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Ethnobotanical Study in Ez`haim Region (North East Al Jabal Al Akhdar, Libya)

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Abstract:
In Libya, there are about 2103 plant species, of which 450 are recognized as medicinal plants and 208 are extensively used for ethnomidicinal folk treatment. due to the use of these plants in folk medicine many of these species are threatened. Therefore, the aim of this study, was to record and list the medicinal plant species growing in the Ez`haim region and discover the endemic medicinal plant species that characterize the area. During several field trips from January 2022 to December 2023, samples were collected during the flowering and fruiting phase. Samples of medicinal plants were listed, collected and kept by the authors. They were identified using the encyclopedia of Libyan flora. The investigation revealed that 30 plant species were found in the study area. 20 of them recorded as medicinal plants. The highest number of genera in the study area was reached by the Asteraceae followed by Lamiaceae. These results are consistent with previous studies in Al Jabal Al Akhdar, in which Asteraceae is the most abundant family in Libya with 237 species. There is therefore growing concern that the careless use of resources could lead to the deterioration of vegetation, which poses a threat to the survival of medicinal plants in the area.

Key words:
(Medicinal plants, Folk medicine, Al-Jabal Al-Akhdar, Endangered species)

Introduction:

Libya is a country in the northern part of Africa, it occupies about 1,760,000 square kilometers, the desert makes up more than 90% of the countries area and the Mediterranean belt (Agiel &Mericli., 2017). The green mountain region (El-Jabal El-Akhdar) is located on the northeast coast of Libya (El-Barasi & Saaed, 2013). This area occupies less than 1% of Libya`s total land area, but accounts for 90% of the country's forest area (Alawamy, 2022).

About 50% of all plants in the whole country were found in this area while the other percentage is distributed in other regions of Libya. (Agiel &Mericli., 2017). In Libya, there are about 2103 plant species belonging to 856 genera and 155 families, of which 450 are recognized as medicinal plants and 208 are extensively used for ethnomidicinal folk treatment (Agiel &Mericli., 2017) several medicinal plants have been used as therapeutic agents various metabolites have been isolated and have proven their medicinal efficacy as an antidiabetic, antioxidant, anticancer, anti-inflammatory, etc. (Abogmaza et al., 2020) in this fragile ecosystem changes in vegetation possibly due to climate change, urbanization and destruction of vegetation, overgrazing, leading to an increase in arid land degradation and desertification (Mukassabi et al., 2017) in recent decades, due to the use of these plants in folk medicine many of these species are threatened (Mukassabi et al., 2017)

The increasing insufficiency of medicinal plants in the study area is leading to a deterioration in the natural growth rate, which has a negative influence on the vegetation cover of the area. The aim of this study, was to record and list the medicinal plant species growing in the Ez`haim region and discover the endemic medicinal plant species that characterize the area.

