



## RESEARCH ARTICLE

## Assessment of the Effects Pastoralism the Vegetation Zone in Sultan Area Cyrenaica, Northern Eastern Part of Libya

Asma S. El-Mograby<sup>1</sup>, Yacoub M. El-Barasi<sup>2</sup>,

<sup>1</sup>Department of Botany, Faculty of Science, Ajdabiya University, Libya

<sup>2</sup>Department of Botany, Faculty of Science, Benghazi University, Benghazi, Libya

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**\*Corresponding Author:**

asmasultin@yahoo.com

The study was conducted in the Sultan area on the coastal strip of the Suluk Plain, one of the most important grazing areas in the northeastern part of Libya. The region has a long history of overuse, as this region is characterized by intense anthropogenic pressure rain-fed agriculture, grazing, and urban expansion. The study aimed to evaluate the current state of vegetation cover and the impact of grazing animals on it. The zone of study is confined between the green belt and the city of Ajdabiya, where human activities are active. According to the statistics obtained from the agriculture and livestock sector in the municipality of Sultan, the number of sheep and goats was 224,675 heads, the number of camels was 1,508 heads, the number of horses was 94 heads, and the number of cows was 60 heads. This environment was greatly affected by various human activities represented by extensive plowing, overgrazing, and intensive agricultural operations. And mobile and other operations to remove vegetation cover, for reasons of cultivation and exploitation for multiple purposes, and many land trampling operations. Which affects the plant environment in the region [1].

**INTRODUCTION**

The history of the study of vegetation in Libya dates back to the seventeenth century, when studies continued until it was compiled in the flora of Libyan [3]. Libya does not have any natural resources except for the natural vegetation cover on which the population depends for grazing, food, medicine, and logging, as well as a refuge for many animals and birds, in addition to the periods of drought that prevail in the region, which directly affect the deterioration of the vegetation cover in addition to the intense human activities [4]. The vegetation cover is also one of the basic components of the ecosystems and supports its continuity, especially in stabilizing the soil and protecting it from erosion and erosion and reducing the phenomenon of desertification, as well as its effective contribution to preserving soil moisture and increasing its underground stock. It has multiple medical and aromatic uses and a source of energy, and its uses go beyond the basic need because it is a cheap source of fodder [2].

In view of the lack of information about the study area in terms of plant diversity and human activities that affect the vegetation cover, this study aims to fill the lack of information and initial inventory of flowering plants growing and spreading there, defining them and preparing a list of them to know their distribution, density and species threatened with extinction. As a result of the depletion of natural resources, the future of many regions is at risk due to the diversity and spread of various human

activities, which have led to a serious imbalance in the ecosystem and thus to the deterioration of its resources and a decline in its productivity. For this reason, the interest of the countries of the world and its societies in environmental affairs has increased and it has become a feature of the modern era, especially These ecosystems have limited carrying capacity, are extremely weak in absorbing the changes that occur in them, and lack inherent flexibility [6]

Despite the important role played by natural pastures in Libya in terms of economic, environmental and social aspects, their area is decreasing at alarming rates as a result of agricultural expansion and desert encroachment, in addition to the continuous deterioration in their productivity due to changes in climatic conditions, "frequent droughts and fluctuations in the level of rain" as well as exploitation Negative behavior by humans leads to a rise in climate temperatures, which increases drought, and this reason pushes the population to search for more fertile areas. Although it is an important agricultural, pastoral and settlement area [1] The vegetation in the various desert regions is characterized by characteristics that are compatible with the conditions of drought, and one of the most important characteristics of the vegetation is the spacing of the plants from each other. The vegetation is often characterized by a permanent structure of spaced perennial plants such as shrubs and trees. weeks after the rain. The goal of surveying and monitoring pastures is to evaluate Sources of vegetation or renewable natural resources at a time It is also considered one of the main characteristics of pasture management. That Protecting natural pastures works to preserve plants threatened with extinction and encourage their growth, multiplication and development [5].

## MATERIALS AND METHODS

### 2.1. Study area

This study was conducted in the area of Sultan, located southeast of the city of Ajdabiya, at a distance of about 40 km. The area is considered a marginal area before the desert. It is located on the northeastern coast of Libya, and thus it dominates within the large coastal plain that extends from the north of the city of Benghazi to the desert. The region is also characterized by flat land, the absence of valleys, little rainfall, and some sand dunes [1] Soils are generally shallow, dry soil deposits over parent calcareous rocks, characterized by a sandy loamy consistency and tend to be alkaline [6]

The physiography of the area consists mainly of open flat plain, with many watercourses that occasionally run in good rainy seasons to end at sea in the west. The soil is generally dry shallow soil sediment over parent calcareous rocks, characterised by sandy loam texture and tends to be alkaline [9].

