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Growth, seed yield and guran yield of guar plants as affected by using cattle manure and some stimulant substances

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Abstract

Field experiment was carried out at the Experimental Farm, Faculty of Agriculture, Al-Azhar University, Assiut, Egypt during the two successive seasons of 2020 and 2021 to determine the impact of cattle manure as organic fertilizer at 0, 5, 10 and 15 m^3/feddan (feddan = 4200 m^2) and foliar spray with some stimulant substances namely, moringa leaf extract at 0, 10, 20 g/L, yeast extract at 5, 10 g/L, garlic extract at 25, 50 ppm and seaweeds extract at 1, 2 ml/L, as well as their interactions on the growth, seed yield, guran percentage and guran yield of guar (*Cyamopsis tetragonoloba* L. Taub) plants. The obtained results showed that supplying plants with cattle manure at all levels resulted in a significant increase in growth traits (plant height, branch number/plant and herb dry weight/plant), seed yield/plant and per feddan, guran percentage and guran yield/plant and per feddan, except for the high level (15 m^3/feddan) concerning plant height, in both seasons. The moderate level of cattle manure (10 m^3/feddan) gave the most effective treatment in augmenting these parameters. Foliar spray with all examined stimulant substances at all concentrations led to a significant augment in all studied characteristics, except for yeast extract at 5 g/L regarding plant height and herb dry weight/plant, in the two seasons, and, also for branch number/plant, in the first season. The most effective treatments in increasing growth aspects were detected by spraying seaweeds extract at 2 ml/L followed by garlic extract at 50 ppm. Moreover, foliar spray with 2 ml/L seaweeds extract proved to be more effective in augmenting seed yield/plant and per feddan, guran percentage and guran yield/plant and per feddan than those given by other treatments and control. Clearly, the interaction effect between the two studied factors was statistically significant on all examined parameters. In this concern, the most combined treatments led to a significant increase in the tested aspects. Obviously, the most effective treatments were obtained when the addition of cattle manure at the moderate level (l0 m^3/feddan) with seaweeds extract at 2 ml/L or with garlic extract at 50 ppm.

Keywords: *Cyamopsis tetragonoloba*, yeast extract, moringa leaf extract, garlic extract, seaweeds extract.

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1. Introduction

Guar or cluster bean (*Cyamopsis tetragonoloba* L. Taub) is summer annual plant, belonging to Fabaceae (Leguminaceae) family. It is cultivated for major purposes namely, as green manure, cattle forage and raw material for industrial preparations (Al Shameri *et al*., 2017). 80% of the world guar productivity is in India, 15% in Pakistan and, also widely grown in Sudan and USA. Guar plant grows in the arid and semi-arid regions, successfully cultivated in Egyptian conditions, particularly in Sinai. Guar legume plant has a valuable crop in rotation cycle whereas, it lives symbiosis with N-fixing bacteria (Undersander *et al*. 1991). Yung pods of guar have been a good source of protein, Carbohydrates, Vitamins A and C, as well as, containing necessity minerals such as, Ca and Fe (Kumar and Singh, 2002). Guar meal (husk and germ) and seeds were utilized as cattle feed due to they contain high amount of protein (Rai and Dharmatti, 2014). Guar seeds are the main source of natural polysaccharide (galactomannan) which is commercially known as guar gum. Guar gum is member of uses in food (Khalil, 2001) and other industries like, paper, textiles, oil well drilling and pharmaceutical preparations, as well as a well-known traditional plant utilized in folklore medicine. Guar gum has been beneficial uses as an appetizer, laxative, digestive aid, cooling agent and, also in dyspepsia and anorexia. Anti-ulcer, cytoprotective, hypolipidemic, hypo-glycemic, anti-secretory and anti-hyperglycemic effects (Mukhtar *et al*., 2006). Organic farming has to be the fastest growing sector and it's considered as a main objective to obtain the balance between the inter-connected system (soil organism, plant, animal and human (Berova *et al*., 2010). The application of organic manures can be served as an alternative to mineral fertilizers for improving soil structure (Douda *et al*., 2008). Also, organic manures contain plant growth hormones like, IAA and GA, macronutrients, essential micro-nutrients and useful microorganisms (Natarajan, 2007 and Sreenivasa *et al*., 2010). The importance of organic manures in increasing the growth, seed yield was examined by Abdou *et al*. (2017), Elnesairy *et al*. (2016), Abo El Ezz (2019) and Chavan (2015) on guar. Concerning guran yield and protein (Abdou *et al*., 2017; Shehata *et al*., 2017) on guar. Regarding N, P and K elements (Abdou *et al*., 2017; Chavan, 2015; Elnesairy *et al.*, 2016; Shehata *et al*., 2017) on guar. Moringa leaf extract (MLE) is an natural stimulant substance, it contains natural endogenous cytokinins (zeatin) whereas, it acts an improving the growth (Price, 2007). MLE has a source of some vitamins like A and C and several elements (K, Ca, Na, Zn, Mn and Fe), as well as organic compounds such as, riboflavin, ß-Carotene, natural phenols, protein, amino acids and antioxidants (Makkar *et al.*, 2007; Jacob and Shenbagaraman, 2011). The promotion in the growth, seed yield and