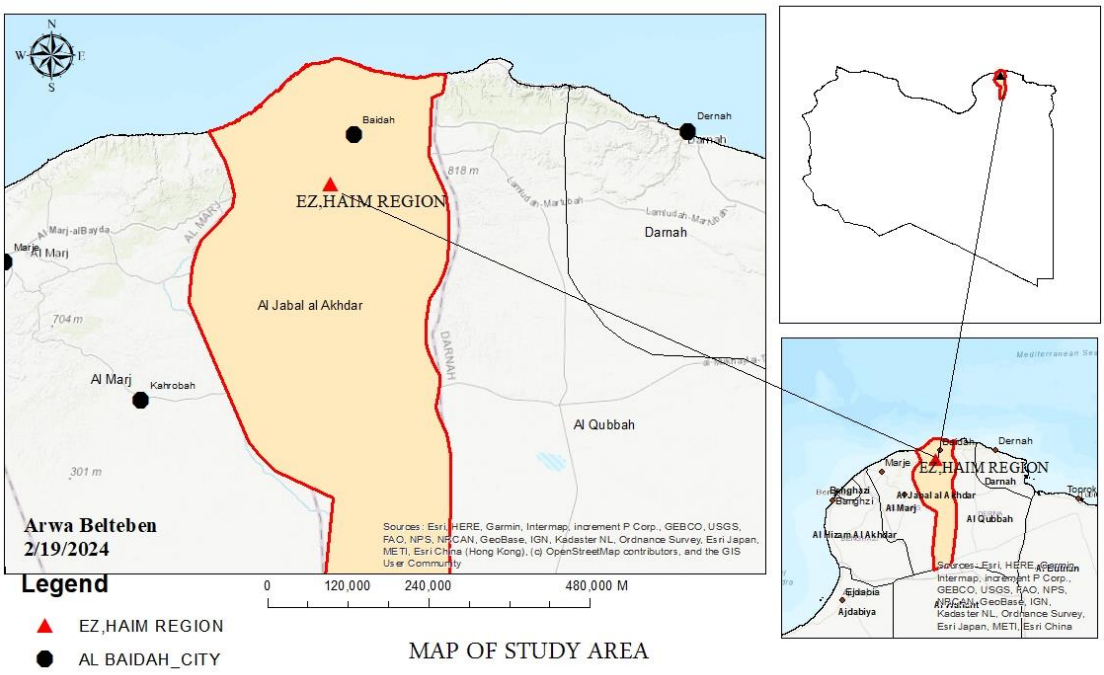

Fig.1_ Location of study area in NE Libya (made by authors using Arcgis 10.7)

Materials and Methods:

Study area:

Ez`haim is a moderately sloping plain south of the city of Al-Bayda, Libya (32◦713N and 21.736 E) (Fig 1) at 600–800 m above sea level. The sampling area, characterized by dence Mediterranean forest cover, covered an area of approximately 3899 m².

The Ez`haim area on the first bank of Al-Jabal Al-Akhdar has a Mediterranean climate with maximum temperatures (29 °C) between May and June and minimum temperatures (14 °C) between January and February (Ashry, M;2005). Rainfall is generally irregular and unevenly distributed. The annual rainfall in winter (October to February) is about 400 mm, of which about 75% falls between December and January.

During several field trips from January 2022 to December 2023, samples were collected during the flowering and fruiting phase, as this is important for classification.

The tools used were a notebook to record the plant species, plastic bags to store the collected plants and a digital camera to take photos.

Samples of medicinal plants were listed, collected and kept by the authors. They were identified using the encyclopedia of Libyan flora (Libya Flora) (Ali & Jafri, 1977; Jafri & El-Gadi, 1986). The life forms of the plants were classified according to Raunkiaer`s system (Raunkiaer, 1934); (phaneophytes (Ph), chamaephytes (Ch), cryptophytes (C), hemicrypto-phytes (H), therophytes (Th) and

geophyte (G). Endemic plant species were also discovered, recorded and identified. Photographs were taken of all recorded plant species for documentation purposes.

Results and Discussion:

The investigation revealed that 30 plant species were found in the study area representing 30 genera and belonging to 23 families (Tab. 1). These plants were divided into the Gymnospermae group represented by a taxon *Juniperus phoeincea L* belonging to the Cupressaceae family, while the Angiospermae contain 29 taxa and 22 families, divided into dicotyledons with 23 taxa belonging to 16 families and monocotyledons with 6 taxa and 6 families. 20 of them recorded as medicinal plants.

Table 1: The division of plant groups found in the study area

Number	Type of plant aggragates	Species	Genera	Family
١	Gymnospermae	١	١	١
٢	Angiospermae	٢٩	٢٩	٢٢
٣	Dicotyledons	٢٣	٢٣	١٦
٤	Monocotyledons	٦	٦	٦
	Total	٣٠	٣٠	٢٣

The highest number of genera in the study area was reached by the Asteraceae with 5 genera and 5 species, followed by Lamiaceae with 4 genera and 4 species while the other families were represented by 1 genus and 1 species each. (Tab.2) These results are consistent with previous studies in Al Jabal Al Akhdar, where Asteraceae was the dominant family in Wadi Al-Ager with 46 species (Alaib et al., 2017). Asteraceae was found to be the family with the highest number of endemic genera in Al-Jabal Al- Akhdar (El-Darier & Mogaspi,2009), overall Asteraceae is the most abundant family in Libya with 237 species (Keith,1965).