Based on the UNCCD aridity index obtained from the ratio between the values of mean annual precipitation (MAP) and potential evapotranspiration (PET), the study area classified as an arid land (MAP: PET = 0.08), characterised by extreme summer temperatures and sporadic and unreliable rainfall, regarding both occurrence and distribution. The rainfall regime is monomodal, occurs primarily during winter months. The average annual rainfall was 162 mm  $y^{-1}$ , and the average relative air humidity throughout the year is 66%. The minimum temperature was 9 °C, and the average maximum temperature was 20 C



**Figure 1: Map showing the geographical location of the study area(the Sultan area)**

**2.2 . MATERIALS AND RESEARCH METHODS:**

The range plants present in the study area were identified by distributing a questionnaire to the residents of the study area (herdreser) and then translated .

**2.3. Survey Of Range Plants Species**

The vegetation in the study area is a mixture of Mediterranean desert and dry vegetation types, and consists mainly of shrubs and sub-shrubs that form the permanent cover. In rainy seasons, waves of short-lived plant growth appear during periods of rainfall and continue as long as water is available. However, most of the study area is either devoid of vegetation or supports only minimal growth, and tall shrubs and small trees are very few and restricted to low-lying areas and watercourses. The distribution and characteristics of vegetation in the region are socio economic study as well as the accumulation of human impacts over centuries (e.g. grazing, dry farming, timber harvesting, uprooting, medicinal and economic. species, soil trampling by off-road driving)]. In general, the vegetation in the area is very heterogeneous and the lowlands and streams have denser vegetation because they receive more moisture through runoff after rainfall

**DATA ANALYSIS**

From the table, we note that the average number of members in a family is 7 people, and the smallest number of families is 1 and the most is 24, with a standard deviation of 4.While the average age when practicing the profession was 18 years, the minimum was 7 years, and the oldest was 40 years, with a standard deviation of 7.While the average period of practicing the herding profession was 28 years, the minimum was 3 and the maximum was 60The average number of people practicing the herding profession in the region was 239 people.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Number of family	106	1	24	7.41	4.151
Age at work	106	7	40	17.75	7.153
Have been working since	106	3	60	28.08	12.317
people working in grazing	106	4	400	239.02	145.449

Gender			
		Frequency	Percent
Valid	male	105	99.1
	female	1	0.9
	Total	106	100.0

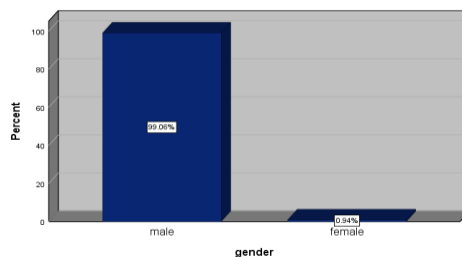


Figure (2)

Social status			
		Frequency	Percent
Valid	Single	13	12.3
	married	84	79.2
	divorced	6	5.7
	Widower	3	2.8
	Total	106	100.0

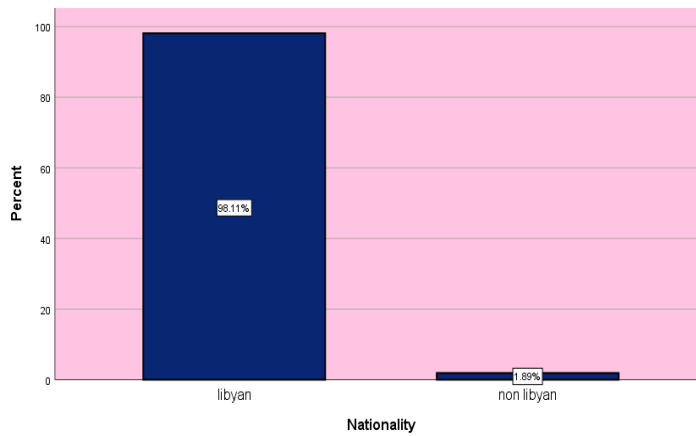


Figure (3) we note that 98% are Libyan

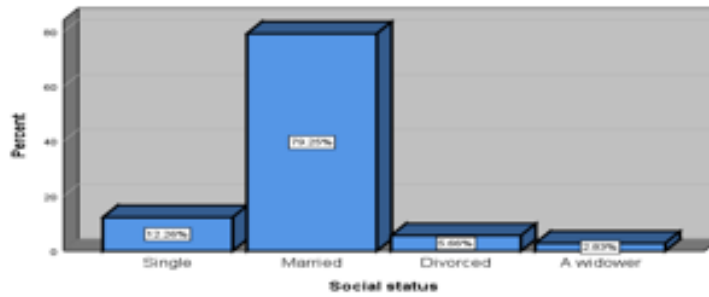


Figure (4) shows the number of married people which reached 84 with percentage 79%

