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Study the of Environmental impact on the morphological and some physiological characterizations of *Zizyphus Lotus* and *Rhus tripartita* (Ucria) plants growing at Coastal and Desert regions around Al Gabal Al Khder , Libya.

[1]WAFA. AHMAD. ABDALLAH .SAID , [1]BASET .E.S.MOHAMMED , [2]WAFA.G.ABDEL SATAR and [3]HAMAD.M.ADRESS.HASAN

[1]Environmental Science Department , Faculty of Natural Resources and Environmental Sciences , Omar Al – Mukthar University, Libya
[2]Botany Department, Faculty of Science, Toubrouk University, , Libya.
[3]Chemistry Department, Faculty of Science, Omar Al-Mukthar University, , Libya.

Abstract
This study was designed to study the morphological and physiological of two plants of growing at different regions (Coastal and Semi desert area) around Al –Gabal Al-Khder regions, Libya. Where the comparing between some characterization as leafs area , plant high , leafs color, regiments starch and carbohydrate contents were estimated. The morphological and physiological properties showed variations of some properties as leafs area steams high and starch , on the other hand no wide variations observed of some other properties as pigments and carbohydrate .The study recorded variations in the physiological characterizations between stems and leaves of the selected plants of the two studied regions. The effect of climate changes between the regions mainly is most factor which affecting of the contents of the studied characterizations.

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I. Introduction

Different parts of plants are used to treat constipation, malaria, measles ,stomach pain and among other diseases. The roots and stems are also effective in treating diseases of the teeth and gums, analgesic activity, antibacterial, antidiabetic, antifungal, anti-hyper cholesterolemic, antioxidant, liver disease prevention and neuritis (Kumar *et al*., 2021). In this study two different plants (***Zizyphus Lotus*** and ***Rhus tripartita*** **(Ucria)** growing at coastal and semi Deseret regions around Al-Gabal Al- Khder Mountain were selected to investigate and comparing of some of physiological and chemical properties.

Zizyphus Lotus (Z. Lotus) is a tropical and subtropical plant that thrives in arid and semiarid regions of China, Iran, Africa, South Korea, and in some of Europe countries (Cyprus, Spain and Greece). ***Z. Lotus*** is found throughout the Mediterranean countries of Africa, including Algeria, Morocco, Tunisia and Libya. Libya's Mediterranean climate encourages the cultivation of many plant species, some of which have medicinal and antioxidant properties . ***Ziziphus lotus*** grows to a height of (2–5 meters) (6.6 –16.4 feet), with 5 cm long lustrous green leaves. A globose dark yellow drupe with a diameter of (1–1.5 cm) is the edible fruit. However, there are several physiologically active compounds in ***Z. lotus*** that could be beneficial to human nutrition, health, and disease. ***Z. lotus*** has a high polyphenol content, which has antioxidant, antibacterial, and immunomodulatory activities (El-Mokasabi, 2014).

Zizyphus Lotus *(Z. Lotus)*, also known as jujube, belongs to the angiosperm *Rhamnaceae* family. This family includes about 135–170 species of ***Zizyphus*** (Maraghni *et al*., 2010). As a tropical and subtropical plant, *Z. Lotus* grows generally in arid and semiarid countries (Adeli and Samavati, 2015),(Pottier, 1981; Abdoul-Azize, 2016).

This plant is employed in nutrition, health and cosmetics in several forms, for example, honey, tea, jam, juice, oil, loaf, and cake. In addition, in traditional medicine, both in North Africa and Middle East, several parts of ***Z. lotus*** are given as anti urinary troubles agents, anti diabetes, skin infections, anti fever, anti diarrhea, insomnia agents, sedative, bronchitis, and hypoglycaemic activities (Adzu et al., 2003; Abdoul-Azize, 2016). On the other hand, this plant offers a delicious read fruit (jujube) that was consumed fresh, dried and processed as food by local populations in substantial amounts (Elaloui *et al*., 2014).

Zizyphus Lotus Grande called “Tahounek” in tamahaq belongs to the botanical family of Anacardiaceae. Sumac is the common name of the genusRhus. *R. tripartita* is an indigenous shrub encountered in the A Hagar arid areas especially in shallow soils of the mountains (Benaissa et al., 2019).