Table 2: Plants species in the study area

Number	Species	Family	Life Form
١	*Viburnum tinus*	Adoxaceae	Phanerophyte
٢	*Pistacia lentiscus L*	Anacardiaceae	Phanerophyte
٣	*Apium graveolens*	Apiaceae	Therophyte
٤	*Arum cyrenaicum*	Araceae	Geophytes
٥	*Asparagus aphyllus L.*	Asparagaceae	Geophytes
٦	*Bellis perennis*	Asteraceae	Hemicryptophytes
٧	*Cathamus lanatus L.*	Asteraceae	Therophyte
٨	*Helichrysum stoechas L. Monch*	Asteraceae	Chamaephyte
٩	*Prenanthes pupurea L*	Asteraceae	Hemicryptophytes
١٠	*Pseudognaphalium luteoalbum*	Asteraceae	Therophyte
١١	*Cistus parviflorus lam.* *Cistus savifolius l.*	Cistaceae	Chamaephyte
١٢	*Juniperus phoeincea L.*	Cupressaceae	Phanerophyte
١٣	*Cynodon dactyylon L.*	Poaceae	Hemicryptophytes
١٤	*Arbutus pavarii Pamp.*	Ericaceae	phanerophyte
١٥	*Lotus corniculatus*	fabaceae	Therophyte
١٦	*Globularia alypum*	Globulariaceae	Chamaephyte
١٧	*Tuberaria guttata*	Cistaceae	Therophyte
١٨	*Drimia aphylla (L.)*	Hyacinthaceae	Cryptophyte
١٩	*Phlomis floccosa D.*	Lamiaceae	Chamaephyte
٢٠	*Salvia Fruticosa L.*	Lamiaceae	Chamaephyte
٢١	*Satureja thymbra L.*	Lamiaceae	Hemi cryptophyte
٢٢	*Teucrium Polium*	Lamiaceae	Chamaephyte

٢٣	*Asphodelus microcarpus Salzm*	liliaceae	Cryptophytes
٢٤	*Phyillyrea angustifolia L.*	Oleaceae	Chamaephyte
٢٥	*ononis spinosa subsp .procurrens*	papilionaceae	Hemi cryptophytes
٢٦	*Rumex vesicarius*	Polgonaceae	Chamaephyte
٢٧	*Polygala aschersoniana*	polygalaceae	Therophyte
٢٨	*Galium circaezan*	Rubiaceae	Therophyte
٢٩	*Prasium majus*	Sapotaceae	Therophyte
٣٠	*Smilax aspera*	Smilacaceae	Geophytes

The life form of the species according to Raunkiaer`s classification (Fig 2. Table 3) Therophyte 27%, Chamaephyte 27%, Hemicryptophyte 16%, Phanerophyte 13%, Geophyte 10% and Cryptophyte 7%. The higher percentage of annual plants may be due to climatic condition of Mediterranean region (dry condition from April to September) (Elmokasabi 2014)

Table 3: The life form of plants in the study area according to Raunkiaer`s classification:

Number	Life form	Number of species	%
١	Phanerophyte ظاهرة	٤	١٣
٢	Chamaephyte فوق سطحية	٨	٢٧
٣	Cryptophyte مختفية	٢	٧
٤	HemiCryptophyte شبه مختفية	٥	١٦
٥	Therophyte حولية	٨	٢٧
٦	Geophytes أرضية	٣	١٠

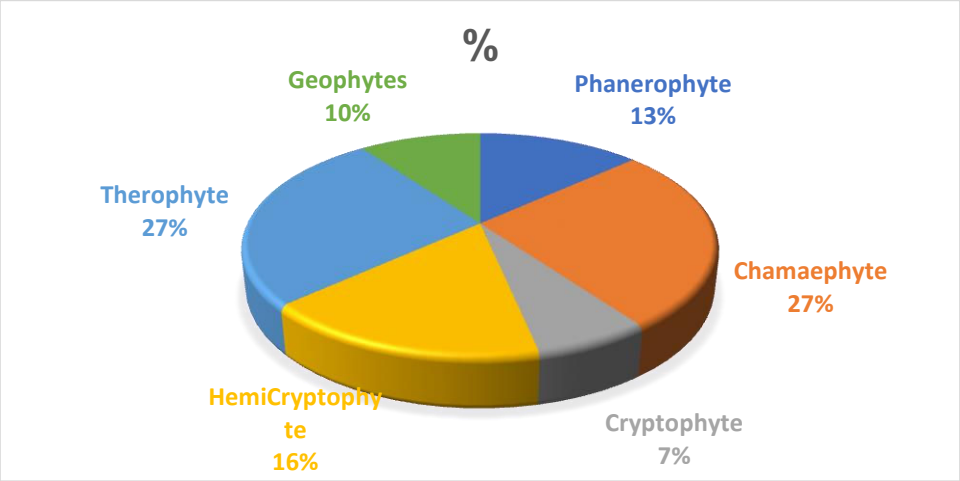

Fig 2: Diagram shows the percentage of life form of medicinal plants recorded in the study area

