

Effect of Extracts of Algae(*Ulva sp.*) And Algae(*Sargassum sp.*) on Some Growth Characteristics of Seeds of Fenugreek (*Trigonella faenum-graecum L.*) And Seed of Lentils (*Lens culinaris*)

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■ Abstract:

This study was conducted to estimate the effect of algae *Ulva sp.* And algae *Sargassum sp.* On the germination and growth indicators of Fenugreek seeds *Trigonella faenum-graecum L.* seeds and Lentil seeds *Lens culinaris* seeds, by preparing extracts of different concentrations of both algae as follows (3.2, 4, 4.5, 5) g / 100 ml, the results of the study showed that the treatment with low concentrations of algae *Ulva sp.* It gave a high effect on the percentage of germination of the seeds of the study plants, especially the seeds of the lentil plant, in which the percentage of germination reached 51%, while it was 61% when using high concentrations of *Sargassum sp.* The study also showed that the low concentrations of *Ulva sp.* It is the highest stimulation in increasing the length of the petiole and stem of both plants, while the high concentrations of *Sargassum sp.* It had the highest effect on stem and stem length for both plants, and it was found through the study that the treatment with *Sargassum sp.* On the average length of the plumage and tufts, the highest stimulation was obtained from the algae extract *Ulva sp.* For fenugreek seeds, about 1 cm apart

● **Key words:** effect of extract, fenugreek, germination percentage, lentils, seaweed.

■ المستخلص:

أجريت هذه الدراسة لتقدير تأثير مستخلص طحلب *Ulva sp.* وطحلب *Sargassum sp.* علي مؤشرات الإنبات و النمو لبذور نبات الحلبة *Trigonella faenum-graecum L.* وبذور نبات العدس *Lens culinaris* ، وذلك بتحضير مستخلصات مختلفة التراكيز لكلا الطحلبين كالتالي (5 ، 4، 5،4 ، 3.2)

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جم / 100 مل، أوضحت نتائج الدراسة بأن المعاملة بتركيز منخفضة لطحلب *Ulva sp.* أعطت أعلى تأثير في نسبة إنبات الحلبة والعدس وخاصة الأخيرة وصلت نسبة الإنبات 51 %، بينما وصلت 61 % عند استخدام التركيزات العالية لطحلب *Sargassum sp.*، كما بينت الدراسة أن التركيزات المنخفضة لطحلب *Ulva sp.* هي الأعلى تحفيز في زيادة طول الرويشة والجدير لكلا النباتين، في حين التركيزات العالية لمستخلص طحلب *Sargassum sp.* أعطت أعلى متوسط لطول الرويشة والجدير لكلا النباتين، بينت الدراسة أن المعاملة بمستخلص طحلب *Sargassum sp.* على متوسط طول الرويشة و الجدير أعلى تحفيز من مستخلص طحلب *Ulva sp.* لبذور نبات الحلبة بفارق 1 سم تقريباً .

● الكلمات المفتاحية : تأثير المستخلص ، طحالب بحرية ، حلبة ، عدس ، نسبة الإنبات .

■ Introduction:

It became clear to man a long time ago the importance of the huge reserves that the seas contain of wealth, especially the renewable resources represented by marine organisms with different degrees of development and their diversity and different forms, ways of life and nutrition, (8). Demand for food in many parts of the world, algae is the main representative of the plant world in the seas and oceans, as it is characterized by its wide spread in temperate and tropical environmental systems, in addition to its unique ability to photosynthesis, as it represents the primary category that produces organic matter and oxygen necessary for nutrition and respiration of the rest of the organisms. It produces approximately (50-70%) of the Earth's oxygen and consumes about (25%) of carbon dioxide (1) (14) (16).

Historical records also showed that the use of seaweed in the agricultural field dates back to the first century AD, when the Romans and Greeks, as well as the Chinese, used them as fertilizers (17) (19).

