقة Mono-regions في كونها موطنها الأصلي للنمط التوزيع الجغرافي المتوسطي 77نوعا. وبينت النتائج أن منطقة توكرة أكثر المناطق تنوعا لقربها من الجبل الأخضر وعمق تربتها ووفرة الأمطار، وأن الجفاف والأنشطة البشرية مثل التوسع الزراعي والزحف العمراني تؤثر سلبا على الغطاء النباتي، لذلك يجب الحفاظ على الغطاء النباتي من خلال إنشاء المحميات واستعادة التوازن البيئي.

الكلمات المفتاحية: التركيب الفلوري، تحليل الغطاء النباتي، ليبيا، سهل بنغازي.

Introduction

Natural plants are one of the most important sources of oxygen necessary for the growth of many organisms, the living is the natural lung through which oxygen is available, and it is also a safe haven for many living organisms of different types, ranks and phases, plant environments vary from Place to place according to the prevailing climate and soil type. Therefore, like any ecosystem, it is disrupted. And the imbalance, according to the changes that occur in the environment surrounding this system. The imbalance in the ecological balance is due to many reasons, which may be natural and human.

Plant diversity in any geographical area is of great value to humans by taking advantage of it in obtaining medicinal herbs and grazing livestock, as well as for beekeepers during the flowering period, climate, surface features and the quality of the soil in any region, are the factors that largely determine the quality and density of vegetation (5). The ecological system plays a fundamental role in the balance of natural resources and its high capacity for rehabilitation when disruptions occur due to human activities (37). The vegetation and the various forms of plant life it contains constitute a significant resource for preserving soil from desertification, especially in arid and semi-arid regions. Species diversity is one of the most important indices which are used for the evaluation of ecosystems at different scales (4). The assessment of flora including floristic, biological spectrum and geographical distribution are important for recognizing biodiversity (42) (43).

The life form of any plant is fixed that is developed based on the morphological adaptation of plants to environmental conditions. The life form differences in various societies make up basis of their structure. Different Classification of the life form there but among them Raunkiaer system is used most (13). Life form also depends on genetics and environmental factors; because the environment can be vital in shaping different forms of plants is undeniable. According to these, plants communities in different climates can be different from the life form diversity are to enjoy. Spectrum of dominant life forms in a climate, represent how the plants adaptation on the climate is special (14). Chorological studies are important to ascertain species distribution, its variation and identifying endemic species. Genetic resources and diversity studies of each habitat are a necessary prerequisite to the ecological studies (1) (27).

The Benghazi plain is characterized by heavy rainfall in the winter for its location between the mountain and the sea, which gave suitable environmental habitats for many flowering plants, especially annuals, and their spread and wide distribution, which was mentioned within the Libyan flora,(21) was the first scientific taxonomic studies of plants in Libya, where he collected 260 plant species along the coastal strip from Tripoli to the border area with Egypt, as well as studies (36) (39) on the inventory of flowering plants growing in the Green Mountain region and successive studies and field trips to collect plants and name them and identify their morphological characteristics and times of flowering and fruiting and recorded in the classifications of floristic ,In the modern area, (17) (18) collected about seven thousand plants from different regions of Libya, and starting from 1976 to 1986, the implementation of the Libyan Plant Encyclopedia, where Gadi & Jafri El- compiled and reviewed all previous studies and revised them in the flora of Libya, which included about 150 species. Followed by some research and studies on vegetation, including the study of (34) where 1750 species of vascular plants were recorded in Libya and included a list of endemic plants in it. And a study (4), (30) in the Green Mountain region on the Mediterranean coast, in which 1790 plant species were collected, the vegetation in Libya is considered poor compared to the vast area estimated at about 1,750,000 million km2, while the number of Libyan plant species is estimated at about 1750 species belonging to 744 genera distributed 118 to a family.

The coastal strip represents 5.5% of Libya's area, but it is the most fertile, where monsoon rainfall falls at a rate of 150 to 600 mL per year (28). The Mediterranean climate and the Sahara Desert are dominated in Flora of Libya (26). This area is quite fertile and receives an adequate amount of rainfall in winter, particularly in the east and west, thus a great part of this belt exhibits the typical Mediterranean flora. In Libya, four Biogeographical regions are recognized, which are Sudanian region, Saharo-Arabian region, the Mediterranean region and Mauritanian steppe of Irano-Turanian region (7) (34). Ali et al. (2015), attribute the losses due to human anthropogenic activities, dry condition, seasonal rainfall and wind erosion of top soil.

This research aims to identify the composition of the natural vegetation in the Benghazi plain form Daryanah to Tokra as part of the vegetation studies in Libya, especially with the lack of studies on the floristic structure and the evaluation of human activities that affected the degrees of diversity and the deterioration of vegetation as a result of the threat of their environmental habitats in the Benghazi plain area.

Materials and Methods

Study area: The Benghazi plain is located in eastern Libya, which is a flat land in the form of a triangle headed at the Tokra area and its base at the Zweitniya area and extends along the eastern heights of the Green Mountain at a distance of 90 km and from the west the Mediterranean coast, which is interspersed inland by some salt lakes or sabkhas, which is considered a habitat for many migratory birds, The coast area north of Benghazi was chosen from Daryanah to Tokra (figure 1), Known as the Sahel region It was divided into five sites: Daryanah, Tansulukh, Al-Mabni, Brace and Tokar. At each site, several stands were selected according to the density of vegetation as illustrated Table 1.