Age			
		Frequency	Percent
Valid	18-25	5	4.7
	26-35	11	10.4
	36-45	35	33.0
	46-55	33	31.1
	56-65	16	15.1
	66+	6	5.7
	Total	106	100.0

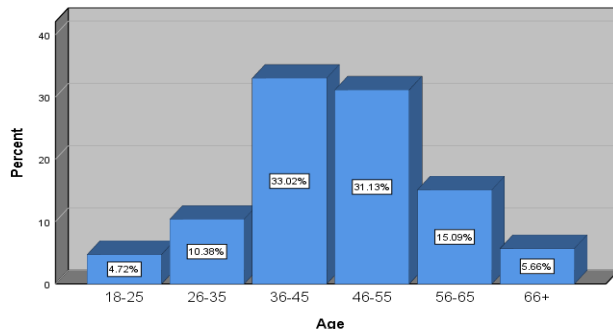


Figure (5) shows the different age group shows the various categories of people who practice the herding profession, where the number of people between (36-45) years old was 33%.

Qualification		Frequency	Percent
Valid	Preparatory	31	29.2
	Secondary	23	21.7
	College degree	25	23.6
	None	27	25.5
	Total	106	100.0

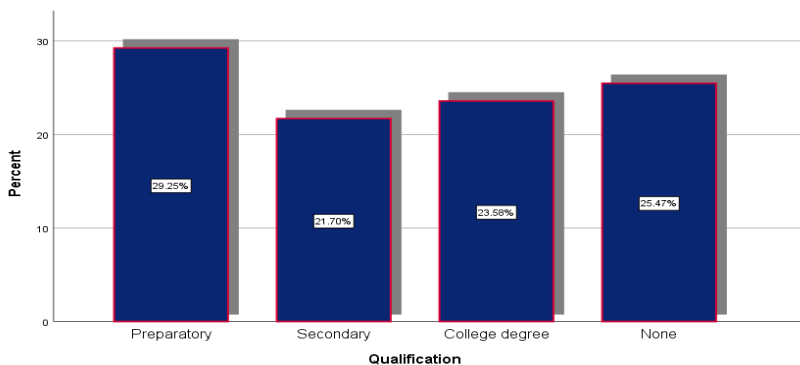


Figure (6) shows the qualification which the number of people get preparatory certificate is 31 ,Secondary 23 , College degree 25 and without certificate 27

Type of wind that blows over the area		Frequency	Percent
Valid	Headwind	7	6.6
	Fickle winds	18	17.0
	Eastern tribal winds	31	29.2
	Northwest	17	16.0
	Marine winds	14	13.2
	Southerly	3	2.8
	Northeast	16	15.1

Total	106	100.0
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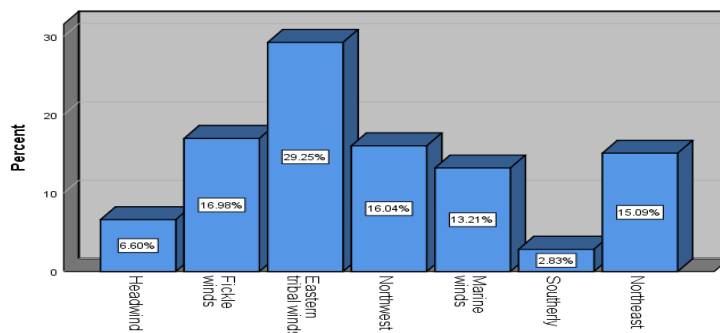


Figure (7) shows most types of winds that blow in the region

Seed type			
		Frequency	Percent
Valid	Wheat	8	7.5
	Barley	77	72.6
	Wheat and barley	21	19.8
	Total	106	100.0

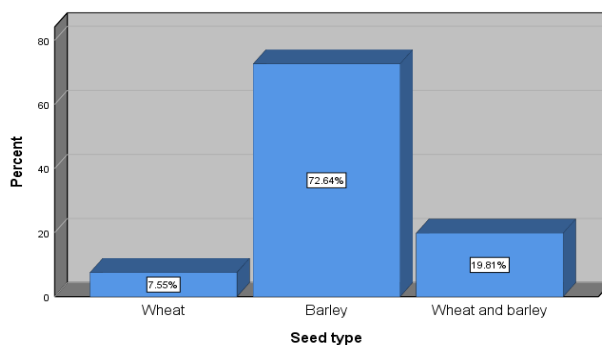


Figure (8) shows the type of seeds, which were the most of them barley with 72%

Type of plants that animals feed on			
		Frequency	Percent
Valid	Grasses"Spring herbs"	24	22.6
	Poaceae" Hordeum , Triticum	10	9.4
	Brassicaceae"Brassica, Didesmus, Enarthrocarpus"	4	3.8
	Asteraceae"Centaurea, Chamomilla, Chrysanthemum, Cynara, Echinops, Launaea, Onopordum, Carthamus,	3	2.8
	Fabaceae" Retama, Astragalus, Medicago"	1	0.9
	Brassicaceae"Erucasative mill"	1	0.9
	Asteraceae, Brassicaceae, Fabaceae	8	7.5