The study of biological characteristics of plants are very important to orient the research on them. Therefore, it was reported that ***R. tripartita*** germination is mainly due to tegumentary inhibition that seems to play an important role of its germination control. On the other hand, the seeds maturation has subjected to the high risks of predation, which reduce the optimum period for the collection of seeds . Furthermore, two types of shoots have distinguished in ***R. tripartita*** species: the long shoots that start from the plant basal part and from the upper side of the oblique branches. They are various relatively leafy and reddish-brown and do not usually develop after the rains. The other shoots, much shorter, develop on the nodes at the time of bud break that occurring even before the rainy season. These shoots end in a clustered inflorescence which is reminiscent of « furs » of some fruit trees (Neffati ,2000).

On the other hand, this shrub flowering occurs shortly after the bud break and seed maturation in synchronous. Therefore, its vegetative cycle starts in the autumn, the rain does not induce it directly and its vegetative development continues even in winter. Therefore, the root systems is highly developed, both in-depth and laterally, then, these pivoting roots can reach up to one meter deep (Neffati, 2000). Furthermore, ***R. tripartita*** is considered a xerophyte plant: a desert adapted species that is not limited by water availability and that has provisions to reduce water losses.

It was reported that the branches of ***R. tripartita*** species are tight, with small leaves sometimes rolled up and clarified; which not only reduce sweating but also protect the plant from excessive sunlight. The strategy adopted by this shrub is drought tolerance with a high water potential, a high concentration of osmolite solutions and an ability to maintain its membrane integrity (Benaissa *et al*., 2019).

Plants have been an important source of medicine since ancient times. Early written reports on the use of plants as medicine appeared about 2600 BC when plants were used as medicine by (Chouaibi *et al*., 2012). Since then, plants have been used to treat ailments such as headaches, toothaches, stomach aches, diarrhoea, wounds, tumours and sexually transmitted diseases (Borgi , 2009), just to mention a few. However, the potential of several plants as medicinal agents has not been fully characterized and established. A review by Funnell, Lindsey, McGraw, Sparg, Stafford (Borgi , 2009), states that about (122) drugs were estimated to have been discovered through ethno botanical leads of (94) plant species.

The screening of plant extracts led to the discovery of important anticancer compounds such as Camptothecin, Taxol and Vinblastine, which are used clinically in the treatment of cancer. Camptothecin, Taxol and Vinblastine were isolated from extracts of Camptotheca acuminate, Taxus brevifolia and Catharanthus roseus, respectively (Chouaibi *et al*., 2012).

plants are still being used among different indigenous groups to treat different diseases and ailments. Despite this, the compounds responsible for the healing actions in most of the Namibian medicinal plants are not yet investigated due to a lack of scientific studies and exposure (Borgi and Chouchane, 2009,Chouaibi *et al*., 2012).

Medicinal plants frequently used as raw materials for extraction of active ingredients which used in the synthesis of different drugs. Like in case of laxatives, blood thinners, antibiotics and anti-malarial medications, contain ingredients from plants. Moreover the active ingredients of Taxol, vincristine, and morphine isolated from foxglove, periwinkle, yew, and opium poppy, respectively (Borgi and Chouchane, 2009).

Medicine, in several developing countries, using local traditions and beliefs, is still the mainstay of health care. As defined by WHO, health is a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity. Medicinal plants can make an important contribution to the WHO goal to ensure, by the year 2000, that all peoples, worldwide, will lead a sustainable socioeconomic productive life .Medicinal plants are an integral component of research developments in the pharmaceutical industry. Such research focuses on the isolation and direct use of active medicinal constituents, or on the development of semi-synthetic drugs, or still again on the active screening of natural products to yield synthetic pharmacologically-active compounds (Souleymane, 2016).

II. Experimental Part

The Study area:

The studied area located at Al Haniya (Coastal regions) and Semi Deseret region (Marawa village) . Al Haniya is a town in the District of Al- Gabal Al -Akhdar in north - eastern Libya, where the city lies between the latitudes, Location: 32.8362 N, 21.5127 E. Al -Haniya area has moderate climatic conditions. The bench is a coastal village located in Al- Gabal Al -Akhdar , Libya, northwest of Al -Bayda, 25 km. It was a port that the Greeks used about 2,500 years ago. It is known for raising horse, livestock, fishing and agriculture, as well as its beaches, salty lakes .Marawa is a village located at Al- Gabal Al –Akhdar region in Libya, at about 65 km south of Al –Bayda city, its Location: 32.4829 N, 21.3919 E and located at the intersection of roads between Al-Marj to Al -Badya road . Marwa area was in the past until the beginning of the new millennium is only a pastoral area, and it is located on the boundary between the two climates, the first is semi -desert, and the second is forests and Table (1).

