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A survey of common toxic plants in Al-Khums city- Libya

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Abstract

Poisonous plants comprise the third largest category of poisons known around world. that affect the health of many forms of life as well as cause their death. This study aims to identify the most common poisonous plants in the city of Al-Khums. The city is located in the northwest of Libya, east of the city of Tripoli, about 120 km. The plants were identified using the Flora of Libya series, and other taxonomic sources, arabic flora and through comparison with the already identified plant species. Data inventory has been documented in the form of family, Botanical name, vernacular name and life form. Results recorded 42 species of toxic plants representing 35 genera and 24 families have been collected,(Gymnosperms) were represented by 1 family Cupressaceae and 1 species *Juniperus oxycedrus* L. The richest families were Solanaceae (5 species) 11.62 %. Therophytes with 22 species were the dominant life form, while Chamaephytes with 2 species were the smallest group. It is crucial to develop conservation methods for these plants and educate people about their toxicity. currently there are no publications available on toxic plants of the area. This work represents an first study who aims to determine the toxic plants of the study area.

Keywords: Al-Khums city, flora of Libya , life form, toxic plants**.**

Introduction:

Toxic plants are plants that have in their constitution chemical compounds or active principles, which through contact, inhalation or ingestion, are capable of causing injury, disease and even death in humans and animals (Benzeid, 2018; Serrano, 2018).

Plant toxins are substances produced as secondary metabolites, they show both useful and harmful effects in human beings and animals (Chandra et al., 2012). The nature of these toxic secondary metabolites changes with varying place of origin and environmental conditions (Dubey**,** et al., 2018). There are present a large amount of toxicologically significant plant constituents such as proteins, amino acids, peptides, alkaloids, glycosides, saponins, oxalic acid, terpenes, phenolics, tannins, and essential oils (Khan et al., 2018).

Poisonous plants comprise the third largest category of poisons known around world. They are the major cause of economic loss in livestock industry since the days of early settlement (Bhatia et al., 2013).These economic losses are not only due to the death of livestock but also deterioration in their health, decreased productivity, deformed offspring, and reduced longevity are also leading causes (Dubey et al., 2018).

Plant toxins can be divided into several groups, such as gastrointestinal toxins, cardiovascular toxins, convulsive toxins, anti-cholinergic toxins, nicotine and nicotine-like alkaloids, calcium oxalate crystals and cellular respiration toxins. Most poisonings cases are characterized by irritations of the gastrointestinal tract (Khan et al., 2018; Jamloki et al., 2022).

Poisonous plants are widely distributed over the world and used for different purposes such as a method of murder, self-harm, execution, hunting, fishing and treating various diseases (Alasbahi and Al-Hawshabi, 2021). Many plants are used in some way or the other in medicines especially in homeopathic pharmacology (Tamilselvan et al., 2014).

Poisonous plants have a seed, root, leaf, stalk, fruit or juice where even a relatively small amount, taken either internally or eternally, can lead to injury to the human body. In some species the poisonous constituents occur throughout the whole plant. In others they are concentrated in one or more parts(Chandra et al., 2012).

The concentration of these toxic substances varies from plant to plant (Bhatia et al., 2013). The toxicity of plants differs from plant to plant and depends on several factors, including chemical, physical, biological and environmental (presence of chemical substances, its concentration, age of plant, used part, ripening state of its fruits, soil type, temperature, humidity, etc.) **(**Serrano, 2018; Jamloki et al.,2022). El-Gadi and Hossain (1986) discussed the morphological description and active substance materials of 93 wild poisonous plant species in Libya.

Libya is a North African country that lies between 18° 33' N. latitude & 9° 25' E longitude (Figure 1), and occupies an area of about 1, 759, 540 square kilometres (El- Mokasabi., 2017) but most of which is Sahara desert. The most important areas for plant diversity are the coastal strip and mountains of the mediterranean coastline which is 1900 km long, the longest of any African country bordering the Mediterranean coastline (Al Sheef, 2015 ; El-Darier, and El-Mogaspi, 2009 ; Boulos, 1972).

The city of Al-Khums it has been one of the most fertile and productive areas in Libya. Some of the poisonous plants of the Al-Khums are being illegally harvested due to their high medicinal values and because of their over-exploitation they are categorized as threatened species. It is crucial to develop conservation methods for these plants and educate people, particularly children, about their toxicity. Further research should be conducted to gain a deeper understanding of the intricate mechanisms of these poisonous plants and their potential in treating various illnesses. currently there are no publications available on toxic plants of the area. The present study is the first research who aims to determine the toxic plants of the study area.

Study area

The city of Al-Khums is located in the northwest of Libya, east of the city of Tripoli, about 120 km, and is bordered by to the north the Mediterranean Sea, to the south the hills and the railway line, to the east Wadi Kaam and Wadi Ghanima in The West, (Figures 1&2). Astronomically, the region is located between latitude 32° 2'3.21" and 32° 32' 53.41" N, and longitude 13° 49 '52.23" and 14° 26'47. 85" E (Senan, 2017).