guran content resulting from applying MLE in this work was also insured by Iqbal (2015) on guran, Rady *et al*. (2015), Latif and Mohamed (2016) on common bean, Hanafy (2017) on soybean, Emongor (2015) on *phaseolus vulgaris* and Maishanu *et al*. (2017) on cowpea plants. Yeast (*Saccharomyces cerensiae*) is bio-fertilizer which is applied either drenching or spraying (Abd-EL-Motty *et al*., 2010), may be attributed to its nutritional characteristics and its contain high concentrations of plant growth substances like, auxins, gibberelins and cytokinins (Jaiboon *et al*., 2016; Tawfiq *et al.*, 2018) Additionally, it plays an important roles in promotes cell division and enlargement, synthesis of nucleic acid and formation of chlorophyll, as well as, accumulation of carbohydrates (Marzouk *et al*., 2014; Medani, 2006). The enhancement in growth, seed yield and guran content in this investigation due to the addition of yeast extract have to be examined by Gomaa and Mohamed (2007), Patel *et al*. (2010), Shehata (2013), and Nattudurai *et al*. (2014) on guar, Amer (2004) on common bean, Wanas (2002) on Faba bean, Mohamed *et al*. (2022) on basil, Abd El Kader *et al*. (2022) on peppermint, Abd-El satar (2020) on dill, Al-Shareif (2013) on black cumin and Helmy (2015) on cumin. Garlic extract is one of natural stimulant substances, due to it contains mositure, protein, volatile oil, fat, crude fiber, ash, carbohydrates, high content of vitamin C and Zn, as well as, rich in sulfur compounds. (Mariam and Devi, 2016). Also, Otunola *et al*. (2010) suggested that garlic contains moisture and crude protein, total carbohydrates, crude fat, fat and ash. The capability of garlic extract on increasing the growth, seed yield and guran content in the present study was, also proved by Abdou *et al.* (2017), Abdou *et al.* (2017) on guar, Mohamed *et al*. (2020) on faba been, Ahmed *et al*. (2005) on pea, Noor El Dean (2005) on *Majorana hortensis*, Fei *et al*. (2007) on tomato, Hanafy *et al*. (2012) on *Schefflera arboricola*, Al-Obady (2015) on tomato, El-Shayeb (2009) on *Oenothera biennis*, Hayat *et al*. (2018) on pepper. Seaweeds extract has natural bio stimulant, which is widely utilized in enhancing the plant growth traits and development of different agricultural crops because it contains some plant growth hormones namely, auxin, gibberellins and cytokinins, besides it contains amino acids, vitamins and the elements of N, P, K, Ca, Zn, Mn, Fe, B, Cu, Mo and Co (Begum *et al.*, 2018; Stirk *et al.*, 2004; Zamani *et al*. 2013). Additionally, they can help in stimulate the growth of useful soil microorganisms (Khan *et al*., 2009) and augment nutrient uptake from soil (Turan and Kose, 2004). The unique role of seaweeds extract in augmenting the growth, seed yield and guran content in this investigation was also explored by Thirumaran *et al.* (2009), Ramya *et al.* (2011) and Vijayanand *et al*. (2014) on guar, Khater and Rania (2016) on guar, Tarraf *et al*. (2015) on fenugreek,

Rathore *et al*. (2009) on soybean. Therefore, the target of this work was to investigate the influence of cattle manure as organic fertilizer and some stimulant substances (moringa leaf extract, yeast extract, garlic extract and seaweed extract), as well as their interactions on the growth, seed yield, guran percentage and guran yield of guar (*Cyamopsis tetragonoloba* L. Taub) plants to figure out the most suitable treatment for enhancing these aspects.