They are areas confined between the sea coast and the heights of the Green Mountain and are interspersed with some valleys, the type of soil prevailing in the study areas clay soil and at the coast be in the form of salt crusts on the surface in the summer and the sandy soil represents the beach area, while the prevailing climate is the Mediterranean climate mild and rainy in winter and hot dry in summer (32).

Table 1: Locations of the study sites within Stands along an elevation gradient.

Sites	Stands	Longitude	Latitude	Altitude (a.s.l m)
Daryanah	1	32 ° 19' 29.4"	20° 17' 7.0"	17
	2	32° 19' 23.8"	20° 17' 53.5"	23
	3	32° 18' 47.6"	20° 18' 23.7"	38
	4	32° 21' 33.1"	20° 19' 8.6"	14
Tansulukh	5	32° 22' 19.7"	20° 21' 59.0"	16
	6	32° 20' 40.8"	20° 23' 43.2"	53
	7	32° 23' 4.6"	20° 22' 27.7"	13
Al-Mabni	9	32° 26' 44.2"	20° 30' 19.2"	35
Brace	8	32° 24' 23.6"	20° 25' 0.3"	16
	16	32° 25' 5.6"	20° 25' 55.1"	10
	17	32° 24' 30.4"	20° 25' 4.2"	11
	18	32° 24' 15.6"	20° 24' 33.0"	14
	20	32° 24' 2.6"	20° 25' 15.3"	18
Tokra	10	32° 29' 22.5"	20° 31' 16.0"	20
	11	32° 30' 20.9"	20° 33' 13.2"	29
	12	32° 29' 54.4"	20° 33' 52.3"	45
	13	32° 30' 53.2"	20° 34' 32.9"	35
	14	32° 32' 48.2"	20° 37' 45.3"	60
	15	32° 29' 16.3"	20° 30' 54.7"	19
	19	32° 29' 22.6"	20° 33' 11.0"	43

Figure 1: Map of the study sites. See Table 1 for further details. Sites are indicated as follows: Stands 1 to 20 in five regions.

Climate shows the dry and humidity period of the study area, and it is noted that the months of December and January represent the very humid season, while the months of February, March and

November have a semi-humid climate, and the month of October is semi-dry, while the months April, May, June, July, August and September represent the dry season that extends for a period of six months in these areas, where there is almost no rain and temperatures reach their highest levels.

Field study: The study was conducted in the spring 2024 , where plants bloom, especially annuals, which are more prevalent in them, and samples were collected from the above-mentioned areas, plant species were inventoried, and transferred after drying and numbering to the laboratory of the Department of Biology - University of Benghazi in order to define them according to the Libyan flora (9), for knowledge of the floristic composition of plant species The method of analyzing life forms was used in classifying endemic plants collected from the study areas. Life forms of species were detected while relying on the location of the regenerative buds and the shed parts during the unfavorable season (34) while the chorotypes were determined according to Zohary (38).

Plant Diversity Study: Plant diversity was calculated based on the law (diversity alpha) for species richness by calculating the number of plant species per site and the number of plant species per site, and using the law (diversity Beta) by calculating the ratio between the total number of species collected from the site and the total number of species collected from the entire study area based on (11).

Results and discussion

A total of 138 species of the vascular plants for 20 stands were identified, belonging to 103 genera in 32 families (Table 2) (figure 2) (figure 3). They consisted of 5 trees and shrubs (3.62 %), 44 perennial herbs (31.88%) and 89 annuals (64.49%). (Table 3) The largest families were Asteraceae and Poaceae (29 and 23 species respectively), Fabaceae (12 species) and Chenopodiaceae (9 species); Lamiaceae and Apiaceae (6 species for each), Boragiaceae (5 species), Brassicaceae (4 species), Liliaceae and Geraniaceae (3 species for each), Crassulaceae (2 species). Seventeen families are represented by only one species (Rhamnaceae, Primulaceae, Asclepiadaceae, Violaceae, Aizoaceae, Linaceae, Roaceae, Anacardiaceae, Rubiaceae, Amaryllidaceae, Convolvulaceae, Amaranthaceae, Araceae, Euphorbiaceae, Solanaceae illecebraceae, Papavaceae). This coincides with the findings of (3) who collected 192 species in the heights of Albakur hills at the northern coast of Al-Marj area (Barce), but less than the collections of (12) who collected 244 species from AL-Asraa valley, and the collections of (6) who collected 317 species from AL-Aqar Valley, as well less than the collections of (8) who collected 336 species from Zaza valley at the first terrace of EL-Jabal EL-Akhdar mountain, The lowest number of plant species is observed in the study area compared to the areas of the Green Mountain due to the low rise above sea level and the lack of rain in the coast.

Table (2): Floristic composition of the recorded species in the study area: Per. = Perennials, Ann. = Annuals; her= hers, Sh = shrub, Tre = trees, Th. = Therophytes, H.=Hemicryptophytes, G.= Geophytes, Ch. = Chamaephytes; COSM = Cosmopolitan, Med= Mediterranean, SA = Saharo-Arbian, ES = Euro-Siberian, IT. = Irano-Turanian, SZ = Sudano-Zambezian.