Table 1. Meteorological data of the studied areas.

Location: 32.4829 N, 21.3919 E					2021 - 2002							
Month	1	2	3	4	5	6	7	8	9	10	11	12
tmax(degC)	14.23	15.13	18.59	22.45	25.67	29.14	29.76	30.34	28.17	25.60	21.30	15.98
tmin(degC)	6.06	6.38	8.52	10.77	13.33	16.89	19.66	19.86	17.86	15.07	11.91	7.93
av TEMP	10.14	10.75	13.55	16.61	19.50	23.02	24.71	25.10	23.01	20.34	16.61	11.95
ppt(mm)	100.74	82.09	25.39	7.94	6.48	1.30	0.00	0.00	2.85	23.90	27.91	92.71
ws(mps)	4.47	4.66	4.62	4.72	4.07	4.10	4.28	3.87	4.00	3.89	3.52	4.30
Location: 32.8362 N, 21.5127 E					2021 - 2002							
Month	1	2	3	4	5	6	7	8	9	10	11	12
tmax(degC)	17.94	18.49	21.11	23.66	26.55	29.35	30.55	31.24	29.38	27.76	24.48	19.64
tmin(degC)	10.05	10.04	11.54	12.87	15.41	18.62	21.85	22.48	20.26	17.83	15.50	11.88
av TEMP	14.00	14.27	16.33	18.27	20.98	23.99	26.20	26.86	24.82	22.79	19.99	15.76
ppt(mm)	97.25	69.86	21.43	5.36	3.80	0.44	0.00	0.00	3.91	29.08	28.76	103.83
ws(mps)	5.49	4.96	5.31	5.45	4.55	4.43	4.52	4.30	5.37	4.49	4.02	4.87

Sampling:

Two different plants of (***Ziziphus lotus and Rhus tripartita***) were selected in this study. The samples were collected from Al-Gabal Al –Khadar region .Stems and leaves of each species of the studied plants were separated, then dried in open air.

Plant Samples preparation:

The leaves and stem samples were washed several times with distilled water and then dried in the dark for 2 weeks. The dried samples were grinded and stored in pre-cleaned polyethylene bottles until the start of the analysis. **Morphological, Physiological, and biochemical analyses:**

Morphological Characteristics:

The investigation traits were plant growths (stems length (cm) and leaf area (cm^2)) and biomass (plant fresh and dry weight (g/plant)). In addition to observing the colors of leaves and stems in plants.

Physiological Analyses:

Estimation of photosynthetic pigment contents:

Leaf samples (0.2 g) harvested from ***B. pseudodictamnus*** were homogenized in acetone 80% (v/v) following ,(Arnon ,1949) method. Extract was centrifuged at 5,000 rpm for 15 min and absorbance was recorded at 646 and 663 nm for chlorophyll (*a* and *b*) estimation and at 470 nm for carotenoids. Pigment content was calculated (mg g^{-1} FW) according to the following formulae as reported by (Lichtenthaler and Wellburn, 1985):

$$\text{mg Chlorophyll } a/\text{ g tissue} = 12.25\ A663 - 2.79\ A646$$

$$\text{mg Chlorophyll } b/\text{ g tissue} = 21.21\ A646 - 5.1\ A663$$

$$\text{Carotenoids} = (1000\ A470 - 1.8\ \text{Chl } a - 85.02\ \text{Chl } b) / 198$$

III. Results and Discussion:

Morphological characteristics

From the results which given in Table 1, the height of the *Rhus tripartite* plant was (1.75 cm) in the coastal areas and decreased in the semi-desert areas, (1.33 cm). For the *Ziziphus lotus* plant, its height was 3.43 cm in coastal areas and 2.56 cm in semi-desert areas. The results were similar for crown area and leaf area index, which were higher in *Rhus tripartite* and *Ziziphus lotus* coastal plants than in semi-desert areas.

Table (2). Comparison of the morphological characteristics of *Rhus tripartite* and *Ziziphus lotus* plant grown in coastal (R1) and semi desert regions (R2).