2. Materials and methods

2.1 Experimental site and treatments

A field trial was conducted during the two growing seasons of 2020 and 2021 at the Experimental Farm, Faculty of Agriculture, Al-Azhar University, Assiut, Egypt to examine the impact of cattle manure as organic fertilizer and some stimulant substances (moringa leaf extract, yeast extract, garlic extract and seaweeds extract), as well as, their interactions on the growth traits, seed yield/plant and per feddan, guran percentage and guran yield/plant and per feddan of guar (*Cyamopsis tetragonoloba* L. Taub) plants. A split plot design with three replicates was carried out in this investigation, cattle manure treatments occupied the main plots (A), while stimulant substance treatments were the sub-plots (B). Guar seeds were obtained from Medicinal and Aromatic Plants Department, Horticulture Research Institute, Agricultural Research Center, Giza, Egypt and were sown on May 19th in the two seasons. The experimental plot was 2 × 1.8 m with 60 cm distance between the rows (3 rows). These seeds were sown in hills 40 cm apart on one side of the row, each plot contained 15 hills. The plants were thinned 30 days later to one plant/hill. Some physical and chemical properties of the used soil were analyzed according to Jackson (1973) and are shown in Table (1). The applied cattle manure was obtained from the farm of Animal Production, Faculty of Agriculture, Al-Azhar University, Assiut, Egypt. Some chemical properties of used cattle manure were estimated according to Black (1965) and are listed in Table (2). Cattle manure levels at 0, 5, 10 and 15 m^3/feddan were added during preparing the soil for cultivation, in both seasons 2020 and 2021. The treatments of stimulant substances were as follows: control (no sprayed plants), moringa leaf extract at 10 and 20 g/l, yeast extract at 5 and 10 g/l, garlic extract at 25 and 50 ppm and seaweeds extract at 1 and 2 ml/l.

Table (1): Physical and chemical characteristics of the used soil for the two seasons of 2020 and 2021 (Jackson, 1973).

Characters		2020	2021
Physical properties	Sand (%)	20.0	18.3
	Silt (%)	56.5	59.6
	Clay (%)	23.5	2
Texture		Silty loam	Silty loam
pH Susp. (1:2.5)		7.5	7.3
E.C (dSm^{-1}) soil past		2.2	2.0
O.M (%)		0.50	0.60
Total $CaCO_3$ (%)		2.53	2.43
Cations (cmol kg^{-1} soil)			
Ca^{++}		3.4	3.6
Mg^{++}		1.9	2.3
Na^{+}		22.72	18.07
K^{+}		3.50	3.35
Anions (cmol kg^{-1} soil)			
HCO_3^{-}		2.8	3.3
Cl^{-}		2.1	1.9
SO_4^{-}		6.5	6.2

Table (2): Chemical analysis of used cattle manure for the two seasons of 2020 and 2021(Black, 1965).

Content	Values	
	2020	2021
Organic matter (%)	37.41	17.3
C (%)	18.71	17.65
pH	7.6	7.4
E.C. (m. mohs/cm)	5.06	6.8
C:N Ratio	11.62	12.43
Total N (%)	1.61	1.42
Total P (%)	0.733	0.65
Total K (%)	1.27	1.12
Ca (%)	0.17	0.16
Mg (%)	0.71	0.80
Fe (ppm)	3307	3810
Mn (ppm)	114	123
Zn (ppm)	90.5	107.3
Cu (ppm)	5.6	5.9

Moringa leaves extract were obtained by fresh mature moringa leaves were collated from mature moringa trees at the Faculty of Agriculture, Al-Azhar University, Assuit, Egypt. After collection, spread on dry blotters and left three days to reach complete air dryness. Prepared 10 g and 20 g of young moringa leaves, were powdered for three minutes in a mechanical blender and soaked in distilled water (1000 ml) for 24 h in a flask, then filtrated throw cotton cloth. The chemical analysis of *Moringa oleifera* leaf extract authorized by Ali *et al.* (2018) is shown in Table (3). Yeast (*Saccharomyces cervisiae*) extract was obtained from the newly produced active dry yeast, Table (4) illustrated the

chemical analysis of yeast (*Saccharomyces cervisia*e) extract authorized by Khedr and Farid (2000). Garlic extract was obtained from the local garlic, by prepared 250 g of local garlic was taken, after cleaning from impurities was mixed with 250 ml distilled water using electrical blender for three minutes.