Species	Family	Life form	Hibat	Life span	chorotype
Vulpia ciliata Dumort.	Poaceae	Th	her	Ann	Med /Trop/Eu-Si
Vulpiellia tenuis (Tineo) Kerguelen.	Poaceae	Th	her	Ann	Med/ Ir -Tu
Cutandia maritima (L.) Barbey.	Poaceae	Th	her	Ann	Med
Dactylis glomerata L.	Poaceae	Ge	her	Per	Med
Trachynia distachyia (L.) Link.	Poaceae	Th	her	Ann	Med/ Ir -Tu
Bromus rubens L.	Poaceae	Th	her	Ann	Med/Ir-Tu/Sa-Ar
Bromus chrysopoyon Viv.	Poaceae	Th	her	Ann	Med/ Ir -Tu
Bromus abpecuros poir.	Poaceae	Th	her	Ann	Med
Aegilops ventricosa Tausch.	Poaceae	Th	her	Ann	Med
Triticum durum Desf.	Poaceae	Th	her	Ann	Trop
Hordeum murinum L.	Poaceae	Th	her	Ann	Med/ Ir -Tu
Hordeum marinum Huda.	Poaceae	Th	her	Ann	Med/ Ir -Tu
Melica minuta L.	Poaceae	Th	her	Per	Med
Avena barbata Pott ex Link.	Poaceae	Th	her	Ann	Med
Aven sterilis L.	Poaceae	Th	her	Ann	Med/ Ir -Tu

Gaudinia fragillis (L.) P. Beauv.	Poaceae	Th	her	Ann	Med
Trisetaria macrochaeta(Boiss.)Maire.	Poaceae	Th	her	Ann	Sa-Ar/ Med
Lophochloa cristata (L.) Hyl.	Poaceae	Th	her	Ann	Med/ Ir -Tu
Phalaris paradoxa L.	Poaceae	Th	her	Ann	Med/ Ir -Tu
Lygeum spartum Loeft ex Linn.	Poaceae	Ge	her	Per	Med
Stipa tenacissima L.	Poaceae	TH	her	Ann	Med
Stipa capensis Thunb.	Poaceae	Th	her	Ann	Ir-Tu /Sa-Ar
Stipa barbata Desf.	Poaceae	TH	her	Ann	Med
Filago micropodioides Lange.	Asteraceae	Th	her	Ann	Med/ Ir -Tu
Evax contracta Boiss.	Asteraceae	Th	her	Ann	Ir-Tu
Micropus supinus L.	Asteraceae	Th	her	Ann	Med /Ir-Tu/Eu-Si
Phagnalon rupestre (L.) DC.	Asteraceae	He	her	Per	Med / Ir-Tu
Anthemis cotula L.	Asteraceae	Th	her	Ann	Med /Ir-Tu/Eu-Si
Anthemis pseudocotula Bioss.	Asteraceae	Th	her	Ann	Med
Achillea santolina L.	Asteraceae	He	her	Per	Med
Chamomilla aurea (Loeft.)Gay ex Cosson &Kralik.	Asteraceae	Th	her	Ann	Med
Senecio leucanthemifolius Poiret.	Asteraceae	Th	her	Ann	Med/Eu-Si
Carlina sicula Ten.	Asteraceae	Th	her	Ann	Med
Carlina lanata L.	Asteraceae	Th	her	Ann	Med / Eu-Si
Atractylis carduus (Forsk.) Christensen.	Asteraceae	Th	her	Ann	Med
Echinops cyrenaicus Durand & Barratte.	Asteraceae	Th	her	Ann	Med
Notobasis syriaca (L.)Cass.	Asteraceae	Th	her	Ann	Med / Ir-Tu
Onopordum espinae Cosson ex Bonnet.	Asteraceae	He	her	Per	Med
Cynara cornigera Lindley.	Asteraceae	Th	her	Ann	Med
Cynara scolymus L.	Asteraceae	Th	her	Ann	Med
Centaurea aegialophila Boiss & Heldr.	Asteraceae	Th	her	Ann	Med /Eu-Si
Carthamis divaricatus Beguinot & Vacc.	Asteraceae	Th	her	Ann	Med
Cichocium pumilum Jacq.	Asteraceae	Th	her	Ann	Med /Ir-Tu
Cichocium spinosum L.	Asteraceae	He	her	Per	Med
Hyoseris scabra L.	Asteraceae	Th	her	Ann	Med / Eu-Si
Tragopogon picroides L.	Asteraceae	Th	her	Ann	Med / Eu-Si
Leontodon tuberosus L.	Asteraceae	He	her	Per	Med
Picris asplenoides L.	Asteraceae	Th	her	Ann	Sa-Ar
Reicharda tingitana (L.) Roth.	Asteraceae	He	her	per	Ir-Tu /Sa-Ar
Launaea nudicaulis (L.) Hooker.	Asteraceae	He	her	Per	Med / Sa-Ar/ Ir-Tu
Sonchus oleraceus L.	Asteraceae	Th	her	Ann	Cosm
Crepis senecioides Delile.	Asteraceae	Th	her	Ann	Med
Malva parviflora L.	Malvaceae	Th	her	Ann	Med / Eu-Si
Allium orientale Boiss.	Alliaceae	Ge	her	Per	Med
Allium erdelii Zuec.	Alliaceae	Ge	her	Per	Med
Allium ampeloprasum L.	Alliaceae	Ge	her	Per	Med