The addition of algae extracts has a significant effect compared to mineral fertilizers, because it contains a large amount of organic matter that retains moisture and helps in facilitating nutrients, which facilitates the roots' absorption of them from the surface of the soil, and this was indicated by the study of Al-Zuraidi et al. On the process of germination and productivity of a tomato plant, it gave positive results as it increased the percentage of germination, stimulated the increase in production, and also improved the quality and characteristics of the fruits. Also, algae extracts contain some

growth stimulants, microelements, amino acids and vitamins that increase the growth of plants and improve their quality. What was indicated by another study by Al-Zuraidi and others (2019) about the effect of treatment with an extract of some green marine algae on the germination and growth of fenugreek seedlings under salinity stress, which led to a highly significant increase in the studied traits. In the field of agriculture, it is a common way to improve production because these organisms contain soft elements that are easy to absorb by plants.

Due to the lack of studies on the effect of seaweed extract on leguminous plants despite its economic importance in Libya and the world and its use as food for humans in the first place and fodder for animals in the second degree due to its high protein content, as well as its importance in improving soil properties, accordingly the study aims to improve germination and growth indicators of plant seeds Fenugreek *Trigonella faenum-graecum* L. and *Lens culinaris* (10) were irrigated by seaweed extracts (*Ulva sp.* & *Sargassum sp.*) (3).

■ **Material and Methods :**

● **First: Sample collection :**

Fenugreek and lentil seeds samples were collected from the agricultural commercial centers in Tripoli, and marine algae of two types (*Sargassum sp.* & *Ulva sp.*) were collected from the beaches of Souk Al-Jumaa - Tripoli, Tajoura, and Sinbad Resort during the period between (1, 2) and Monthly (6, 7), and they were placed in plastic containers with an amount of sea water until they were transported to the laboratory.

● **Algae processing**

Green algae (*Sargassum sp.* & *Ulva sp.*) were collected from the beach, then the algae were washed, first with plain water twice to get rid of suspended impurities and sand, then after washing with distilled water three times, leaving the leaves soaked in distilled water For half an hour each time, then we dry it on preliminary drying papers, then it is transferred inside thermal lids to the oven for a whole day under a temperature of (50-60) C for a period of 24 hours, then it is ground until it becomes a powder and is kept inside dark glass bottles for a while. use it.

Algae extract preparation

/Clean and dry the algae1

The algae were cleaned after collection by washing them directly after collecting them with tap water to get rid of sand and impurities attached to them. After that, they were washed with distilled water three consecutive times by soaking them in distilled water for half an hour each time, then the washed algae were placed on drying paper and then transferred to drywall. Thermal to be dried in a drying oven at a temperature of 50-60 degrees Celsius for 24 hours, then ground into powder and kept in dark glass vials (18)

Preparation of algae extract 2/

5 different weights of each algae powder were prepared to prepare the extract, which are (3.2, 4, 4.5, 5) g. Each weight was placed in a flask with a capacity of 100 cm³, distilled water was added to it, and it was left for 24 hours in a dark place. The extract was filtered and kept in a Opaque glass bottles kept in a cool place at 4 C until use, (4).

Seed processing

The used fenugreek and lentil seeds were sterilized by soaking them in a 30% sodium hypochlorite solution for two minutes, then washed with distilled water a number of times and transferred directly to petri dishes containing two sterile filter papers, so that 100 seeds per dish at a rate of 3 iterations according to a completely randomized design (C.R.D).

Steps of the experiment

Three iterations of seeds were prepared for each algae extract (Deeb et al. 2017), 10 ml of algae extract were added to each plate with a sterile pipette on the first day of cultivation, then distilled water was added when needed to maintain moisture inside the dishes, then all the cultivated dishes were placed in the incubator At a temperature of 25 ° C (± 2), 3 dishes were prepared for each type of seed, to which only distilled water was added instead of extract as a control.

Measurements made in the study

1 -Seed germination rate(%)

It was calculated according to the following equation

The percentage of germination = the number of germinated flower beds / the number of total flowering X 100

2 -The average length of the jedir and ruwaisha (cm)

The length of the feather and the ruler was measured after a week of cultivation, and the average length of each of them was calculated

statistical analysis

The data were analyzed statistically and a completely randomized design (C.R.D) was calculated using the SAS system (SAS, 2002) (Al-Khalidi and Daoud, 2017), and to find significant differences for the effect of different concentrations of algae extract, the multiple range test (Duncan) was used. (Duncan, 1955).