Morphological characteristics	*Rhus tripartite*		*Ziziphus lotus*	
	Coastal R1	Semi desert R2	Coastal R1	Semi desert R2
Height (cm)	1.75	1.33	3.43	2.56
crown area (mm^2)	1.58	1.28	2.13	1.84
leaf area index (Mean of 10 for 3 branches) cm^2 / plant	7.98	7.44	6.75	6.25

Photosynthetic pigments, starch and carbohydrates content

The results given in Table 2 indicated that the contents of chlorophyll *a* in the leaves of the *Ziziphus lotus* plant increased significantly, in semi-desert regions compared to the coastal regions, which recorded 0.719 mg g^{-1} FW, r. The content of chlorophyll *b* in the leaves of the *Ziziphus lotus* plant growing in coastal areas was 0.610 mg g^{-1} FW. The carotenoid content recorded high value in the leaves of *Ziziphus lotus*, which grows in semi-desert areas, (1.372 mg g^{-1} FW). The starch content increased in leaves of the *Ziziphus lotus* plant, of value (41.60 mg g^{-1} DW) in semi-desert areas. The results illustrated in Table 2 showed that the carbohydrate content recorded the highest values in coastal areas, being 0.94 and 0.862 µg/g in leaves and stems of *the Rhus tripartite* plant , respectively , and the values of 0.86 and 1.034 µg/g in leaves and stems of the *Ziziphus lotus* plant, respectively.

The main photosynthetic pigments are chlorophyll *a*, chlorophyll *b*, and carotenoids, which all play a vital role in photosynthesis. Variations in pigment content were regarded as changes in photosynthesis. As pigment content and environmental factors have a negative association, they can be used as the basis for selecting tolerant and sensitive crop varieties. Carotenoids are required for the photoprotection of photosynthesis. Nowadays, increased levels of carotenoids in plants are of considerable attention for breeding and genetic engineering in various plants .Despite the significant decrease in net carbon dioxide uptake, the accumulation of soluble carbohydrates in plants in response to various environmental variables such as temperature, humidity, drought, and so on has been frequently recorded.The accumulation of soluble sugars could be attributed to rising starch conversion to sugars or decreased carbohydrate uptake by tissues under unfavorable conditions Under any form of stress, carbohydrate accumulations play an important objective in osmotic protection, osmotic modulation, carbon storage, and radical scavenging (Parida *et al*., 2002). Photosynthesis is the primary source of carbohydrates, and photosynthetic rates are reduced in plants exposed to difficult climatic conditions (Parida and Das, 2005).Table(3) and Figures(1-3).

Table (3). The contents of photosynthetic pigments, starch, and carbohydrate in the studied plants grown in coastal (R1) and semi desert(R2).

Samples	Photosynthetic pigments (mg g^{-1} FW)						Starch (mg g^{-1}DW)		Carbohydrates	
	Chlorophyll *a*		Chlorophyll *b*		Carotenoids					
	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
Rhus tripartite	0.109	0.014	0.023	0.011	0.713	0.013	29.00	8.100	0.94	0.65
Ziziphus lotus	0.719	0.622	0.610	0.116	1.372	1.172	41.60	37.71	0.862	0.76
Average	0.414	0.318	0.316	0.063	1.042	0.592	35.3	22.905	0.901	0.705
SD	0.431	0.429	0.415	0.074	0.465	0.819	8.909	20.937	0.055	0.077
P value	0.844		0.485		0.760		0.671		0.100	