Fabaceae, Chenopodiaceae, Asteraceae, Brassicaceae	5	4.7
Poaceae, Asteraceae, Fabaceae, Apiaceae	11	10.4
Amaryllidaceae, Allium, Fabaceae, Retama, Thymeliaceae	1	0.9
Brassicaceae, Didesmus, Asteraceae, Chrysanthemum, Poaceae, Hordeum	9	8.5
Asteraceae, Cyharacornigera, Brassicaceae, Didesmus, Amaryllidaceae, Allium	10	9.4
Papveraceae, Brassicaceae, Erucasative mill, Asteraceae, Cyharacornigera	2	1.9
Brassicaceae, Enarthrocarpus, polygonum, Liliaceae, Asteraceae, Chrysanthemum, Matthiola, Brassicaceae	15	14.2
Malvaceae, Chrysanthemum, Allium	2	1.9
<b>Total</b>	<b>106</b>	<b>100.0</b>

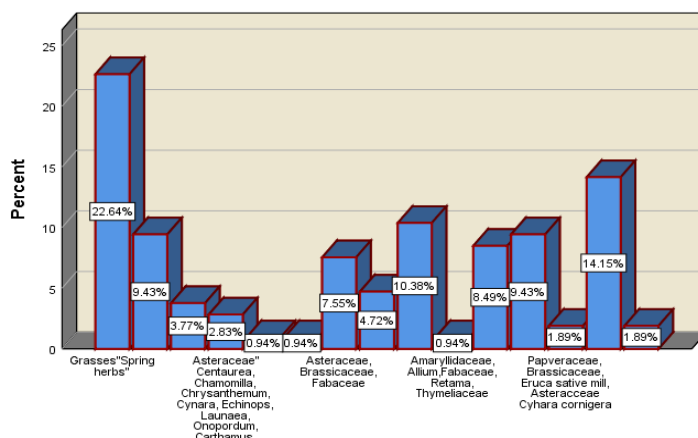


Figure (9) types plants that animals feed on, where grasses and spring plants were the majority, at a rate of 23%.

Problems you face while grazing			
Valid	The tendency	7	6.6
	Desertification	14	13.2
	Petrification of the earth	7	6.6
	Lack of rain	32	30.2
	None	1	0.9
	Limited space for grazing and plowing	12	11.3
	Roads and farms	1	0.9
	Wolves and diseases that cause death to livestock	1	0.9
	Lack of proper and good management	1	0.9
	High cost of feed	26	24.5
	High grazing fees	1	0.9
	Difficulty moving to grazing areas	1	0.9

	All of the above	2	1.9
	Total	106	100.0

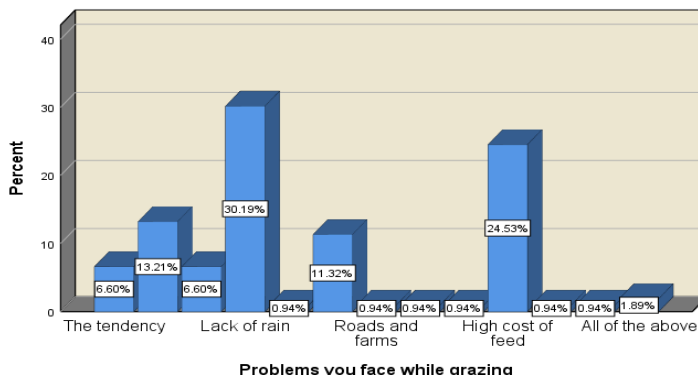


Figure (10): The problems facing the shepherd, the most prominent of which are the high cost of fodder and the lack of natural pastures throughout the year by 25%.