Results And Discussion

First: the effect of *Ulva sp.*

The effect of *Ulva sp.* On the percentage of germination of fenugreek and lentil seeds

The results of the study shown in Table (1) showed an increase in the percentage of germination of fenugreek and lentil seeds when treated with low concentrations of alga extract, as it gave a germination rate of 22.77% for fenugreek seeds when treated with a concentration of 3.2 g / 100 ml, followed by treatment with 4 g / 100 ml, with a germination rate of 17%. The percentage of germination of lentil seeds was 51% and 47%, respectively, when treated with a concentration of (4 and 4.5) gm/100 ml.

Table (1): The effect of algae extract on the percentage of germination for both plants:

concentration / Transaction	0	3.2	4	4.5	5
Trigonella faenum-graecum L.	87.77	22.77	17	7.77	10.33
Lens culinaris	89.33	10	51	47	18.33

The effect of *Ulva sp.* On the average length of feathers and stalks of fenugreek seeds and lentils

The results of the study also showed the effect of algae extract on the average length of feather and stem for both plants, that low concentrations had the highest effect on the average length of feather and stem of both plants, as shown in Table (2), and this is consistent with the study (5)

Table (2): The effect of algae extract on the average length of stem and stem for both plants:

<i>Plant type</i>	<i>Lens culinaris</i>		<i>Trigonella faenum-graecum L.</i>	
growth indicators	Radicle	Epicotyl	Radicle	Epicotyl
Concentration				
0	2.11	1.08	2.29	2.73
3.2	0.87	0.22	0.39	0.34
4	0.69	0.6	0.68	0.64
4.5	0.51	0.53	0.17	0.14
5	0.29	0.47	0.21	0.16

The results of the study shown in Table (3) showed that there were significant differences for the effect of the algae extract between the percentage of germination of fenugreek seeds and the percentage of germination of lentil seeds with a difference of 14.667%, while there were no significant differences in the average length of the plumage between the two plants and vice versa in the case of the average length of the stem, and this is consistent with the results of the study (19).

Table (3): shows the effect of algae extract on the type of plant:

Plant type growth indicators	<i>Trigonella faenum-graecum</i> L.	<i>Lens culinaris</i>	SE	P
germination percentage	28.466 b	43.133 a	2.7117	0.001
Epicotyl	2.387 a	1.742 a	0.231	0.06
Radicle	2.555 a	1.738 b	0.259	0.03

* The different letters indicate a significant difference, while the letters that share a letter do not have significant differences.

The results of the study listed in Table (4) showed significant differences between the different concentrations of algae extract on both plants, where a significant difference was observed in the percentage of seed germination between a concentration of 4 g / 100 ml and concentrations (3.2 and 5) g / 100 ml, while there was no A significant difference between the concentrations (3.2, 4.5, and 5) gm / 100 ml, and this is consistent with the study (3) and the study (13), while there are no significant differences between the different concentrations of algae extract on the average length of the feather, as well as the average length of the beard

Table (4): shows the effect of different concentrations of algae extract on germination and growth indicators for both plants:

growth indicators	Concentrations					SE	P
	0.0	3.2	4.0	4.5	5.0		
germination percentage	87 a	16.3 c	34 b	27.3 bc	14.3 c	4.29	0.0001
epicortyl	2.23 a	1.92 a	2.4 a	1.5 a	2.21 a	0.37	0.48
radicle	2.54 a	2.44 a	1.9 a	1.8 a	1.96 a	0.41	0.65

* The different letters indicate a significant difference, while the letters that share a letter do not have significant differences.

the effect of *Sargassum sp.*:

The effect of *Sargassum sp.* On the percentage of germination of fenugreek and lentil seeds

The results of the study shown in Table (5) showed an increase in the percentage of germination of fenugreek seeds when treated with low and high concentrations (3.2 and 4.5) gm / 100 ml, with a germination rate of (70.77 and 67.78) gm / 100 ml, respectively, while the concentration gave The higher (5) gm / 100 ml had the highest germination rate for lentil seeds, which reached 61%. This is consistent with (15) and (7) for the stimulating effect of seaweed extract, and the increase in germination percentage is due to the increase in the nutritional content of the algae extract.