Table (3): Chemical analysis of moringa leaf extract (Ali *et al*., 2018).

Components	Value (mg/g DW)
Total phenols	1.635
Total chlorophyll	4.378
Ascorbic acid (mg/g FW)	8.47
Total carotenoids	1.72
Amino acids	387.72
Proline	33.65
Total	352.28
Nutrient profile	
Potassium	13.78
Phosphorus	3.82
Nitrogen	12.36
Calcium	15.92
Magnesium	3.96
Zinc	0.051
Iron	0.379
Manganese	0.081
Copper	0.038
Phytohormonal profile (µg/g FW)	
Gibberellins	0.65
Cytokinins	0.63
Indol acetic acid	0.72
Abscisic acid	0.13
Salicylic acid	1.87

Table (4): The chemical analysis of yeast extract (weight/100 g D.W.) (Khedr and Farid, 2000).

Minerals		Amino acid mg/100g DW		Vitamins mg/100g DW		Carbohydrates mg/100g DW	
N	33.24 g	Arginine	1.99	Vitamin B1	2.23	Carbohydrates	23.2
P_2O_3	7.22 g	Histidine	2.63	Vitamin B2	1.33	Glucose	13.33
K_2O	49.66 g	Isoleucine	2.31	Vitamin B6	1.25		
Mg	5.75 mg	Leucine	3.09	Vitamin B12	0.15		
CaO	3.02 mg	Methionine	0.72	Riboflavin	4.96		
Nacl	0.28 mg	Phenylalanine	2.01	Insitrol	0.26		
Zn	335.9 mg	Threonine	2.09	Biotin	0.09		
Mn	82.3 mg	Tryptophan	0.45	Nicotinic acid	39.88		
B	177.3 mg	Valine	2.19	Panthothenic acid	19.56		
FeO	0.93 mg	Glutamic acid	2.00	Paminobenzoic acid	9.23		
Al	650.2 mg	Serine	1.59	Folic acid	4.36		
Co	67.8 mg	Aspartic acid	1.33	Pyridoxine	2.90		
Sn	223.9 mg	Cystine	0.23				
Sio_2	1.55 mg	Proline	1.53				
So_2	0.49 mg	Tyrosine	1.49				
Cl	0.06 mg						

Then the solution was filtered using filter paper. There concentrations were prepared 25 and 50 ml/L (Alamery, 2001). The main chemical constituents of garlic cloves are carbohydrates, ascorbic acid, arginine, biotin, aspartic acid, coffeic acid and beta Carotene (Duke, 1992). Also, garlic contains moisture, crude protein, carbohydrates, crude fiber, crude fat, ash, several elements (P, K, Mg, Ca, Fe, Zn and Mn), as well as, carotenoids, tannins, alkaloids, flavonoids, saponins, steroids and cardenalides (Yusuf *et al*., 2018). Oligo x product contains seaweeds extract and was obtained from the United Agricultural Development Co., Egypt. The chemical properties of the applied seaweeds extract are presented in Table (5).

Table (5): The chemical characteristics of the used seaweed extract.

Macro and micro elements	Value	Organic components	Value	Growth regulators	Value
Organic nitrogen	3.12%	Carbohydrates	35%	IAA	0.03%
P_2O_5	2.61%	Total amino acids	6%	Cytokynins	0.02%
K_2O	4.71%	Manitol	4%	Adenine	0.01%
CaO	0.25%	Alginic acid	10%		
S	3.56%	Betaines	0.04%		
Mg	0.58%				
Fe	150 ppm				
Zn	70 ppm				
Mn	13 ppm				
B	60 ppm				
I	30 ppm				

The plants were foliar sprayed with the four studied stimulant substances, three times at two weeks interval starting June 30th for both seasons, the plants were foliar sprayed till run off. one day period was allowed between spraying these materials. All other agricultural practices were performed as usual. At the termination (the fourth week of October), in the two seasons, the following data were recorded as follows: plant height (cm.), branch number/plant, herb dry weight (g)/plant, seed yield (g)/plant and (kg) per feddan. Also, guran percentage in the seeds was determined according to the method described by Pawar and Mello (2004) and Malviya *et al*. (2011), and then guran yield (g)/plant was calculated by multiplying guran percentage in seed yield (g)/plant, as well as guran yield (Kg)/feddan was calculated. All obtained data were tabulated and statistically analyzed according to MSTAT-C (1986) using the L.S.D. test at 5% to know the differences among all treatments according to Mead *et al*. (1993).