Status of pastures during 2010-2018		Frequency	Percent
Valid	Stable	12	11.3
	Degraded	94	88.7
	Total	106	100.0

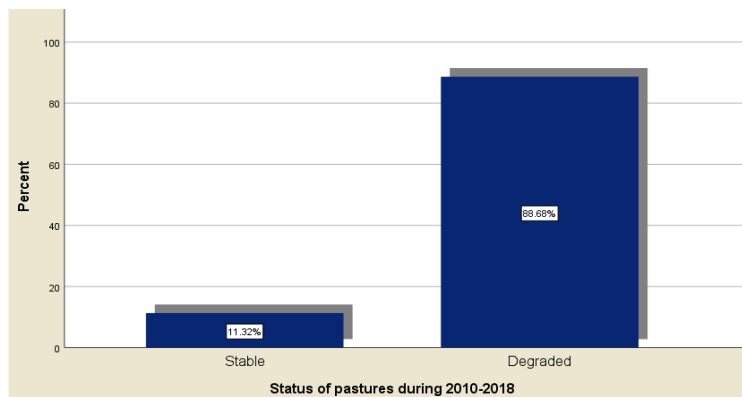


Figure (11) the condition of pastures during the period between 2010-2018, which shows their deterioration in terms of area and productivity by 89%

Type of pastures in the area		Frequency	Percent
Valid	Sheep	2	1.9
	Goat	1	0.9
	Sheep and goat	61	57.5
	Camel	1	0.9
	All of the above	3	2.8
	Sheep and goat and camel	38	35.8
	Total	106	100.0



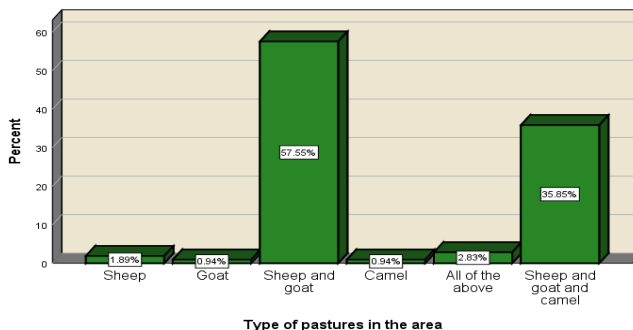


Figure (12) shows the type of pastures in the region, which shows that the most types of pastures are sheep and goats, at a rate of more than 57%.

Do you have an additional government work			
		Frequency	Percent
Valid	Yes	79	74.5
	No	27	25.5
	Total	106	100.0

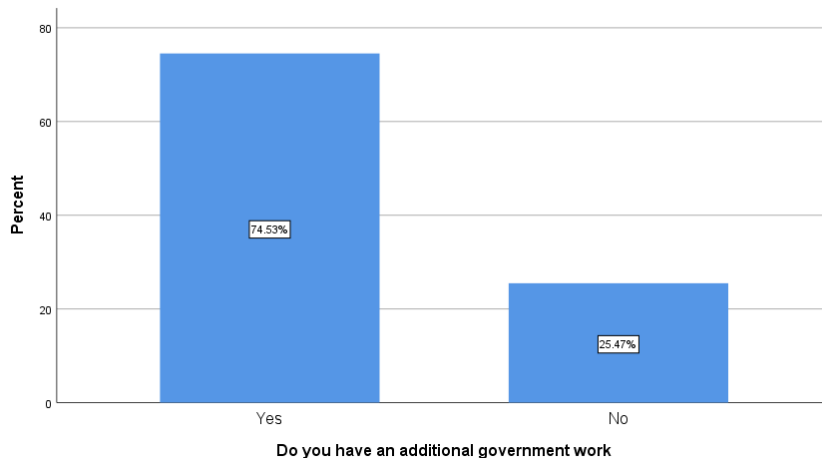


Figure (13): shows that the most shepherd have an additional government work

The reason for this work			
		Frequency	Percent
Valid	The only option available	13	12.3
	Desire and love for this profeccion	23	21.7
	Occupation of parent and relatives	70	66.0
	Total	106	100.0

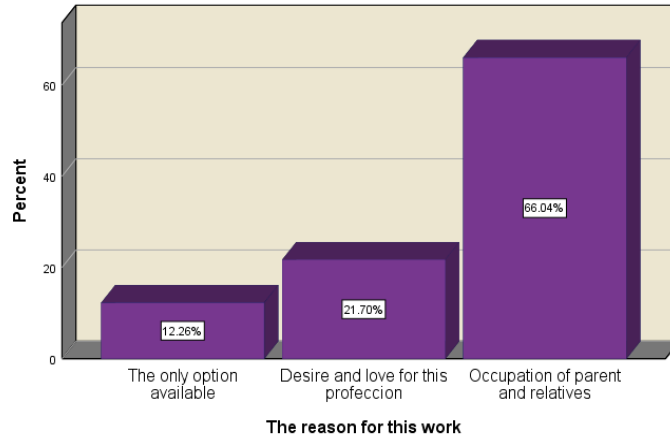


Figure (14) shows that the most shepherd have this work from the father

Do you deprive the earth every year			
		Frequency	Percent
Valid	Yes	55	51.9
	No	10	9.4
	Sometimes	41	38.7
	Total	106	100.0