Allium ruhmerianum Asch.	Alliaceae	Ge	her	Per	Endemic
Allium negrianum Maire & Weiller.	Alliaceae	Ge	her	Per	Endemic
Plantago crypsoides Boiss.	Plantaginaceae	Th	her	Ann	Ir-Tu/Eu-Si
Plantago cyrenaica Durand & Barratte.	Plantaginaceae	Th	her	Ann	Endemic
Genista acanthoclada DC.	Fabaceae	Ph	her	Per	Med
Astragalus hispidulus DC.	Fabaceae	Th	her	Ann	Med /Ir-Tu
Astragalus hamosus L.	Fabaceae	Th	her	Ann	Med
Astragalus caprinus L.	Fabaceae	Th	her	Ann	Med /Ir-Tu
Hymenocarpos circinatus (L.)Savi.	Fabaceae	Th	her	Ann	Med/ Ir -Tu
Lotus edulis L.	Fabaceae	Th	her	Ann	Med
Lotus cytisoides L.	Fabaceae	Th	her	Ann	Med
Lotus ornithopodioides L.	Fabaceae	Th	her	Ann	Med
Tetragonolobus purpureus Moench.	Fabaceae	Th	her	Ann	Med
Anthyllis vulneraria L.	Fabaceae	He	her	Per	Med
Scorpiurus muricatus	Fabaceae	Th	her	Ann	Med
Onobrychis crista-gelli (L.) Lam.	Fabaceae	Th	her	Ann	Sa-Ar Med /
Ononis reclinata L.	Fabaceae	Th	her	Ann	Med
Trigonella maritima Del. ex Poir.	Fabaceae	Th	her	Ann	Med / Ir -Tu
Medicago orbicularis L.	Fabaceae	Th	her	Ann	Med / Ir-Tu
Trifolium tomentosum L.	Fabaceae	Th	her	Ann	Med / Ir-Tu/Eu-Si
Trifolium stellatum L.	Fabaceae	Th	her	Ann	Med / Eu-Si/ Ir-Tu
Trifolium purpureum Lois.	Fabaceae	Th	her	Ann	Med
Trifolium dasyurum C.Presl.	Fabaceae	Th	her	Ann	Med
Teucrium brevifolium Schreber.	Lamiacece	Ch	her	per	Med/Ir-Tu
Teucrium barbeyanum Aschers.	Lamiacece	Ch	her	per	Med/Ir-Tu
Salvia verbenaca L.	Lamiacece	Th	her	Ann	Med / Ir-Tu/Eu-Si
Prasium majus L.	Lamiacece	Ph	her	per	Med
Phlomis floccosa D.Don.	Lamiacece	Ch	her	per	Med
Neoeta scordotis L.	Lamiacece	He	her	per	Med
Micromeria nervosa (Desf.)Benth.	Lamiacece	Ch	her	per	Med
Chenpodium murale L.	Chenopodiacea	TH	her	Ann	Eu-Si
Kochia indica Wight.	Chenopodiacea	TH	her	Ann	Med / Ir-Tu/Eu-Si
Atriplex stylosa Viv.	Chenopodiacea	Ch	her	per	Med / Ir-Tu/Eu-Si
Atriplex rosea L.	Chenopodiacea	TH	her	Ann	Med / Eu-Si/ Ir-Tu
Halocnemum strobilaceum (Pall.) M.Bieb.	Chenopodiacea	Ch	her	per	Med / Ir-Tu/Eu-Si
Arthocnemum macrostachyum(Moric.) Moris.	Chenopodiacea	Ch	her	per	Med / Ir-Tu/Eu-Si
Suaeda pruinosa Lange.	Chenopodiacea	TH	her	Ann	Med
Suaeda aegyptiaca (Hasselq.)Zoh.	Chenopodiacea	TH	her	Ann	Med
Salsola kali L.	Chenopodiacea	TH	her	Ann	Cosm
Anabasis articulata (Forsk.) Moq.	Chenopodiacea	Ch	her	per	Med / Ir-Tu/Eu-Si
Asphodelus microcarpus Salzm &Viv.	Liliaceae	Ge	her	per	Med
Asphodelus aestivus Brot.	Liliaceae	Ge	her	per	Med