3. Results and Discussion

3.1 Plant height (cm)

The obtained data in Table (6) indicated that supplemented guar plants with cattle

manure as organic fertilization positively affected plant height, during both seasons. Clearly, the addition of cattle manure at all levels led to a significant increase in plant height, except for the high level (15 m^3/feddan), in the two seasons, as compared to unfertilized ones. It could be noticed that the moderate level (10 m^3/feddan) gave the longest plants reached 9.5 and 13.0% over the check treatment, in the first and second seasons, respectively. The capability of organic manures on augmenting plant height has been reported by Abdou *et al*. (2017), Elnesairy *et al*. (2016), Chavan *et al.* (2015) and Nattudurai *et al*. (2014) on guar. It is worth mentioning that such trait was significantly influenced by foliar spray with the four examined stimulant substances at all concentration, in both seasons. Apparently, foliar spray with these substances at all concentrations resulted in a significant augment in plant height except for the low concentration of yeast extract (5 g/l), during the two seasons, compared to no sprayed plants.

Table (6): Effect of cattle manure levels, stimulant substances and their interactions on plant height (cm) of guar plants, during 2020 and 2021 season.

Some stimulant substances (B)	Cattle manure levels (A)				
	Control	5 m^3/feddan	10 m^3/feddan	15 m^3/feddan	Mean (B)
	First season (2020)				
Control	113.5	122.5	127.4	119.3	120.7
Moringa extract at 10 g/L	133.6	136.6	143.4	132.5	136.5
Moringa extract at 20 g/L	137.5	138.2	147.7	136.5	140.0
Yeast extract at 5 g/L	119.4	125.5	131.3	122.5	124.7
Yeast extract at 10 g/L	138.3	140.3	151.2	139.3	142.3
Garlic extract at 25 ppm	122.7	129.5	135.5	126.2	128.5
Garlic extract at 50 ppm	142.5	144.7	155.5	140.4	145.8
Seaweed extract at 1 m/L	126.5	134.3	140.2	130.4	132.9
Seaweed extract at 2 m/L	144.4	149.2	158.4	143.5	148.9
Mean (A)	130.9	135.6	143.4	132.3	
L.S.D. at 5%	A = 3.5 B = 4.3 A×B = 8.6				
Second season (2021)					
Control	106.4	120.4	125.5	112.3	116.2
Moringa extract at 10 g/L	124.3	135.9	145.6	126.5	133.1
Moringa extract at 20 g/L	134.6	136.6	146.2	132.6	137.5
Yeast extract at 5 g/L	113.7	124.3	130.4	117.7	121.5
Yeast extract at 10 g/L	136.7	137.5	150.7	136.6	140.4
Garlic extract at 25 ppm	118.5	127.4	137.5	123.2	126.7
Garlic extract at 50 ppm	141.6	141.7	152.3	139.4	143.8
Seaweed extract at 1 m/L	120.8	132.6	141.8	124.1	129.8
Seaweed extract at 2 m/L	143.2	147.4	157.2	143.1	147.7
Mean (A)	126.6	133.8	143.0	128.4	
L.S.D. at 5%	A = 5.5 B = 6.3 A×B = 12.6				

Moreover, the use of seaweed extract at the high concentration (2 ml/l) followed by garlic extract at the high one (50 ppm) proved to be more effective in increasing plant height than those detected by other treatments and control, during the two

experimental seasons. Numerically, the two previous superior treatments augmented such aspect by 23.4, 20.8, 27.1 and by 23.8% over untreated ones, in both seasons, respectively, as clearly shown in Table (6). The stimulation in plant height due to the application of moringa extract was also examined by Emongor (2015) on snap bean and Rady *et al*. (2015) on common bean. The positive effect of yeast extract on plant height was also proved by El-Tohamy *et al*. (2008) on eggplant and Al-Qubaie (2002) on roselle. The augment in plant height as a result of adding garlic extract was also studied by Mohamed *et al*. (2020) on faba bean and Al-Obady (2015) on tomato. The beneficial role of seaweed extract in increasing plant height has been described by Vijayanand *et al*. (2014) and Thirumaran *et al*. (2009) on guar. In respect to the interaction, the revealed data in Table (6) postulated that it was statistically significant effect on plant height of guar, during the two growing seasons. In this regard, the application of most combined treatments significantly increased plant height, as compared to untreated plants, in the two seasons. Obviously, supplying guar plants with the moderate level of cattle manure (10 m^3/feddan) with seaweed extract at the high concentration (2 ml/l) followed by garlic extract at the high concentration (50 ppm) and then with the high one of yeast extract (10 g/l) were the most effective treatments in increasing plant height, in comparison with those given by other combination treatments, during the two consecutive seasons.