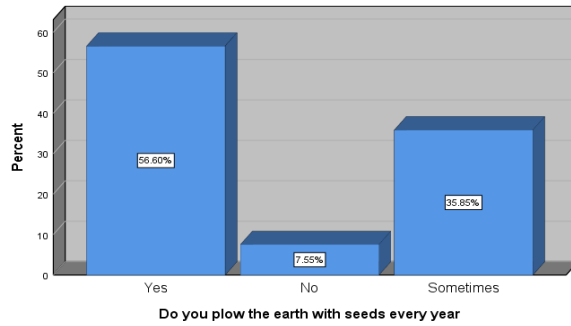


Figure (15) shows if they plow the earth with seeds every year

Agricultura transformadora			
		Frequency	Percent
Valid	Yes	24	22.6
	No	40	37.7
	Sometimes	42	39.6
	Total	106	100.0

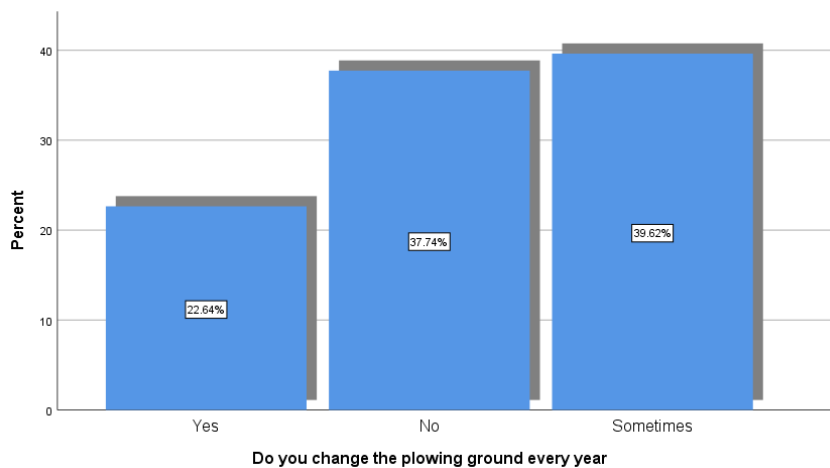


Figure (16) shows if they change the plowing ground every year

Effect of maching			
		Frequency	Percent
Valid	Yes	94	88.7
	No	9	8.5
	Sometimes	3	2.8
	Total	106	100.0

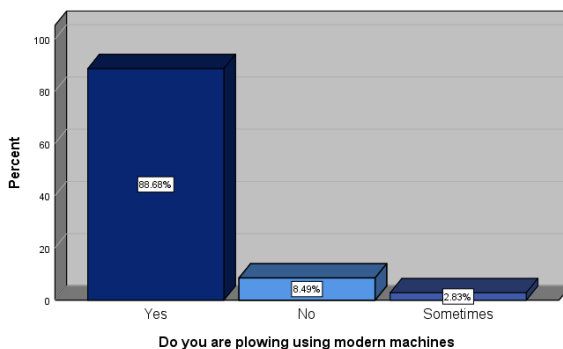


Figure (17) shows if they are plowing using modern machines

cut wood in area			
		Frequency	Percent
Valid	Yes	48	45.3
	No	32	30.2
	Sometimes	26	24.5
	Total	106	100.0

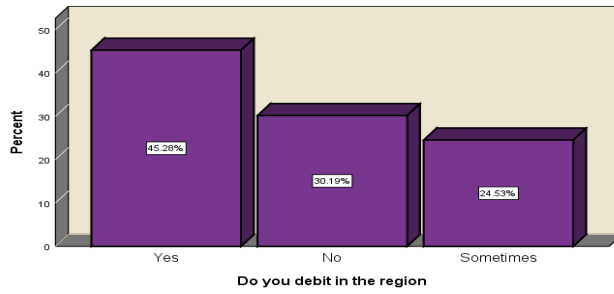


Figure (18) they are cut wood in area

What is the annual cost of animal grazing			
		Frequency	Percent
Valid	10 Thousand	9	8.5
	Less than 10 thousand	20	18.9
	More than 10 thousand	77	72.6
	Total	106	100.0