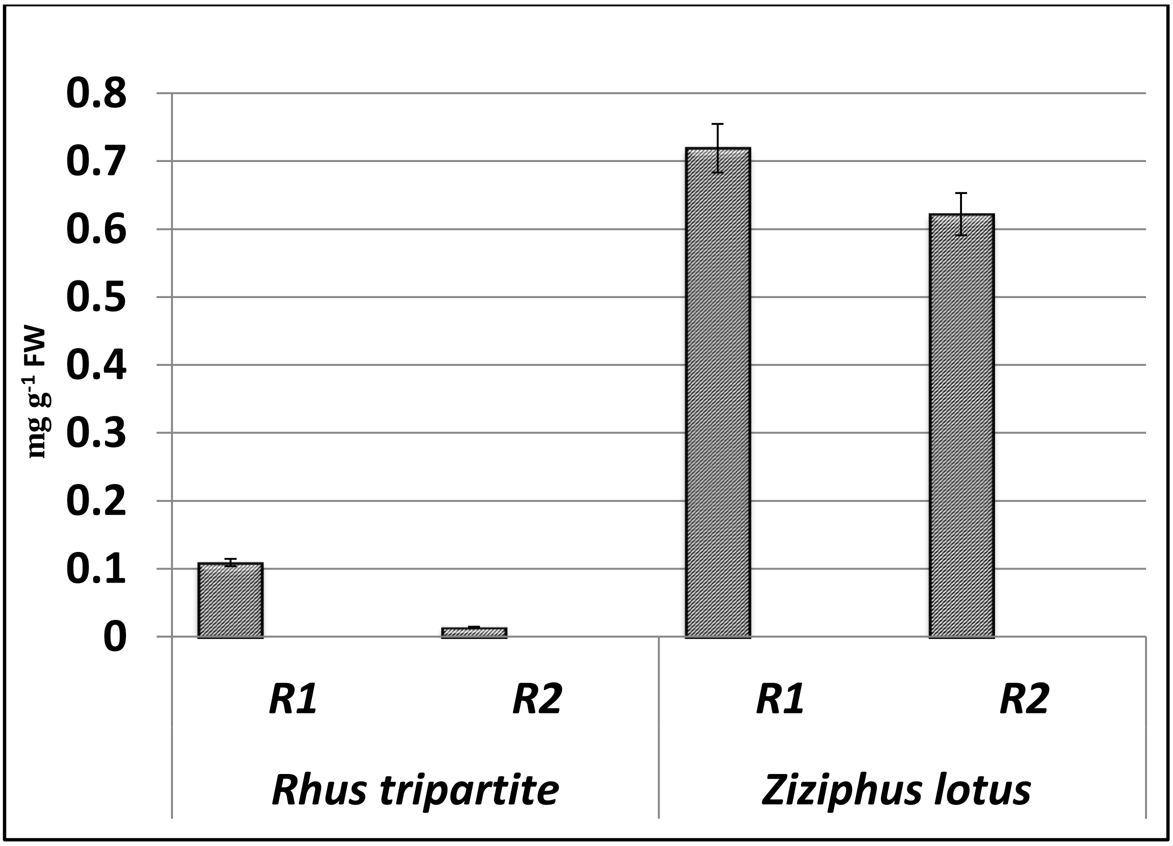

Figure 1: The contents of chlorophyll *a* pigments in *Rhus tripartite* and *Ziziphus lotus* plants grown in coastal and semi desert regions.