3.2 Number of branches /plant

The listed data in Table (7) revealed that branch number of guar/plant was positively responded to the application of cattle manure, in the two seasons. Apparently, fertilizing guar plants with such manure at all levels, led to a significant augment in branch number/plant, during the two seasons, comparing to the check treatment. In connection, the highest number of branches/plant was observed by applying cattle manure at the moderate level (10 m^3/feddan) as ranged 28.2 and 34.8% over unfertilized plants, during the two growing seasons, respectively. The efficiency of organic manures on augmenting branch number was also demonstrated by Abdou *et al*. (2017) on guar, Gomaa *et al*. (2010) on faba bean and Khare *et al.* (2016) on soybean. Concerning stimulant substance treatments, the data in Table (7) emphasized that spraying guar plants with those studied materials positively affected branch number/plant, in the two seasons. Clearly, foliar spray with all tested substances. at all concentration in both seasons caused a significant increase in branch number/plant, except for yeast extract at the low concentration (5 g/l), in the first season, as compared to no sprayed ones. The highest values of such parameter were obtained due to foliar spray with seaweeds extract and

garlic extract, each at the high concentrations, 2 ml/l and 50 ppm, respectively which they augmented branch number/plant by 45.7, 36.2, 68.4 and by 58.1% over control plants, in the first and second seasons, respectively. The role of moringa extract in improving branch number was also insured by Maishanu *et al.* (2017) on cowpea and Yasmeen *et al*. (2014) on tomato. The primitive influence of yeast extract on branch number was also stated by Al-Qubaie (2002) on roselle and El-Tohamy *et al*. (2008) on eggplant. The increments of branch number due to applying garlic extract has been explained by Mohamed *et al*. (2020) on faba bean and Hayat *et al*. (2018) on pepper. The unique role of seaweeds extract in augmenting branch number was also reported by Mahmoud *et al*. (2021) on roselle and Hamed (2017) on anise.

Table (7): Effect of cattle manure levels, stimulant substances and their interactions on number of branches of guar plants, during 2020 and 2021 seasons.

Some stimulant substances (B)	Cattle manure levels (A)				
	Control	5 m^3/feddan	10 m^3/feddan	15 m^3/feddan	Mean (B)
	First season (2020)				
Control	12.3	14.3	15.4	13.2	13.8
Moringa extract at 10 g/L	15.1	16.8	19.3	16.3	16.9
Moringa extract at 20 g/L	15.4	17.2	19.6	17.3	17.4
Yeast extract at 5 g/L	13.3	14.8	16.5	14.2	14.7
Yeast extract at 10 g/L	15.8	18.9	20.3	17.7	18.2
Garlic extract at 25 ppm	14.1	15.8	17.3	14.8	15.5
Garlic extract at 50 ppm	16.1	19.3	21.3	18.4	18.8
Seaweed extract at 1 m/L	14.9	16.4	18.3	15.4	16.2
Seaweed extract at 2 m/L	16.9	20.6	23.5	19.7	20.1
Mean (A)	14.9	17.1	19.1	16.3	
L.S.D. at 5%		A = 1.4	B = 1.5	A×B = 3.0	
	Second season (2021)				
Control	9.6	12.3	13.4	11.6	11.7
Moringa extract at 10 g/L	14.4	16.5	18.6	16.2	16.4
Moringa extract at 20 g/L	15.2	16.8	19.5	16.4	17.0
Yeast extract at 5 g/L	10.5	13.4	15.2	13.3	13.1
Yeast extract at 10 g/L	15.3	17.2	20.1	17.5	17.5
Garlic extract at 25 ppm	12.5	14.6	17.3	14.3	14.7
Garlic extract at 50 ppm	16.1	18.5	21.7	17.8	18.5
Seaweed extract at 1 m/L	13.8	15.7	18.5	15.1	15.8
Seaweed extract at 2 m/L	16.7	20.1	23.4	18.4	19.7
Mean (A)	13.8	16.1	18.6	15.6	
L.S.D. at 5%		A = 1.1	B = 1.3	A×B = 2.5	