The endemic species have been found in the study area *Viburnum tinus, Arum cyrenaicum*, *Pistacia lentiscus L, Arbutus pavarii*, *Juniperus phoeincea L*, *Phyillyrea angustifolia L, Cynodon dactyylon L, Polygala aschersoniana, Prasium majus* and *Smilax aspera*
Two of them (*Arbutus pavarii*, *Juniperus phoeincea L*) considered to be under risk by IUCN red list database.(Tab. 4 & Fig. 4)

Table 4: The endemic species found in the study area:

Family	Species
Adoxaceae	*Viburnum tinus*
Anacardiaceae	*Pistacia lentiscus L*
Araceae	*Arum cyrenaicum*
Ericaceae	*Arbutus pavarii*
Cupressaceae	*Juniperus phoeincea L*
Oleaceae	*Phyillyrea angustifolia L*
Poaceae	*Cynodon dactyylon L.*
polygalaceae	*Polygala aschersoniana*
Sapotaceae	*Prasium majus*
Smilacaceae	*Smilax aspera*

Juniperus phoeincea *Pistacia lentiscus L*

Arbutus pavarii *Phlomis floccosa D*

Fig. 4: Some of medicinal plants in the study area

The percentage of diseases treated with the medicinal plants available in this study was rheumatism (22.9%), gastrities (20%), dermatitis (17.1%), urinary tract infections (14.3%), hypertension (11.4%), skin diseases (8.6%) and diabetes (5.7%). (Tab. 5 & Fig. 5) (El-Mokasabi 2014)(Al-Traboulsi, & Alaib 2021 There is therefore growing concern that the careless use of resources could lead to the deterioration of vegetation, which poses a threat to the survival of medicinal plants in the area.

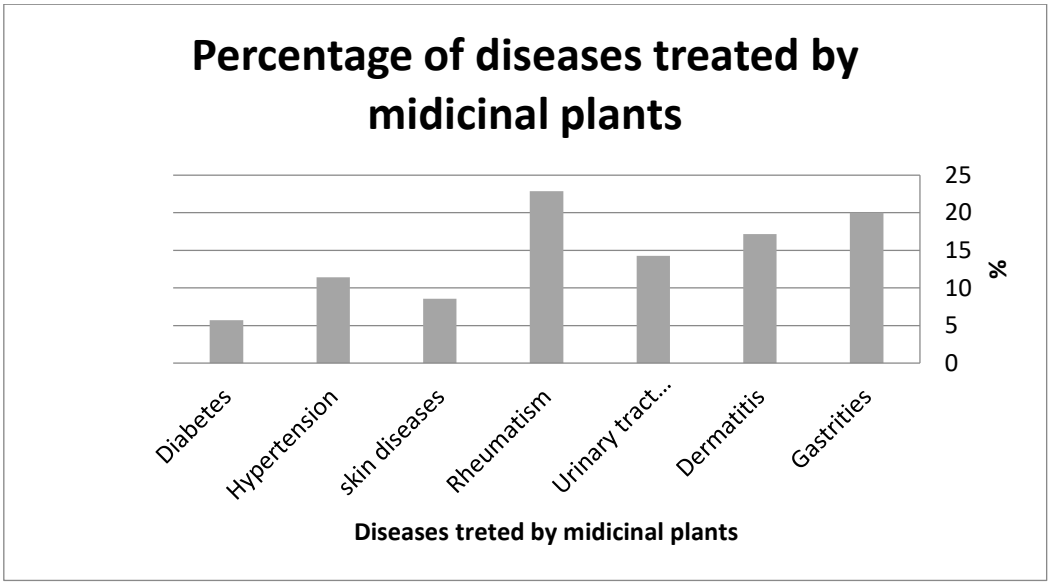

Fig 5: Some diseases commonly treated by medicinal plants

Table 5: The medicinal plant and its use

Family	Scientific Name	Local Name	Part Used	Medical Use
Adoxaceae	*Viburnum tinus*	Mernakh مرناخ	Fruits	Gastritis
Anacardiaceae	*Pistacia lentiscus L.*	Batoom بطوم	leaves	Gastritis, Ulcer, Gingivitis, Psoriasis, Dermatitis, Rash, Piles, Colitis Treatment of involuntary urination and stomach infection Ulcer, Antioxidant, anticarcinogenic antimicrobaleffects, appetite stimulant,
Araceae	*Arum cyrenaicum*	لوفي رينيش جدري Renish		Dermatitis, Psoriasis, Corn, Bone spur
Asparagaceae	*Asparagus aphyllus L.*	Helyon هليون جعفراز		Antioxidant, anti-inflammatory, antimbacterial , liver disorder, stomachache, rheumatism
Asteraceae	*Helichrysum stoechas L.*	Rabbit herb عشبة	Whole plant	Renal stones, Urinary tract infection, Ureterolith,