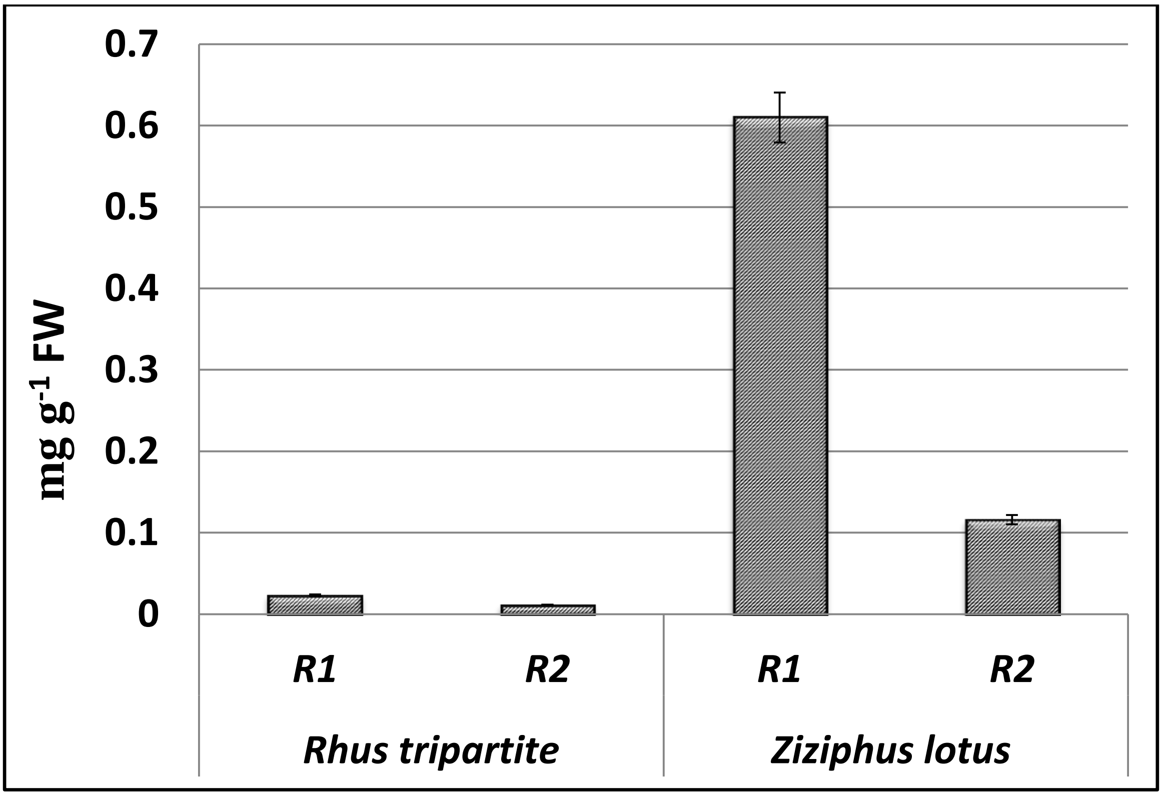

Figure 2: The contents of chlorophyll *b* pigments in *Rhus tripartite* and *Ziziphus lotus* plants grown in coastal and semi desert regions.

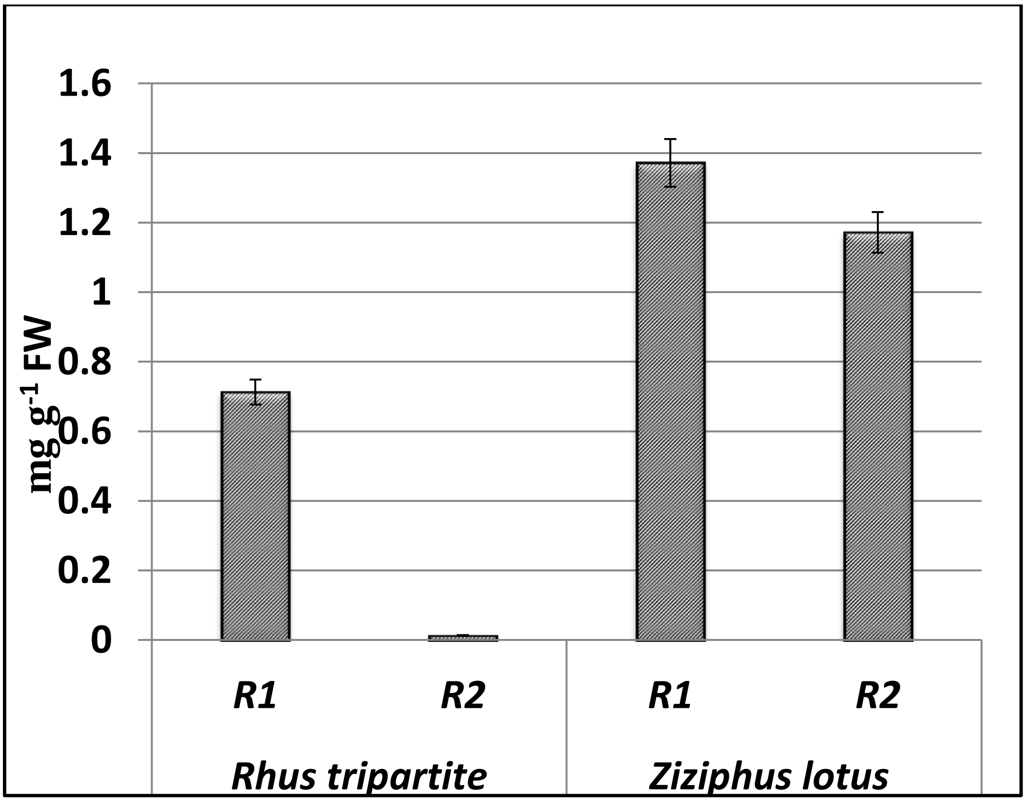

Figure 3: The contents of carotenoids pigments in *Rhus tripartite* and *Ziziphus lotus* plants grown in coastal and semi desert regions.

IV. Conclusion

According to the obtained results in this study which carried out on deferent plants **(*Rhus tripartite*** and ***Ziziphus lotus*)** grown in coastal and semi desert regions. The morphological and physiological properties showed variations of some properties as leaves area stems high and starch , on the other no wide variations observed of some other properties as Pigments and carbohydrate .The study recorded variations in the physiological characterizations between stems and leaves of the selected plants of the two studied regions.

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