As for the combined effect, it was statistically significant on branch number/plant of guar, during both seasons. from the obtained results, it could be noticed that the use of most combined treatments resulted in a significant augment in branch number/plant, in the two seasons, comparing to untreated plants. Obviously, the utilization cattle manure at the moderate level (10 m^3/feddan) in combination with seaweeds extract at 2

ml/l or with garlic extract at 50 ppm achieved the maximum values of such aspect, in comparison with those noticed by other combination treatments, during the two experimental seasons, as clearly declared in Table (7).

3.3 Herb dry weight /plant

Shown data in Table (8) cleared that herb dry weight/plant of guar was significantly affected by receiving the plants cattle manure, in both seasons. Apparently, such trait was significantly increased as a result of treating the plants with cattle manure at all levels, comparing to the check treatment, in the two seasons. It seems that the heaviest herb dry weight/plant was detected, when adding cattle manure at the moderate level (10 m^3/feddan) reached 20.8 and 24.3% over unfertilized ones, in both seasons, respectively. The importance of organic manures in augmenting herb dry weight has been examined by Abo El-Ezz (2019), Abdou *et al.* (2017), Elnesairy *et al*. (2016), Chavan *et al*. (2015) and Nattudurai (2014) on guar.

Table (8): Effect of cattle manure levels, stimulant substances and their interactions on herb dry weight (g) of guar plants, during 2020 and 2021 seasons.

Some stimulant substances (B)	Cattle manure levels (A)				
	Control	5 m^3/feddan	10 m^3/feddan	15 m^3/feddan	Mean (B)
	First season (2020)				
Control	126.6	138.6	146.2	135.3	136.7
Moringa extract at 10 g/L	137.2	153.2	164.4	148.3	150.8
Moringa extract at 20 g/L	139.5	156.9	169.7	153.0	154.7
Yeast extract at 5 g/L	131.1	142.7	149.4	137.5	140.2
Yeast extract at 10 g/L	140.3	160.6	174.3	155.5	157.6
Garlic extract at 25 ppm	134.5	145.2	154.8	140.1	143.7
Garlic extract at 50 ppm	142.9	161.4	181.8	157.8	161.0
Seaweed extract at 1 m/L	136.7	149.6	161.6	144.6	148.1
Seaweed extract at 2 m/L	144.6	164.4	187.4	160.9	164.3
Mean (A)	137.0	152.5	165.5	148.1	
L.S.D. at 5%		A = 4.5	B = 5.1	A×B = 10.2	
	Second season (2021)				
Control	120.2	134.7	142.3	130.9	132.0
Moringa extract at 10 g/L	131.3	149.6	162.6	147.5	147.7
Moringa extract at 20 g/L	132.2	154.2	166.7	150.2	150.8
Yeast extract at 5 g/L	122.1	137.4	148.5	133.3	135.3
Yeast extract at 10 g/L	136.5	157.5	172.5	152.7	154.8
Garlic extract at 25 ppm	125.5	141.3	154.3	138.3	139.8
Garlic extract at 50 ppm	141.6	160.2	179.2	155.6	159.2
Seaweed extract at 1 m/L	130.5	146.2	160.7	144.5	145.5
Seaweed extract at 2 m/L	144.6	163.4	185.5	156.2	162.4
Mean (A)	131.6	149.4	163.6	145.5	
L.S.D. at 5%		A = 4.1	B = 4.7	A×B = 9.4	