The climate of the study area is typical of the mediterranean, characterized by the cool, rainy winter and a hot dry summer. Whereas, the climate over most of the country is hot, arid-semiarid Sahara, but it is moderated along the coastal littoral by the Mediterranean Sea (Al-Sghair et al., 2019**).** The types of soils found in the area are dry brown soils, sandy clay soils, and soils Silt clay. These soils often contain good amounts of potassium and a little of phosphorus, which is suitable for plant growth, it is composed of salts, minerals, and organic materials (Ministry of Agriculture 1971). Two kinds of soil represent mainly the north-western valleys of Libya, including Wadi Kaam Valley alluvial soil which is the result of flood accumulation over a continuous-time, ranging from clay and sandy, with proportions of gravel, stones, dissolved salts, calcium carbonate and gypsum. Sediments of water-courses soil mainly exist in narrow and small tributaries (Almushghub et al., 2022).

Figure: (1). location of the study area

Figure: (2). The study area

Materials and Methods:

The study was in 2018-2019, the field trips were more frequently made from September to May where most of the plants are in flowering conditions. The plant specimens were collected in flowering or fruiting conditions.

Plants collected from the study areas then identified with the help of available literature. First, the family of the plant was determined by the use of a key to the families of flora of Libya

(Erteb, 1994). The genus and species were identified by the utilization of available taxonomic literature (Ali and Jafri, 1976-1977; El-Gadi, 1988-1989; Jafri and El-Gadi, 1977-1986),(Boulos,1999,2000,2002) and by comparing with the already identified plant specimens of the herbarium, of the Botany Department, Faculty of Science at EL-Mergib University. Plants with botanical name , family, vernacular name and life form were listed in Table (5).

Results and Discussion

From this study a total of 42 species of toxic plants representing 35 genera and 24 families have been collected and identified, whereas (Gymnosperms) were represented by 1 family Cupressaceae and 1 species *Juniperus oxycedrus* L. (Table 4). Dicotyledons were represented by 20 families, 28 genera and 34 species whereas; Monocotyledons were represented by 3 families, 6 genera and 7 species (Table 1).

Table: (1). Different taxonomic groups present in the study area

Palnt group	No of familis	No of Genera	No of species
Dicotyledons	20	28	34
Monocotyledons	3	6	7
Gymnosperms	1	1	1
Total	24	35	42

The richest families were Solanaceae (5 species) 11.62 %, Poaceae (4 species) 9.30%, Asteraceae (3 species) 7% , Chenopodiaceae (3species) 7%, whereas 8 families were recorded in 2 species, 4.65% (Alliaceae, Amaranthaceae, Euphorbiaceae,Boraginaceae, Cucurbitaceae, Papaveraceae, Ranunculaceae, Urticaceae), whereas 12 families were recorded as mono species 2.32% of the total recorded families (Table 2).

Table: (2). Shows the dominant families

family	No of species	%
Solanaceae	5	11.62
Poaceae	4	9.30
Asteraceae	3	7
Chenopodiaceae	3	7

Genera with the highest number of species were *Euphorbia* 4 species, *Amaranthus* 4 species , *Chenopodium* 3 species *Medicago* 3 species *Plantago* 3 species *Urtica* 3 species and *Bromus* 3 species (Table 3).

Table (3). Shows the dominant genera

Genus	No. of species
Euphorbia	4
Amaranthus	4
Chenopodium	3
Medicago	3
Plantago	3
Urtica	3
Bromus	3

The results of analysis of life form spectrurm of the species based on Raunkiae system. (Ph) = Phanerophyte, (Ch) = Chamaeophyte, (He) = Hemocryptophyte, (Ge) = Geophyte and (Th), showed the absolute dominance of Therophytes with 22 species, followed by Hemicryptophytes with 5 species, Geophytes with 8 species Chaemephytes with 2, and Phanerophytes with 6 species. (Table 4).

Table: (4). Shows life forms and number of plant species collected from the are**a**

Life Form	No. of species	%
Therophytes	22	51.16
Geophytes	8	18.60
Phanerophytes	6	13.95
Hemicryptophytes	5	1,621
Chamaephytes	2	4,65

Table:(5). List of plant species recorded in the study area with their families and life form

Family	Scientific name	Life Forms	Vernacular name
Alliaceae	*Allium cepa* L.	Ge	Basl
	Allium sativum L.	Ge	Thom
Amaranthaceae	*Amaranthus hybridus* L.	Th	-
	Amaranthus retroflexus L.	Th	Bu zinzir

