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RESPONSE OF FREESIA (*FREESIA HYBRIDAA*) TO GROWTH MEDIUM AND FOLIAR SPRAY WITH MARINE ALGAE EXTRACT (ALGA PLANT)

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Abstract

The experiment was carried out in a greenhouse of the research station in the Department of Horticulture and Gardening Engineering, College of Agriculture, University of Diyala to study the effect of Four combinations of growth Medium (M4-M3-M2-M1) and spraying the seaweed extract (Alga plants), using two concentrations 1.0 and 1.5 ml. Liters^{-1} in the characteristics of vegetative growth, flowering, and bulb of *Freesia hybrida*. The experiment was carried out for a factorial experiment (4 x 3) according to the Randomized Complete Block Design (RCBD) and with three replicates**.** The cultivation of Freesia plant in the medium of growth M4 resulted in a significant increase in both the Leaves area and the leaf content of chlorophyll carotenoids the dry matter in the leaves, the number of inflorescences, the diameter of the flower, the number of florets in the inflorescence, length of Inflorescence stem, the time of flowering, and the early date for flowering and the highest content of anthocyanins In flowers and the largest diameter of corms, while the growth medium M1 gave the highest rates for both the height of the plant and the number of leaves and corms diameter, while the growth medium M3 gave the highest percentage of dry weight in the inflorescence. Treatment S2 improved all vegetative, flowering and corms growth characteristics, with the exception of the characteristic number of leaves that increased significantly when treatment S1.0.

Keywords : Freesia, *Freesia hybrida*, Marine Algae, Alga Plant

Introduction

Freesia hybrida is an annual bulb plant that belongs to the Iridaceae family. The genus Freesia contains about 11 species, all of which are native to South Africa specifically in West of Cape (Manning *et al*., 2010). Its height ranges between 30-45 cm, and it is from the winter bulbs group under the climatic conditions of Iraq and the best temperature for its growth is between 13-20 mm (AL-Khafaji and Chalabi, 2016). Freesia flowers have become one of the most popular picking flowers in Europe and the United States of America, Because of the aromatic scent that freesia flowers enjoy in addition to the longevity of the flowers and the multiplicity of the colors of the flowers. It entered to Europe at the end of the nineteenth century and is now one of the most Important flowers in the world, About 110 million floral stems are sold in the UK every year. In recent years, the production of freesia flowers in the Netherlands has increased dramatically as about 500,000,000 flower stems are produced and sold every year and the Netherlands is the largest country that produces flowers (Anderson, 2006; FU *et al*., 2007; Khan *et al*., 2012).

The growing media is one of the most important factors affecting the growth of ornamental plants, that many plants spend their life cycle in planting pots and need media that provides them with their different needs. Therefore, it is necessary to create suitable growth media that contain the necessary components for this purpose (Mohamed, 2018). Soil alone, as a growth medium, does not provide all the plant needs needed to give the highest output, so the soil must be mixed with other components that have appropriate chemical and physical specifications to reach ideal milestones (Chauhan, 2014; Bostan *et al*., 2014). Therefore, scientific research has recently turned to the use of different environments for agricultural purposes that stimulate the conditions of greenhouses. These settings differ from one country to another according to the availability of raw materials included in the components of the medium and their prices (Radhi and Jaafar, 2011). (Meller and Jones, 1995) pointed out the necessity of replacing soil-based media with organic media based on organic or industrial basis such as peat moss, perlite and others, especially in the cultivation of containers, Because of their effective role in developing a strong healthy root system capable of supplying the plant with nutrients. Growth circles play a major role in plant growth and development, as well as providing support to plants. In addition, growth media are a source of water and essential plant nutrients and allow oxygen to circulate to the roots (Atowa, 2012).