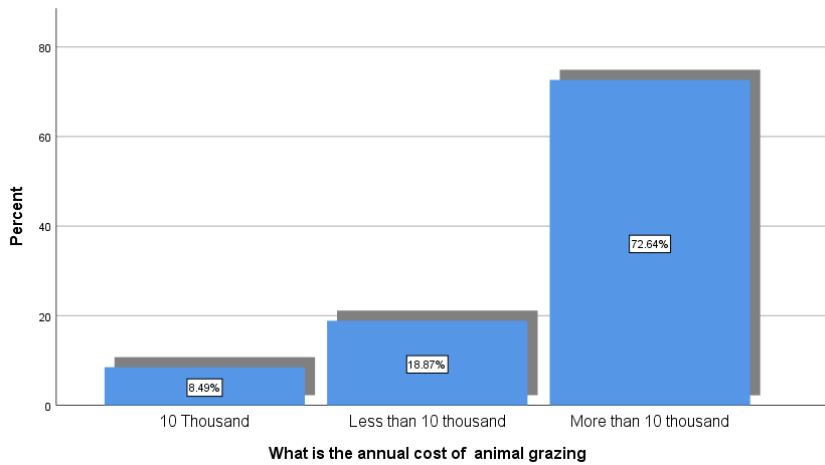


Figure (19) shows the annual cost of animal grazing

Is grazing constant without moving throughout the year			
		Frequency	Percent
Valid	Yes	46	43.4
	No	18	17.0
	Sometimes	42	39.6
	Total	106	100.0

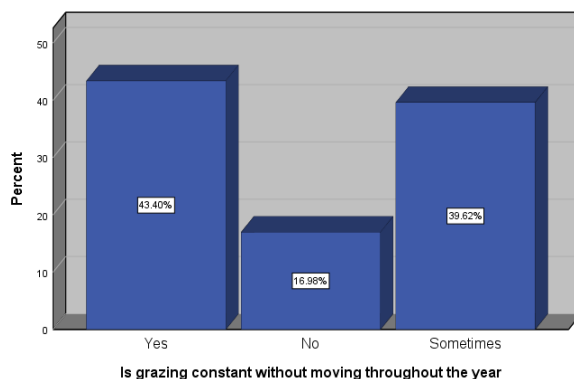


Figure (20) shows if the grazing constant without moving throughout the year

List of range species in the study area

**Asteraceae**

- |                      |                             |                                       |
|----------------------|-----------------------------|---------------------------------------|
| 1.                   |                             | <i>Artemisia herba alba</i>           |
| 2.                   | <i>Carthamus lanatus</i> L. |                                       |
| 3.                   |                             | <i>Centaurea sphaerocephala</i>       |
| L.                   |                             |                                       |
| 4.                   |                             | <b><i>Chamomilla racutita</i> (L)</b> |
| <b>Rauschert.</b>    |                             |                                       |
| 5.                   |                             | <i>Chrysanthemum</i>                  |
| <i>coronarium</i> L. |                             |                                       |
| 6.                   |                             | <i>Cynara cornigera</i> Lindley.      |
| 7.                   |                             | <i>Echinops galalensis</i>            |
| Schweinf.            |                             |                                       |
| 8.                   |                             | <i>Launaea nudicaulis</i>             |
| (L.)Hooker.          |                             |                                       |
| 9.                   |                             | <i>Onopordum espiniae</i> Cosson.     |
| 10.                  |                             | <i>Urospermum picroides</i>           |

**Boraginaceae**

- |             |  |                                     |
|-------------|--|-------------------------------------|
| 1.          |  | <i>Echium horridum</i> Batt.        |
| 2.          |  | <i>Brassica tournefortii</i> Gouan. |
| 3.          |  | <i>Didesmus bipinnatus</i>          |
| (Desv.) DC. |  |                                     |

4.	<i>pterocarpus</i> (Pers).	<i>Enarthrocarpus</i>
5.		<i>Eruca sativa</i> Mill.
6.	Venta)	<i>Matthiola longipetala</i> (
<b>Chenopodiaceae</b>		
1.	<i>Anabasis articulate</i> (Forsk) Mog.	
2.		<i>Anabasis oropetiorum</i>
3.		<i>Atriplex halimus</i>
<b>Fabaceae</b>		
1.		<i>Astragalus annularis</i> Forsk.
2.		<i>Medicago littoralis</i> Rohde.
3.	Webb & Berth	<i>Retama raetam</i> (Forssk.)
<b>Poaceae</b>		
1.	(Mabille) Porta.	<i>Ammophila australis</i>
2.		<i>Hordeum murinum</i> L.
3.	<i>Hordeum glaucum</i> L.	
<b>Polygonaceae</b>		
1.		<i>Emex spinosus</i> (L) amped.
2.	(Sibth-Sm)	<i>Polygonum equisetiforme</i>
<b>Alliaceae</b>		
1.		<i>Allium subhirsutum</i> L.
<b>Liliaceae</b>		
1.	Salzm.	<i>Asphodelus microcarpus</i>
<b>Apiaceae</b>		
1.	(Desf) Benth. & Hook .f. ex Asch. & Schweinf.	<i>Pituranthos tortuosus</i>

**Thymelaeaceae**

1.

*Thymelaea hirsute* (L.) Endl.