Asphodelus fistulosusa L.	Liliaceae	Ge	her	per	Med
Urginea maritima L.	Liliaceae	Ge	her	per	Med
Bellevalia sessiflora (Viv.) Kunth.	Liliaceae	Ge	her	per	Med
Enarthrocarpus pterocarpus (Pers.) DC.	Brassicaceae	Th	her	Ann	Med
Cakile aegyptica (L.) Willd.	Brassicaceae	Th	her	Ann	Eu-Si/Sa-Ar
Matthiola tricuspidata (L.) R.Br.	Brassicaceae	Th	her	Ann	Eu-Ar
Matthiola parviflora (Schousbos.) R.Br.	Brassicaceae	Th	her	Ann	Med
Anchusa aegyptiaca (L.) DC.	Boraginaceae	Th	her	Ann	Med
Echium angustifolium Mill.	Boraginaceae	Ch	her	Per	Med
Heliotropium eurassavicum L.	Boraginaceae	Th	her	Ann	Med
Heliotropium europaeum L.	Boraginaceae	Th	her	Ann	Med
Cynoglossum cheirifolium L.	Boraginaceae	Th	her	Ann	Med
Ziziphus lotus (L.) Lam	Rhamnaceae	Ph	Sh	Per	Med
Cyclamen rohlfsianum Aschers.	Primulaceae	Ge	her	Per	Endemic
Caralluma europara (Guss.)N.E.Br.	Asclepiadaceae	He	her	Per	Med
Viola scorpiureides Coss.	Violaceae	He	her	Per	Med
Mesembryanthemum crystallinum L.	Aizoaceae	Th	her	Ann	Med/ Sa-Ar
Linum bienne Mill.	Linaceae	Th	her	Ann	Med / Ir-Tu
Herniaria fortanesii J.Gay.	illecebraceae	Th	her	Per	Cosm
Glaucium flavum Crantz.	Papaveraceae	Ch	her	Per	Med / Eu-Si
Arisarum vulgare Targ.	Araceae	Ge	her	Per	Med
Amaranthus graecizans L.	Amaranthaceae	Th	her	Ann	Trop
Convolvalus althaeoides L.	Convolvulaceae	He	her	Per	Med
Paneratium maritimum L.	Amaryllidaceae	Ge	her	Per	Med
Lycium europaeum L.	Solanaceae	Ch	her	Per	Ir -Tu/ Sa-Ar
Erodium touchyanum Delile.	Geraniaceae	Th	her	Ann	Med /Ir -Tu/ Sa-Ar
Erodium keithii Guitt.	Geraniaceae	Th	her	Ann	Endemic
Erodium gruinum (L.) Herit.	Geraniaceae	Th	her	Ann	Eu-Si
Valantia hispida L.	Rubiaceae	Th	her	Ann	Med
Pistacia lentiscus L.	Anacardiaceae	Ph	Sh	Per	Med
Umbilicus rupestris (Salisb.) Dandy.	Crassulaceae	He	her	Per	Med
Sedum bracteatum Viv.	Crassulaceae	Th	her	Ann	Endemic
Euphorbia chamaesyce L.	Euphorbiaceae	Th	her	Ann	Trop
Eryngium campestre L.	Apiaceae	He	her	Per	Med / Eu-Si
Scandix pecten-veneris L.	Apiaceae	Th	her	Ann	Med /Eu-Si
Scaligeia cretica (Mill.) Boiss.	Apiaceae	Th	her	Per	Med
Anethum graveolens L.	Apiaceae	Th	her	Ann	Eu-Si
Ammoides pusilla (Brot.)Breist.	Apiaceae	Th	her	Ann	Med/Eu-Si
Malabaila suaveolens (Dcl.) Coss.	Apiaceae	He	her	Per	Med
Scarcopoterium spinosum (L.) Spach	Roaceae	Ch	her	Per	Med/Eu-Si

Taxonomally, the study found that Monocot 33 species (23.91%) and Dicot 105 species (76.08%) (Table 3). It was found that most plants are annuals because they fluctuated rainfall and soil thickness, which is dominated by calcareous soil. (Table 3) (figure3).

Table 3. Different taxonomic groups present in the study area.

Plant group	No. of families	No. of Genera	No. Species
Monocotyledons	3	21	33
Dicotyledons	29	82	105
Total	32	103	138

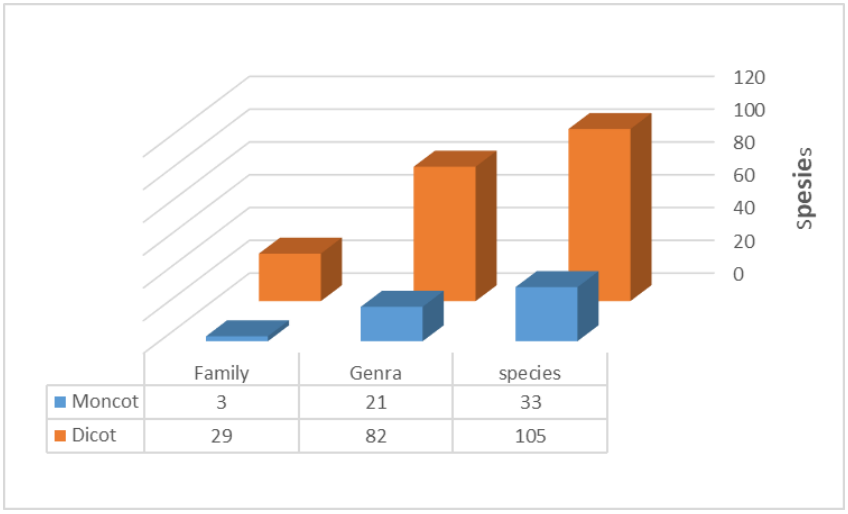

Figure (2): Different taxonomic groups present in the study area

The plant species that have been collected from the study area in the list of families, according to the classification of Angler as presented in Figure 3.