In recent years, flower cultivation has evolved towards an environmentally friendly, sustainable approach to achieving adequate yields, increasing the quality of flowers due to the agricultural revolution in recent decades, overuse of fertilizers and environmental damage caused by agricultural practices. Bio stimulants are one of the methods of this approach (Bhargavi *et al*., 2018). Biological catalysts are any microorganism or substance applied to the plant, seeds, or root environment to stimulate and stimulate biological processes within the plant and thereby increase the efficiency of fertilizer use and reduce non-biological stresses (Traon, 2014). Marine algae has been used as a bio stimulants and is a good source of organic materials as Contains a group of carbohydrates and contains growth regulators such as oxins, gibberellins and cytokines as well as similar substances in their effect of hormones such as betanes as well as vitamins and antioxidants and contain a wide range of biological stimuli (Spinelli *et al*., 2009) (Jothinayagi and Anbazhagan, 2009).

Materials and Methods

The experiment was carried out during the fall season 2018-2019 in one of the greenhouses of the Research Center for Horticulture and Gardening Engineering/College of Agriculture/University of Diyala, the experiment was conducted for the period from 20/10/2018 to 10/6/2019. The steps of the research started with preparing the land of the unheated plastic house, from the cleaning up and level of the land. Then Covering the land of the greenhouse by the white (polyethylene) plastic cover to keep the experiment site

clean. The culture media used in the experiment was prepared using different mixtures of soil, peat moss, and perlite using a volumetric unit of supplement. Random samples were taken from the growth media and analyzed in the Laboratory of Soil and Water Resources Department, College of Agriculture, University of Baghdad. Table No. (1) represents some chemical and physical characteristics of the growth media.

Table 1 : Chemical and physical properties of growth media

Agricultural media	EC. ds.m-^{1}	PH	N %	P %	K %	O.M %	Sand %	Silt %	Clay%	Type of culture
M1	1.06	7.65	1.21	1.23	1.85	2.34	88	2.4	9.6	Sand
M2	1.18	7.83	1.31	1.11	1.68	1.95	88	2.4	9.6	Sand
M3	0.68	6.27	1.43	1.13	2.01	19.25	----	-----	----	**-----**
M4	1.49	8.01	1.21	1.27	2.21	3.24	88	2.4	9.6	Sand

The culture media was sterilized with fungicide Roben (granularicide) (Metalaxyl active ingredient 5% G) at a rate of 10 g / pot, and then packed in the pots. The 'Prominence' variety of freesia, which is characterized by its red-colored flowers imported from Holland Bulb Market/Netherlands, was cultivated by an agricultural office in Baghdad on 11/11/2018 in plastic pots. The diameter of 25 cm contains the growth media at a depth of 5 cm from the soil surface. After the completion of planting and the plants reaching a certain height, the plants were supported by placing wire brackets to keep the plants growing in a steady way. The plant was fertilize with Amino Triplex neutralizer 20-20-20 at a concentration of 1 g. Liter. The necessary servicing operations were carried out with the purpose of hoeing, weeding and controlling insect and pathological injuries whenever needed.

The experiment included a study of two factors, as the first factor in the growth medium, which included four growth media, resulted from combinations of three growth media, which are the Mix soil, the peat moss and the perlite, mixed on the basis of volume, which is 1 Mix soil: 1 peat moss, denoted by M1, and 1 Mix soil: 1 perlite, denoted by M2, 1 Peat moss: 1 perlite, symbolized by M3, and 2 Mix soil: 1 peat moss: 1 perlite, denoted as M4. The second factor was the foliar spray with Alga Plant, Table No. 2, which shows the components of the extract, and in three concentrations are spraying with distilled water as a comparison treatment, symbolized by S0, and S1.0, S1.5 ml. L^{-1} symbolized by S1 and S1.5 On the relay. The plants were sprayed twice, as the first spray was carried out 60 days after the date of cultivation of the Corms and the second spray 10 days after the first spray, liquid soap was added with the spray solution as a spreader, the plants were sprayed with the concentrations used until complete wetness using a manual spray. The experiment was carried out as a global experiment (4 × 3) according to the design of complete randomized sectors (RCBD) and with three replicates, to study the effect of two factors, the first among growth and symbolized by M, and paper spray with extract of Alga Plant and symbolized by S, included Experiment with 12 treatments with three replicates, so that the number of experimental units is 36 experimental units, in each experimental unit there are 5 pots in every single plant pot. Data were analyzed according to the SAS statistical program (2003) and the arithmetic mean was compared using the Duncan polynomial test at a 0.05 probability level.