Apocynaceae	*Nerium oleander* L.	Ph	Defla
Asteraceae	*Senecio gallicus* Chiax	Th	Daraita,Mourare
	Senecio vulgaris L.	Th	Kraa Eddjaja
	Silybum marianum (L.) Gaertn.	Th	Shobrum
Asclepiadaceae	*Calotropis procera* (Aiton) W.T.Aiton	Ph	Brumbak
Boraginaceae	*Echium plantagineum* L.	Th	-
	Heliotropium europaeum L.	Ch	-
Chenopodiaceae	*Chenopodium album* L.	Th	Bu–Zenzer
	Chenopodium ambrosioides L.	Th	Effena
	Kochia scoparia (L.) Schrad	Th	-
Convolvulaceae	*Convolvulus arvensis* L.	Ge	Ullak
Cucurbitaceae	*Citrullus colocynthis* (L.) Schrad.	He	Handel
	Ecballium elaterium (L.) A.Rich.	He	Bzek
Cupressaceae	*Juniperus oxycedrus* L.	Ph	Araar shoke
Euphorbiaceae	*Euphorbia helioscopia* L.	Th	Lebbena
Fabaceae	*Medicago sativa* L.	Th	Gadb , safsafa
Liliaceae	*Urginea maritime* (L.) Baker	Ge	Faraon
Moraceae	*Ficus carica* L.	Ph	karmos
Oxalidaceae	*Oxalis pes-caprae* L.	Ge	Hummad
Papaveraceae	*Glaucium flavum* Crantz	Th	Gurn- aljadian
	Papaver rhoeas L.	Th	Bugraun
Poaceae	*Avena sativa* L.	Ge	Gussiba
	Cynodon dactylon (L.) Pers.	Ge	Najem
	Phalaris minor Rrtz	Th	Zewan
	Sorghum halepense (L.) Pers.	Ge	Hashishat el-faras

Primulaceae	*Anagallis arvensis* L.	Th	Ain Algatuus
Ranunculaceae	*Adonis aestivalis* L.	Th	-
	Adonis microcarpa DC	Th	Ain El-Buma
*Ruta*ceae	*Ruta graveolens* L.	Th	Fagal
Solanaceae	*Datura inoxia* Mill.	Th	Datora
	Hyoscyamus albus L.	Th	Ghengheet
	Nicotiana glauca R. C. Graham.	Ph	Akkuzemusa.
	Nicotiana tabacum L.	Th	Dukhan
	Solanum nigrum L.	He	Anab ed. Deeb
Urticaceae	*Urtica dioica* L.	Ch	Horregh
	Urtica pilulifera L.	Th	Horregh
Verbinaceae	*Lantana camara* L.	He	-
Zygophyllaceae	*Peganum harmala* L.	He	Harmal

Conclusion

To conclude, toxic plants can be present anywhere in the cities and may cause poisonings, which in some cases are severe but preventable. In order to prevent plant poisonings, the general population as well as health care providers need to be better informed on the toxicity of plants. It is crucial to develop conservation methods for these plants and educate people, particularly children, about their toxicity. Further research should be conducted to gain a deeper understanding of the intricate mechanisms of these poisonous plants and their potential in treating various illnesses. Our work recorded from Al-Khums 43 species of toxic plants representing 35 genera and 23 families have been collected.

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حصر النباتات السامة الشائعة في مدينة الخمس – ليبيا

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المستخلص

النباتات السامة هي النباتات التي يؤدي تناولها كاملة أو جزئياً بالمضغ والابتلاع إلى ظهور ردود أفعال وتأثيرات ضارة عند الإنسان أو الحيوان أو الحشرات وقد تنتهي بالموت. تشكل النباتات السامة ثالث أكبر فئة من السموم المعروفة في جميع أنحاء العالم. التي تؤثر على صحة العديد من الكائنات الحية. تهدف هذه الدراسة إلى التعرف على أهم النباتات السامة في مدينة الخمس. تقع مدينة الخمس في الشمال الغربي من ليبيا، شرق مدينة طرابلس، على بعد حوالي 120 كم. تم في هذه الدراسة التعرف على النباتات باستخدام موسوعة النباتات الليبية وغيرها من المصادر التصنيفية والفلوارت العربية ومن خلال المقارنة مع الأنواع النباتية التي تم تحديدها سابقا. من نتائج هذه الدراسة تجميع وتصنيف 42 نوعاً من النباتات السامة تتبع 35 جنساً و24 فصيلة، في حين تم تمثيل نباتات معراه البذور بفصيلة واحدة Cupressaceae ونوع واحد . *Juniperus oxycedrus* L وكانت السيادة في هذه الدراسة للفصيلة البادنجانية Solanaceae (5أنواع) بنسبة 11.62 %. أظهرت نتائج التحليل لأشكال الحياة السيادة المطلقة لنباتات Therophytes بعدد 22 نوعاً. ومن الأهمية بمكان تطوير طرق الحفاظ على هذه النباتات وتثقيف الناس حول سميتها.

الكلمات المفتاحية : النباتات السامة ، مدينة الخمس، الفلورا الليبية ، شكل الحياة .