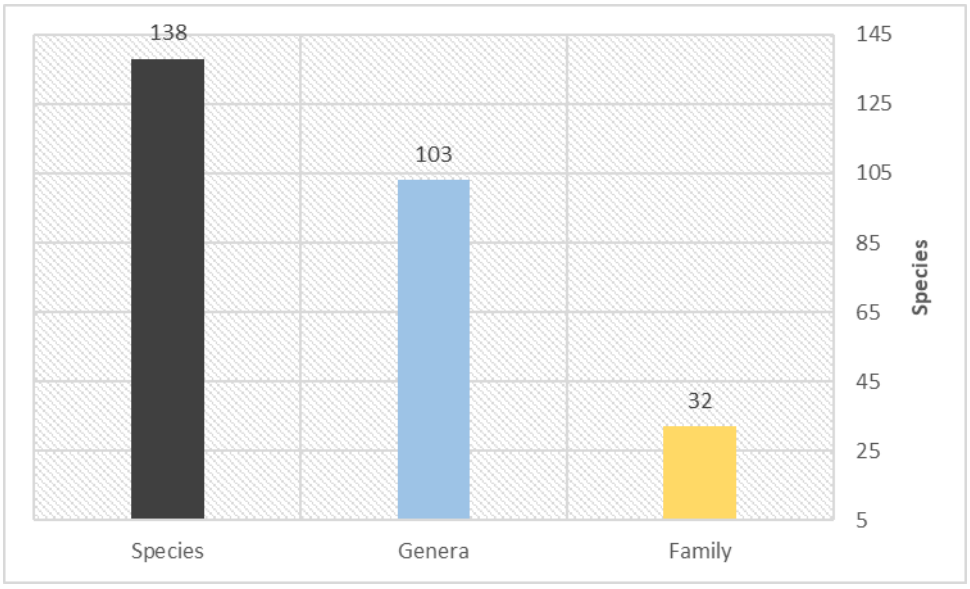

Figure (3): Number of Families. Genera and species.

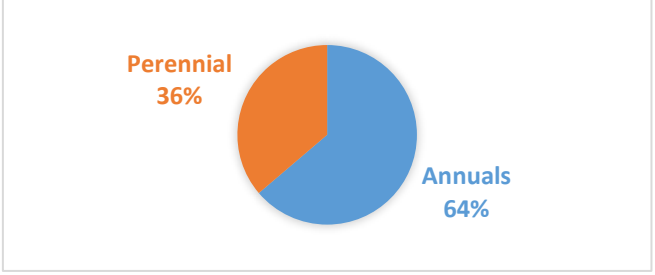

Figure (4): Annuals and Perennial plants in study area.

By comparing the largest families of the study area with the largest families of the Libyan flora, it was noted that the compound family (Asteraceae) is in the most widespread is the region and in Libya, followed by the family Poaceae, Fabaceae then the Barssicaceae. This is agreement with previous studies of (1), (2), (6), (10). (Table 4). In addition, the dominance of Asteraceae and Poaceae families was an expected result, because most of its members' ware herbaceous plants. However, perennial plants often are distinguished from annual plants in that they complete their life cycle during a relatively short favorable growth period. Drought and high temperatures place severe restrictions on plant growth from late spring to early fall. Such conditions generally favor short-lived life forms such as annuals (33).

Table 4: Number of species of Libyan flora families compared to the number of some types of families of the study area with the percentage of Libyan flora.

N	Family	Number of species		%
		In Flora of Libya	In study area	
1	Asteraceae	240	29	12.08
2	Poaceae	228	23	10.08
3	Fabaceae	200	12	6
4	Brassicaceae	100	4	4
5	Apiaceae	75	1	1.33
6	Lamiaceae	62	6	9.67
7	Chenopodiaceae	55	9	16.36
8	Liliaceae	42	3	7.14

All plant species were classified using growth analysis according to the classification s'Raunkiaer system., (34) life forms were identified, with the highest proportion of annual plants Therophytes (66.68%) Hemicryptophytes (10.6%), then Cryptophytes (10.6%), Chaemephytes (8.51) and then perennial plants. Phanerophytes (3.54%) respectively. Table (5), Figure (4), (23), (24), (25). the life form distribution among Libya plants was characterized by a high proportion of herbs (annual to perennial) (Figure 4) and a low number of woody (tree and shrub) species. These reflect the defensive capabilities of vegetation in such drought condition (19). It was noted that annual plants are one of the most dominant plants in the region, and they (41) Which also confirmed Comparing life forms in the study area with some previous studies (3), (8), (32) All agreed that sovereignty was for annual plants, despite the different proportions, and this can be explained by the length of the dry period during the year, starting from April until September may extend to October and this is confirmed by (40) He stated that annuals dominate in arid region.

Table (5): Life Form of plant species in study area.

Life form	No of species	%
Phanerophytes	5	3.54
Chaemephytes	12	8.51
Cryptophytes	15	10.63
Hemicryptophytes	15	10.63
Therophytes	94	66.68
Total	141	100