Table 2 : Alga plants Extract components

Carbohydrates and proteins	Vitamins	Nutrients
Mannitol 0.48-0.84	Vitamin E 0.24-4.2 mg/100g	N Natural acid 4%
Laminarin 0.96 –1.60	Niacin 2.5-4.0ppm	N .1%
Alginic acid 1.2 -2.4 %	Biotin 0.02-0.09ppm	P . 5%
Amino acid 1.25 - 2.3 %	Riboflavin 1.00-2.00 ppm	K.10%
Organic matter 5.4 – 6.6 %	Carotene 3.00-10.00 ppm	
Other carbohydrates 1.4 %	Thiamine 0.14-0.29 ppm	
Amino acid 20	Folic acid 0.0 4 ppm	

Results

1. Influence of growth medium, marine algae extract and their interaction on the characteristics of vegetative growth of freesia

The results in Table (3) indicate that the growth medium M1 gave the highest height of the plant to 50.78 cm compared to the rest of the media and was significantly superior to both the M2 medium and the M3 medium, while it did not differ significantly with the M4 medium which gave the height of the plant reached 49.28 cm while it gave The middle m2 is the lowest height, at 43.22 cm. The spraying of the plant with seaweed extract and spraying with boric acid and the interaction between them did not have any significant difference in the height characteristic of the plant. The results show the significant effect of bilateral interference between the growth medium and sprinkling with marine algae extract, as treatment M1 x S1.5 gave the highest height of the plant reaching 51.33 cm, while the lowest height of the plant when treatment M1 x S0 reached 42.67 cm.

It should be noted that the growth medium had a significant effect on the characteristic of the number of leaves, and the growth medium M1 was significantly superior in giving it the most number of leaves amounted to 10.00 leaves. Plant^{-1}, but it did not differ significantly from the growth medium M4 as it gave a number of leaves amounting to 9.02 leaves. Compared to other growth media.

The treatment of spraying with seaweed extract had a significant effect on the adjective number of leaves, as treatment S1.0 gave the most number of leaves amounting to

9.12 leaves.$^{-1}$ plant compared to the comparison treatment that gave the lowest number of leaves reached 8.01 leaves.$^{-1}$ plant. Bilateral interactions between the growth medium and marine algae extract concentrations showed a significant effect on the number of leaves characteristic and treatment S1.5 x M1 recorded the most number of leaves reached 11.27 leaves. Plant^{-1}, in succession. The results indicated that there was a significant effect of the mean growth in the leafy area, as the growth medium M4 gave the largest paper area 33.42 cm, while the growth medium M1 gave the lowest paper area reached 29.29 cm. It was noted that the treatment of spraying plants with seaweed extract S1.5 resulted in a significant increase in the leafy area as it reached 35.75 cm^2 compared to other treatments. Bilateral interference factors between the growth medium and sprinkling with marine algae extract showed a significant effect on the characteristic of the foliar area and treatment S1.5 x M4 recorded the largest paper area of 37.67 cm^2 compared to other factors

Table 3 : Effect of medium of growth and sprinkling with seaweed extract and their interaction on the characteristics of vegetative growth of freesia.