Table (5): shows the effect of algae extract on the percentage of germination for both plants

Transaction \ Concentration	0	3.2	4	4.5	5
Fenugreek	87.87	70.77	34.78	67.78	37.78
Lentils	89.33	32.33	26.33	14.33	61

The effect of *Sargassum sp.* On the average length of feathers and stalks of fenugreek seeds and lentils

The results of the study showed the effect of the algae extract on the average blade length, which for both plants stimulated an increase in the average blade length in low concentrations (3.2) g / 100 ml and high concentrations (4.5) g / 100 ml, while the high concentrations stimulated (4.5) g / 100 ml. The average length of the cuticle, which reached (1.16) cm for the fenugreek plant, while the highest reading of the average length of the cuticle and the cuticle was recorded for the seeds of the lentil plant at a concentration of (5) g / 100 ml. It reached (0.69) cm for the cuticle and (0.76) cm for the cuticle, as shown in Table (6), and this is expected for the positive effect of algae extract on growth characteristics (17). This result agreed with the study of (13), (3) and (9).

Table (6): The effect of milking extract on the average length of stem and stem for both plants:

growth indicators	<i>Lens culinaris</i>		<i>Trigonella faenum-graecum L.</i>	
	radicle	epicortyl	radica	epicortyl
0	2.11	1.08	2.29	2.73
3.2	0.49	0.49	0.78	1.14
4	0.41	0.42	0.85	0.85
4.5	0.25	0.26	1.16	1.22
5	0.76	0.69	0.95	0.89

The results of the study shown in Table (7) showed that there were significant differences in the effect of the algae extract between the percentage of germination of fenugreek seeds and the percentage of germination of lentil seeds, with a difference of 14.4%, so that the stimulating effect on lentil seeds was higher than that of fenugreek seeds. This is in agreement with the results of (Karim and Al-Ajil, 2012) that spraying seaweed extract was significantly superior in vegetative growth characteristics, also in agreement with the study (9), while there were no significant differences in the case of the average shoot length.

Table (7): shows the effect of algae extract on the type of plant:

<i>Plant type</i>	<i>Lens culinaris</i>	<i>Trigonella faenum-graecum L.</i>	Standard Error	Pr
germination percentage	44.667 b	59.067 a	4.089	0.0217
epicortyl	1.518 b	2.308 a	0.1797	0.0055
radical	1.785 a	2.068 a	0.1766	0.2709

* The different letters indicate a significant difference, while the letters that share a letter do not have significant differences.

Effect of Extracts of Algae (*Uva sp.*) And Algae (*Sargassum sp.*) on Some Growth Characteristics of Seeds of Fenugreek (*Trigonella faenum-graecum L.*) And Seed of Lentils (*Lens culinaris*)

The results of the study listed in Table (8) showed significant differences between the different concentrations of algae extract on both plants, where a significant difference was observed in the percentage of seed germination between the low concentrations (3.2 and 4) g / 100 ml, while there was no significant difference between the concentrations (3.2 and 4) 4.5 and 5) gm / 100 ml, and this is consistent with the study (3) and the study (13), while there are no significant differences between the different concentrations of algae extract on the average length of the feather, as well as the average length of the peduncle.

Table (8): The effect of different concentrations of algae extract on germination and growth indicators for both plants:

growth indicators	Standard Error	0.0	3.2	4	4.5	5.0	P
germination percentage	6.467	87.00 a	51.500 b	30.500 c	41.00 cb	49.33 cb	0.0001
epicortyl	0.284	2.23 a	1.59 a	2.041 a	2.065 a	1.628 a	0.4356
radica	0.279	2.545 a	1.328 b	2.128 ab	1.995 ab	1.636 b	0.0545

* The different letters indicate a significant difference, while the letters that share a letter do not have significant differences.

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