	Monch.	الارنب		Jaundice, Renal colic, Gastritis
Cistaceae	*Cistus parviflorus lam.* *Cistus savifolius l.*	Berbesh بربش Torrash ahmer	Leaves	intestinal irritation, digestive problems Eczema, skin diseases, rheumatism, cold antimicrobaial, anti-inflammatory effects Urinary tract infection, Epigastric, Gastritis, Widening of intestines
Cupressaceae	*Juniperus phoeincea L.*	Ar`aar Sha`ra - عرعر شعرة	leaves	Stomach infections urinary tract infection, diarrhea, flatulence, bronchitis, rheumatism Gastritis, Oxytocic, Vermicide, Cystitis, Ulcer, Flatulence, Colic, Varicose veins, Colitis
Poaceae	*Cynodon dactyylon L.*	نجيلة		Gastritis, Ulcer, Urinary tract infection, Hypertension, Fever, Prostatitis
Ericaceae	*Arbutus pavarii Pamp.*	Shmary Ajoor - شماري عجور	Leaves – fruits	Laxative, Gastritis, Urinary tract infection, Epigastritis, Renal colic,
Globulariaceae	*Globularia alypum*	Zriqa زريقة	Shoots	Skin diseases, abscesses, Rheumatism. anti-inflammatory, antibacterial effects Diuretic, Gastritis, Hypertension, Metritis, Ovary stimulant, Stroke, Vaginal diseases, Diarrahea, Ulcer, Colic, Eczema, Psoriasis, Dermatitis, Vaginitis, Hemostatic, Delayed menses, Abortion
Lamiaceae	*Phlomis floccosa D.*	Sehera زهيرة	Whole plant	Expectorant, bronchitis, diuretic, tonic Metritis
Lamiaceae	*Salvia*	Tofah	Arial part	Bloating, diarrhea,

	Fruticosa L.	shai marymia h تفاح الشاهي مريمية		diabetes, diuretic, throat infection, anti-inflammatory effects
Lamiaceae	*Satureja thymbra L.*	زعتر حمار زعتر المعيز	Arial part	Diarrhea, antiseptic , antioxidant, antimicrobaial effects
Lamiaceae	*Teucrium Polium*	جعدة	Whole plant	Diabetes, Gastritis, Thyroiditis, Anaemia, Common cold, Hypertension, Renal stone
liliaceae	*Asphodelus microcarpus Salzm*	عنصل طويل	Whole plant	Herpes, Dermatitis, Wounds, Abscess, Rhumatic, Hair-fall, Arthritis, Vitiligo are used in the treatment of lichen and heart failure.
Oleaceae	*Phyillyrea angustifolia L.*	Sakhab سخاب	leaves	Hypertension, diuretic ;
papilionaceae	*ononis spinosa subsp .procurrens*	أوراق مسننة شبرق زاحف	Roots leaves and flowers	Antimicrobial, diuretic , anti-inflammatory ,antioxidant, anticancer, rheumatism, healing of wounds , eczema and other skin diseases
Polgonaceae	*Rumex vesicarius*	Hommad et hmam حميضة سلق بري	Arieal part	antioxidant
Sapotaceae	*Prasium majus*	E`nab eldheeb عنب الذيب	Fruits and leaves	Liver diseases, diuretic , constipation, dematities, arthritis, rheumatic, hypertention
Smilacaceae	*Smilax aspera*	Olaiq عليق فشاغ قاس	Leaves	Rheumatism, diabetes, diuretic, antioxidant effects Dermatitis, Blood purification

Conclusion:
From this study we can conclude that Ez`haim region is rich with medicinal plants that have extensive use in folk medicine in which two of them (*Arbutus pavarii*, *Juniperus phoeincea L*) have been classified as endangered species. There are fears that they could be destroyed in the near future because they are not yet safe. the vegetation cover in the study area must be protected by preventing the cutting down of the medicinal plants and other human activity such as deforestation, overgrazing, agricultural expansion and urbanization that leads to distraction of natural habits and biodiversity.

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