A - Effect of culture media								
Studied qualities / Treatments		Height of plant (cm^{-1})	Number of leaves (leaf, plant)	Area of leaf (cm^{-1})	The leaf content of chlorophyll (mg-gm^{-1})	The leaf content of carotenoids (Mg-gm^{-1})	Percentage of dry matter in leaves (%)	Percentage of carbohydrates in leaves (%)
M1		A 50.78	A 10.00	33.15A	35.60A	27.56A	27.61AB	19.50B
M2		C 43.22	C 7.48	29.29B	33.3B	27.45A	26.48B	19.31B
M3		B 47.39	BC 8.17	33.13A	35.74A	27.94A	27.61AB	21.39A
M4		A 49.28	AB 9.02	33.42A	36.46A	28.25A	27.91A	20.71AB
B - Effect of spraying with seaweed extract								
S0		A 46.91	B 8.01	B 30.14	C 32.59	C 25.97	C 25.57	**19.57**B
S1.0		A 46.91	A 9.12	B 30.85	B 34.60	B 27.17	B 27.20	B 19.61
S1.5		A 48.29	AB 8.86	A 35.74	A 38.68	A 30.26	A 29.44	A 21.31
C- The effect of interference between agricultural media and spraying with seaweed extract								
M1	S0	A 51.16	A 8.70	DE 28.03	EF 32.76	CD 25.60	C 25.01	D 18.06
	S1.0	A 49.83	AB 11.27	ABC 33.80	CDE 34.70	BC 26.78	AB 28.00	BCD 18.86
	S1.5	A 51.33	A 10.03	A 37.61	A 39.33	A 30.30	A 29.82	ABC 21.58
M2	S0	C 42.67	CD 7.10	CD 31.45	G 30.19	D 24.88	C 24.74	ABC 19.50
	S1.0	C 43.83	D 7.48	E 25.26	FG 32.05	B 27.44	C 25.77	ABC 19.76
	S1.5	C 43.17	C 7.87	CD 31.16	AB 37.87	A 30.02	AB 28.94	CD 18.66
M3	S0	AB 48.17	CD 7.90	CD 31.20	DEF 33.50	BCD 26.45	BC 26.83	AB 21.85
	S1.0	BC 45.50	BCD 8.07	CD 31.65	CD 35.58	B 27.52	BC 26.78	AD 20.63
	S1.5	AB 48.50	BC 8.53	AB 36.55	A 38.13	A 29.86	A 29.21	AB 21.70
M4	S0	A 49.16	ABC 8.37	CD 29.90	DEF 33.91	BC 26.95	C 25.01	BCD 19.65
	S1.0	AB 48.50	AD 9.67	BC 32.71	BC 36.05	BC 26.93	AB 28.23	BCD 19.20
	S1.5	A 50.16	AB 9.01	A 37.65	A 39.41	A 30.87	A 27.79	A 23.30

* The averages that take the same letter for each factor or overlap between them do not differ significantly (P≤0.05) according to the Duncan polynomial test.

The Results indicate the superiority of the M4 growth medium in giving it the highest chlorophyll content in the leaves of 26.46 mg, but it did not differ significantly from the M1 and M3 growth media that recorded the chlorophyll content in the leaves amounted to 35.74 and 35.60 mg.gm^{-1}, respectively, compared to the M2 growth medium. The lowest chlorophyll content was 33.37 mg. gm^{-1}. It was found that spraying plants with seaweed extract significantly affected the chlorophyll content in the leaves and the S1.5 treatment excellence in giving it the highest chlorophyll content was 38.68 mg. gm^{-1} compared to other treatments. Interference coefficients between the growth medium and sprinkler with algae extract showed significant differences in the chlorophyll content in the leaves, and treatment S1.5 x M4 gave the highest chlorophyll content of 39.41 mg.gm^{-1} compared to other factors. The results showed that there were no significant differences in the leaf content of carotenoids when planting freesia in the growth media used, while the leaf content of carotenoids increased by increasing the concentration of algae extract as treatment S1.5 gave the highest carotenoids content reaching 30.26 mg.gm^{-1} compared to the comparison treatment Which gave the lowest content of 25.97 mg. gm^{-1}. The treatment of the interaction between the growth medium and spraying with the algae extract showed significant differences in the chlorophyll content in the leaves, and the generalized S1.5 x M4 gave the highest carotenoids content in the leaves was 30.87 mg.gm^{-1} as a comparison treatment. The results show significant differences in the percentage of carbohydrates in the leaves when planting in different growth media. The growth medium M3 gave the highest percentage of carbohydrates at 21.39%, while the growth medium M2 gave the lowest percentage of 19.31%. The spraying treatments with seaweed extract showed significant differences in the percentage of dry matter in the leaves, and treatment S1.5 gave the highest percentage of carbohydrates in the leaves amounting to 21.31%. Interference coefficients between the growth medium and sprinkler with algae extract showed significant differences in the percentage of carbohydrates in the leaves.