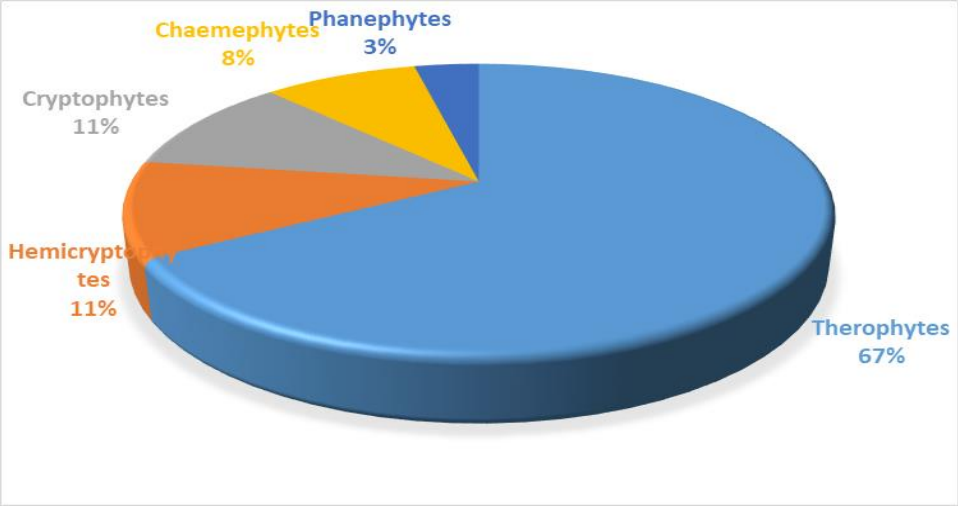

Figure (5): Percentage of life form in study area.

The study area was characterized by the presence of 6 endemic plant species distributed over 5 families, and these species represent (4.25%) of the total number of species grouped as the family Alliaceae is considered. One of the largest families that contained endemic species has Represented by two endemic species table (6).

Table (6): Endemic plant species in the study area.

Species	Family
Allium ruhmerianum Asch.	Alliaceae
Allium negrianum Maire & Weiller.	
Erodium keithii Guitt.	Geraniaceae
Sedum bracteatum Viv.	Crassulaceae
Cyclamen rohlfsianum Aschers.	Primulaceae
Plantago cyrenaica Durand & Barratte.	Plantaginaceae

This percentage of species is considered a slightly lower than the previous studies of, (3). (6), (8), (12). The percentage for each of them was about 5% where of the total flora, and this is what came out (2). They accounted for about 4% of the Libyan flora, about 50% of these that the plants endemic to Libya plants were concentrated in the Green Mountain region (an area with conditions). Distinctive as it contained this percentage of endemic plants. Results of the total chorological analysis of the surveyed flora presented in (Figure 5), which revealed that 82 species (65%) of the total recorded species were mono-regional in being native to Mediterranean chorotype (77 species), Saharo-Arabian and Euro-Siberian chorotype (one species for each). About 21% of the recorded species were Bi-regional (33 species) in being native to Mediterranean + Euro-Siberian, Mediterranean + Irano-Turanian, Mediterranean + Saharo-Arbian, Saharo-Arbian + Irano-Turanianand Saharo-Arbian regions. Pluri-regional (8%) extending their distribution all over the Mediterranean, Saharo-Arabian, and Irano-Turanian regions (Table 7) (figure 6) (figure 7). Geographical distribution of the studied area showed the dominance of Mediterranean, which can be due to lack of rain. It seems that the annual life form is the preferable strategy in the study area. Several studies deal with this subject, e.g. (15) in Brazilian cerrado sites, (31) in NW Himalayas, (16) in semi-arid regions of West and Southern Africa, (20) in Mount Hymettus (Central Greece); (29) in deciduous thorn woodland (caatinga) in north-eastern Brazil, (10) in the arid region of Saudi Arabia (22), (35).

Table (7): Number of species and their percentage in chorotypes**.**

Corotype	No of species	%
Med	77	55.79
Med./ Ir-Tu	13	9.42
Med./ Ir-Tu./ Eu-Si.	11	7.97
Med./ Eu-Si.	10	7.24
Endemic	6	0.72

Cosm	4	2.89
Eu-Si/Sa-Ar	3	2.17
Med./ Sa-Ar.	3	2.17
Ir-Tu./ Sa-Ar.	3	0.72
Med/ Ir-Tu /Sa-Ar	2	2.17
Trop	2	2.17
Ir-Tu	1	0.72
Ir-Tu/Eu-Si	1	0.72
Sa-Ar.	1	0.72
Eu-Si	1	0.72
Total	138	100

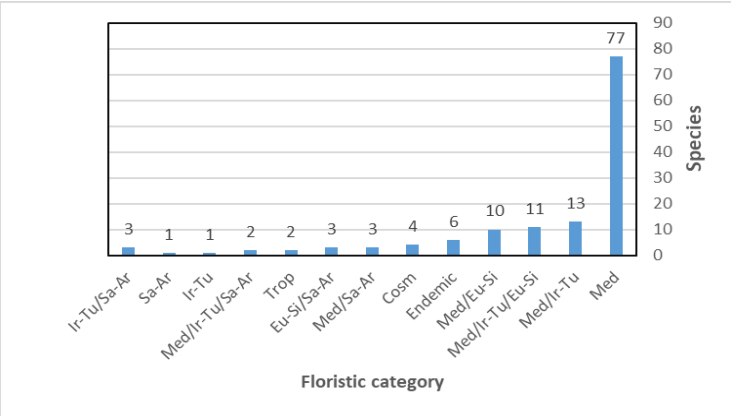

Figure (6): Chorotype analysis species in area study.