**Malvaceae**

1.

*Malva parviflora* L.

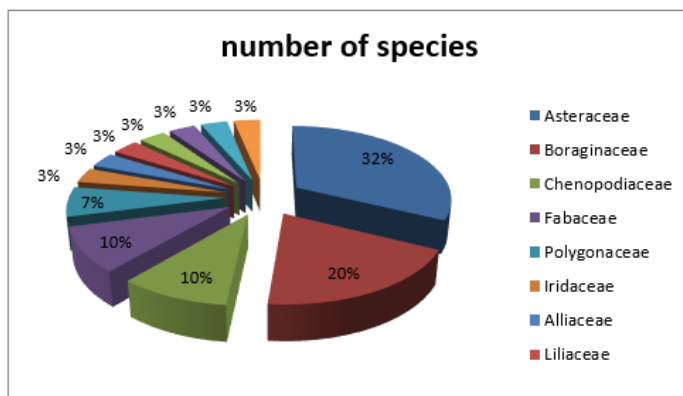
**Papaveraceae**

1.

*Papaver hybridum* L.

**The number of families according to identified in the study area**

Family	number of species
Asteraceae	10
Boraginaceae	6
Chenopodiaceae	3
Fabaceae	3
Polygonaceae	2
Iridaceae	1
Alliaceae	1
Liliaceae	1
Apiaceae	1
Thymelaeaceae	1
Malvaceae	1
Papaveraceae	1



**Figure (21) The number of families according to identified in the study area**

**The percentage of life-form spectra based on the number of plant species**

LIFE-FORM SPECTRUM	LIFE-FORM SPECTRUM	PERCENTAGE
Therophytes	19	55,9
Chamaephytes	6	17,6
Cryptophytes	4	11,8

Hemicryptophytes	3	8,8
Phanaerophytes	2	5,9

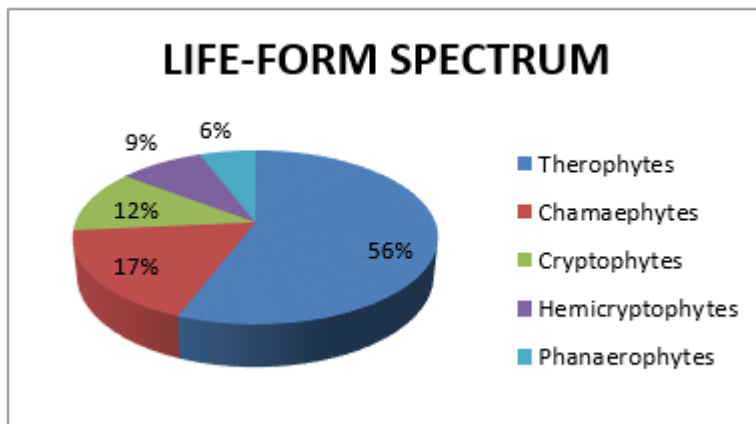


Figure (22) life-form

## RESULTS AND DISCUSSION

A total of 34 range species are identified in the study zone , these are the species that livestock feed on not all of them are considered palatable but due to the poverty of the pasture livestock are forced to depend on them.

Despite the presence of species considered principal range species as *Artemisia herba alba* as [1] , [7] ,[8] and others species *Astragalus annularis* Forsk , *Medicago littoralis* Rohde but these are considered in state of deteriorateion [9] and what remains is considered only remnant .come of them as selective for only to Camels and goats such as the wide distributed *Retama raetam* From reviewing the results of the respondents it was noted that mo st of them stated the existence of environment imbalance in the study zone represented by the lack of rainfall ,desertification and the lack sufficient and are to practice grazing activities due to agriculture expansion as well as the prices of imported fodder and this is what 80% of responout reported on what affeching the zone of study.

this considers with [11] which reported that the zone in general suffers an increase in sand storms , winds, and a rise in temperature especially in recent decades. although the reason as a whole was previously targeted by plan to restore and develop natural pastores by spreading seeds annual range species in particular but the program was nepleted later periods

## CONCLUSION

The interactions between the long history of anthropogenic pressure, mainly overgrazing and arid environmental conditions prevailing in Sultan area have likely led to the current poor rangeland state. This is demonstrated in this study area by lower values of: floristic composition, life-form structure, biodiversity indices, . This coupled with sparsely vegetated feature and highly denuded areas. This decreased the systems' potential for improvement and its resilience against natural and human-induced disturbances. However, the high dominance of annual species and the low portion of perennial species in both vegetation , in addition to the arid environmental factors that impose significant constraints on seeds germination and seedling survival might impede the rehabilitation of these rangelands. This necessitates the need for active rehabilitation intervention to sustain and improve the rangeland ecosystems in Sultan area .



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