Table 4 : Effect of growth medium and sprinkling with seaweed extract and their interaction on flowering characteristics of freesia

A. Effect of the growth media								
Studied Qualities / Treatments		**The date of flowering (day)**	**The number of inflorescences (INFL. / plant)**	**The number of florets FLORET/ INFL**	**The diameter of the florets (cm)**	**The length of Inflorescence stem (cm)**	**The leaf content of anthocyanin (Mg / 100g)**	**vase life (day)**
M1		B 129.04	AB 2.83	AB 6.61	AB 5.55	BC 28.50	A 51.35	A 7.77
M2		A 134.02	B 2.77	B 5.66	B 5.00	C 27.44	B 48.02	A 7.94
M3		B 127.48	AB 2.83	A 7.23	AB 5.61	A 31.00	A 51.00	A 7.77
M4		C 124.20	A 3.33	A 7.33	A 5.75	**31.16**A	A 51.70	A 7.66
B. Effect of spraying with seaweed extract								
S0		A 129.13	A 3.16	B 5.14	B 5.12	A 28.70	B 49.11	B 7.50
S1.0		A 129.08	A 3.33	B 6.29	B 4.89	A 29.00	AB 50.49	AB 7.83
S1.5		A 127.85	A 3.50	A 8.37	A 6.41	**30.12**A	A 51.94	A 8.04
.C **The effect of interference between agricultural media and spraying with seaweed extract**								
M1	S0	BCD 129.36	A 3.00	D 4.80	AD 5.66	CD 27.66	BCD 50.25	A 7.66
	S1.0	CDE 127.93	A 2.66	CD 6.16	DE 4.83	BCD 28.00	ABC 52.21	A 7.83
	S1.5	BC 129.83	A 2.83	AB 8.83	ABC 6.16	AD 29.83	AD 51.58	A 7.83
M2	S0	A 136.16	A 2.83	CD 5.66	DE 4.66	D 27.00	D 47.80	A 7.83
	S1.0	A 134.73	A 2.50	D 4.83	E 4.00	CD 27.50	D 47.63	A 7.83
	S1.5	B 131.16	A 3.00	CD 6.50	AB 6.33	BCD 27.83	CD 48.63	A 8.16
M3	S0	DEF 126.46	A 3.16	CD 6.16	BE 5.16	AB 31.16	BCD 48.93	A 7.33
	S1.0	BCD 128.60	A 2.66	C 6.83	DE 4.83	ABC 30.66	AD 51.23	A 8.00
	S1.5	CF 127.40	A 2.66	AB 9.00	A 6.83	AB 31.16	AB 25.83	A 8.00
M4	S0	FG 124.55	A 3.16	CD 5.50	CDE 5.00	AD 29.00	BCD 49.46	A 7.16
	S1.0	EFG 125.06	A 3.33	BC 7.33	AD 5.91	AD 29.83	AD 50.90	A 7.66
	S1.5	G 123.00	A 3.50	A 9.16	AB 6.33	A 31.66	A 54.73	A 8.16

*The averages that take the same letter for each factor or overlap between them do not differ significantly (P≤0.05) according to the Duncan polynomial test.

Table 5 : effect of growth medium and sprinkling with seaweed extract and their interaction on bulb characteristics.