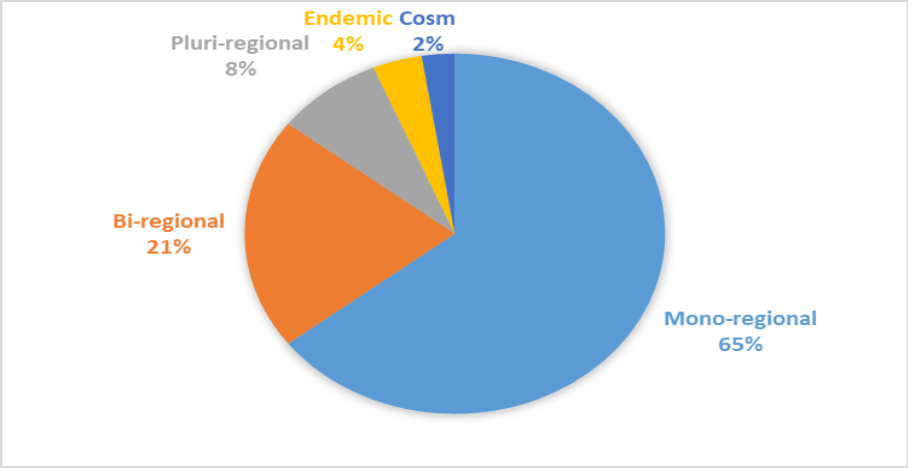

Figure (7): Number of species in chorotypes**.**

It was noted that the highest value of diversity in the Tokra region (76.08 %) due to its proximity to the edge of the Green Mountain, the depth of the soil in it, the abundance of rainfall, and the lowest value for diversity in the Al-Mabni area (15.95) due to the fragility of the soil and the increase in pastoral load in it, which put pressure on the ecosystem. (Table 8).

Table (8): Plant diversity in the study area.

Sites	No of species collection	Alpha diversity	Beta diversity (%)
Daryanah	45	45	32.60
Tansulukh	24	24	17.39
Al-Mabni	22	22	15.95
Brace	32	32	23.18
Tokra	105	105	76.08

The results showed that the Tokra area has the highest number of registered species while the Al-Mabani area has the lowest number of collected species as presented in Figure 8 to Figure 12. While the Tokra area has environmental conditions suitable for the abundance of species due to the depth of the soil and its proximity to the Green Mountain and the abundance of rain falling in it as presented in Figure 13 and Figure14.

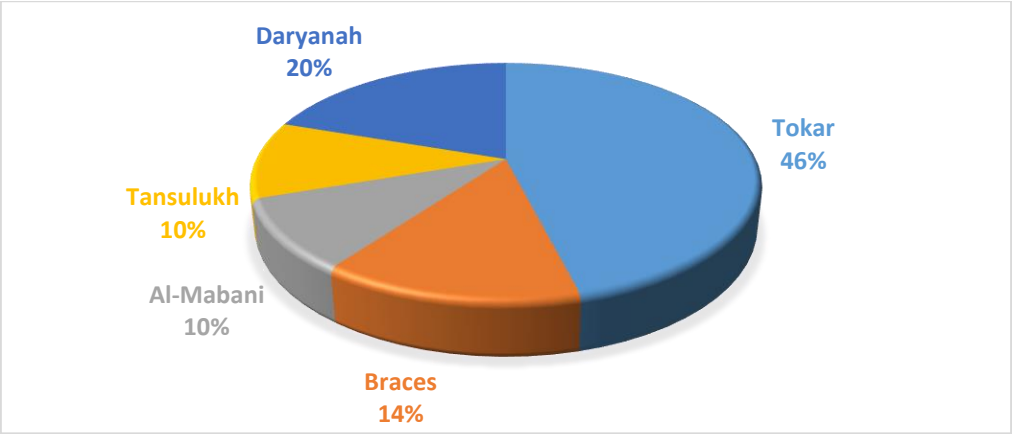

Figure (8): Percentage number of species study area.

Figure (9): Pistacia lentiscus L.

Figure (10): Phlomis floccose (Desf.) Benth.

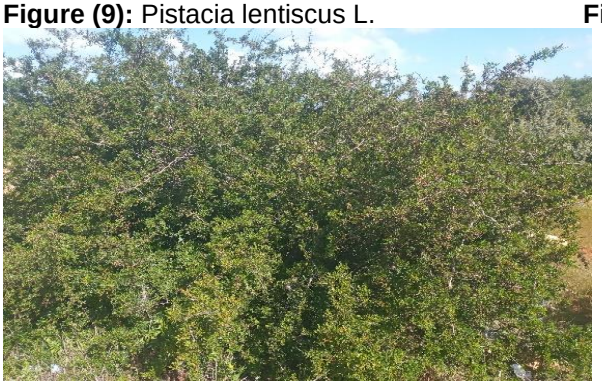

Figure (11): Ziziphus lotus (L.) Lam.

Figure (12): Urginea maritima L.

Figure (13): Rich location vegetation Tokra region.

Figure (14): Poor location vegetation Al-Mabni region.

In addition to environmental conditions, human activities in the study area have a significant negative impact on the natural vegetation. The vegetation in the study area is exposed to negative activities such as urban expansion, agriculture, construction of branches roads and removal of shrubs in it, and only small areas remain exposed. Therefore, reserves must be preserved and established in them and the density of vegetation is restored.

Conclusion

The results showed that the area suffers from drought and increased human activities, especially urban expansion in population centers and agricultural operations, especially crops and increasing pastoral load, in the past there were areas for the development of forests and a large part of them was removed, which negatively affected the spread and distribution of plants in them, and requires restoring the environmental balance through the establishment of reserves and increasing afforestation and controlling human activities in them.

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