A - Effect of the growth media					
Studied traits / Treatments		**Number of corms**	**Diameters of corms mm**	**Diameters of infl.mm**	**The percentage of carbohydrates in corms (%)**
M1		5.33 A	AB 19.11	A 9.44	14.18 A
M2		A 5.00	C 16.55	C 7.27	A 14.69
M3		A 4.83	B 18.66	B 8.16	A 14.20
M4		B 3.27	A 20.22	AB 8.94	A 14.08
B-Effect of spraying with seaweed extract					
S0		B 4.41	B 17.58	B 7.70	C 10.75
S1.0		B 4.25	B 18.12	B 8.04	B 14.17
S1.5		A 5.16	A 20.58	A 9.62	A 17.95
C - Effect of interference between the agricultural media and spraying with seaweed extract					
M1	S0	BCD 4.66	BC 19.16	B 8.83	C 10.75
	S1.0	AB 5.16	C 18.16	B 8.83	B 13.75
	S1.5	**6.15**A	AB 21.50	A 10.66	A 18.05
M2	S0	DE 3.66	D 14.50	C 6.50	C 11.36
	S1.0	E 3.16	C 15.66	C 6.66	A 14.87
	S1.5	E 3.00	ABC 19.50	B 8.66	A 17.85
M3	S0	BC 4.83	C 18.00	BC 7.66	C 10.49
	S1.0	BC 4.83	C 18.50	B 8.66	B 14.11
	S1.5	AB 5.33	ABC 19.50	BC 8.16	A 18.00
M4	S0	BCD 4.50	C 18.66	BC 7.83	C 10.39
	S1.0	CDE 3.83	ABC 20.16	BC 8.00	B 13.94
	S1.5	A 6.16	A 21.83	A 11.00	A 17.92

The averages that take the same letter for each factor or overlap between them do not differ significantly (P≤0.05) according to the Duncan polynomial test

The results showed in Table (4) that the mean of growth had a significant effect on the date of flowering, as the mean of growth M4 gave the lowest flowering time to 124.20 days, while the mean of growth M2 gave the longest flowering time 134.13 days. The treatment of spraying with seaweed extract had no significant effect at the time of flowering. The Overlap between the growth media and spraying with the algae extract showed significant differences at flowering time, and treatment M4 x S1.5 gave the lowest flowering time to 123.00 days. The results also showed significant differences in the number of flower inflorescence when planting the freesia plant in different growth media, and the M4 growth medium gave the highest number of flower inflorescence amounting to 3.33 inflorescence. $Plant^{-1}$, while the growth medium M2 gave the least number of inflorescences amounting to 2.77 inflorescence.$plant^{-1}$ The treatment of seaweed extract showed no significant effect on the characteristic number of flower inflorescence. The results of Table (4) showed significant differences in the number of florets when planting in different growth media, as M4 growth gave the most number of florets in inflorescence at 7.33. floret. $inflorescence^{-1}$, While M2 gave the lowest number of florets to 5.66 floret. $inflorescence^{-1}$.

As for the treatment of spraying with seaweed extract, the S1.5 treatment gave the most number of florets to 8.37 floret. $Inflorescence^{-1}$ compared to the comparison treatment that gave the least number of florets to 5.14 floret. $inflorescence^{-1}$ The treatment of the interference between the growth medium and the spray with the algae extract showed significant differences in the number of florets, and treatment M4 x S1.5 gave the most number of florets gave a 9.16 flora. The results of the same table also showed significant differences in the characteristic of flower diameter when planting plants in different growth media, and the M4 medium gave the largest floret diameter of 5.75 cm, while the growth medium M2 gave the lowest floret diameter of 5.00 cm.

As for spraying with seaweed extract, the S1.5 treatment gave the largest diameter of the floret was 6.41 cm compared to the comparison treatment that gave the smallest diameter of 5.12 cm. Bilateral interference coefficients between the growth medium and sprinkling with the algae extract showed significant differences in the diameter of the flower, and the M3 x S1.5 gave the largest flower diameter of 6.83 cm compared to other factors. The results of Table (4) show that there were significant differences in the length of the inflorescence stem of growing plants in different growth media, and the M4 growth medium outperformed it in giving it the largest length of the inflorescence stem gave a 31.16 cm, which did not differ significantly from the growth medium M3 which gave the length of inflorescence stem reached 31.00 cm. Spraying with seaweed extract had no significant effect on the characteristic length of the inflorescence stem. Bilateral interactions between the growth medium and marine algae extract concentrations showed a significant effect on the characteristic of the inflorescence stem length, and treatment M4 x S1.5 recorded the largest length of the inflorescence stem gave a 31.66 cm. The results of Table (4) showed that the mean of growth affected significantly the flowering content of anthocyanin, as the mean of growth M4 gave the highest content of anthocyanin amounted to 51.70 mg. 100 g^{-1}, while the growth medium M2 gave the lowest content of anthocyanin gave a 48.02 mg. 100 g^{-1}. The spray treatment with S1.5 seaweed extract gave the highest percentage of anthocyanin in flowers at 51.94 mg. 100 g^{-1}, while the comparison treatment gave the lowest content amount to 49.11 mg. 100 g^{-1}. The treatment of bilateral interference between the growth medium and spraying with the algae extract showed significant differences in the flowering content of anthocyanin, and the M4 x S1.5 coefficients gave the highest anthocyanin content in flowers amounting to 54.73 mg. 100g^{-1}. The results of Table (4) showed that treatment of growth medium did not have any significant effect on flowering age characteristic. The results indicated that the treatment of spraying with marine algae extract (S1.5) outweighed its longest vase life of 8.04 days, but it did not differ significantly from treatment S1.0 which gave vase life 7.83 days. The results showed that the treatment of bilateral interference between the growth medium and the concentrations of seaweed extract did not have a significant effect on flowering age. The results of Table (5) showed that there were significant differences in the number of creams when planting Freesia plant in different growth media, as the growth medium M1 gave the most number of creams amounting to 5.33 creams. $Plant^{-1}$, while the growth medium M4 gave the lowest number of creams amounting to 3.27 creams. $Plant^{-1}$. The treatment of spraying with seaweed extract showed significant differences in the number of creams, and the S1.5 spray treatment gave the most number of creams to 5.16 creams. $Plant^{-1}$. The generalized bilateral interaction between the growth media and spraying with the algae extract showed significant differences in the number of creams, and the M4 x S1.5 treatments gave the most creams to 6.16 $creams^{-1}$. The results of Table (5) showed the presence of significant effects of the growth mean in the diameter of the corms, as the growth medium M4 gave the largest diameter of the corm amount to 20.22 mm, while the growth medium M2 gave the lowest diameter of the corm amount to 16.55 mm. The treatment of spraying with algae extract S1.5 gave the largest diameter of the corm, amount to 20.58 mm, compared to the comparison treatment, which gave the lowest diameter of the corm amount to 17.58 mm. Bilateral interference coefficients between the growth medium and spraying with the algae extract showed significant differences in the diameter of the korma, and the treatments gave M4 x S1.5 the largest diameter of the corms amount to 21.83 mm. on The results of Table (5) showed the significant effect of the mean growth in the corm diameter, as the growth medium M1 gave the largest diameter of corm amount to 9.44 mm, while the growth medium M2 gave the lowest diameter of 7.27 mm. The treatment of spraying with seaweed extract S1.5 gave the largest cream diameter of 9.62 mm compared to the comparison treatment that gave the lowest cream diameter of 7.70 mm. The results showed in Table (5) that there was no significant effect of the mean growth in the percentage of carbohydrates in corm. While it is noticed from the results that the percentage of carbohydrates increased by increasing the concentration of marine algae extract, as the S1.5 treatment gave the highest percentage of carbohydrates in corm, which amount to 17.95% compared to the comparison treatment that gave the lowest percentage of carbohydrates amounting to 10.75%.

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