In relation to stimulant substance treatments spraying guar plants with these materials significantly influenced herb dry weight/plant in the two seasons. (Table 8). Clearly, such aspect was significantly augmented as a result of

foliar spray with the four studied stimulant substances at all concentrations, except for yeast extract at 5 g/l, in both seasons, comparing to no sprayed plants. Moreover, foliar spray with seaweed extract at 2 ml/l, followed by garlic extract at 50 ppm and then yeast extract at 10 g/l proved to be more effective in increasing herb dry weight/plant than those revealed by other treatments and control, during the two consecutive seasons. Numerically, these above-mentioned superior treatments augmented such parameter by 20.2, 17.8, 15.3, 23.0, 20.6 and by 17.3 % over untreated ones, in the two seasons, respectively. The enhancement in herb weight due to the use of moringa extract has been declared by Latif and Mohamed (2016) and Rady *et al*. (2015) on common bean. The stimulating influence of yeast extract on herb weight was also described by Al-Qubaie (2002) on roselle and Abd El-Latif and Esraa (2006) on *Salvia officinalis*. The efficiency of garlic extract on augmenting herb weight was also concluded by Mohamed *et al.* (2020) on faba bean and Al-Obady (2015) on tomato. The capability of seaweeds extract on increasing herb weight has been exhibited by Vijayanand *et al*. (2014) and Ramya *et al.* (2011) on guar. Data in Table (8) illustrated that herb dry weight/plant of guar was significantly affected by the interaction treatments, during the two growing seasons. Obviously, treating the plants with the most combined treatments led to a significant increase in herb dry weight/plant, in relative to control plants, during both seasons. In this concern, higher values of such trait were detected from adding cattle manure at the moderate level (10 m^3/feddan) plus seaweeds extract at 2 m/l, followed by the same level of such manure + garlic extract at 50 ppm than those obtained by other combination treatments, in the two seasons.

3.4 Seed yield/plant and per feddan

The presented data in Tables (9 and 10) revealed that seed yield/plant and per feddan of guar were positively responded to the application of cattle manure, during the two experimental seasons. From the obtained results, it could be noticed that supplemented the plants with cattle manure at all levels resulted in a significant augment in seed yield/plant and per feddan, as compared to the check treatment, in both seasons. Apparently, the use of cattle manure at the moderate level (10 m^3/feddan) gave the highest values of seed yield/plant and per feddan as ranged 37.8 and 46.9% over unfertilized ones, during the two consecutive seasons, respectively. Moreover, this previous superior treatment produced 590.2 and 522.2 Kg/feddan seeds, while the check treatment recorded 428.3 and 355.6 kg/fed seeds, in the first and second seasons, respectively. The beneficial influence of organic manures on increasing seed yield was also reported by Abo El-Ezz (2019), Abdou *et al.*

(2017), Elnesairy *et al*. (2016) and Chavan *et al*. (2015) on guar. It is evident from the obtained data in Tables (9 and 10) that seed yield/plant and per feddan of guar were significantly affected by foliar spray with the studied stimulant substances, during the two consecutive seasons. It is clear that utilizing all these substances at all concentrations significantly augmented seed yield/plant and per feddan, in both seasons, as compared to no sprayed ones. Obviously, foliar spray with seaweeds extract at 2 m/l, gave heavier seed yield/plant and per feddan than those noticed by other treatments and control, during the two experimental seasons. In connection, this above-mentioned superior treatment increased these aspects by 60.6 and by 82.4% over control, in the two seasons, respectively and also yielded 589.6 and 528.3 Kg/fed seeds, in contrast no sprayed plants produced 367.1 and 289.6 Kg/fed seeds. during the two growing seasons, respectively.

Table (9): Effect of cattle manure levels, stimulant substances and their interactions on seed yield (g)/plant of guar plants, during 2020 and 2021 seasons.

Some stimulant substances (B)	Cattle manure levels (A)				
	Control	5 m^3/feddan	10 m^3/feddan	15 m^3/feddan	Mean (B)
	First season (2020)				
Control	19.3	22.3	24.6	21.9	22.0
Moringa extract at 10 g/L	25.9	29.5	36.1	28.8	30.1
Moringa extract at 20 g/L	26.5	31.3	37.9	29.1	31.2
Yeast extract at 5 g/L	23.5	27.0	30.4	25.5	26.6
Yeast extract at 10 g/L	28.1	31.8	39.2	30.9	32.5
Garlic extract at 25 ppm	24.8	27.6	32.6	26.4	27.9
Garlic extract at 50 ppm	28.3	33.2	40.4	32.6	33.6
Seaweed extract at 1 m/L	25.2	28.6	35.3	27.2	29.1
Seaweed extract at 2 m/L	29.7	35.7	42.2	33.9	35.4
Mean (A)	25.7	29.7	35.4	28.5	
L.S.D. at 5%	A = 1.7		B = 1.8	A×B = 3.5	
	Second season (2021)				
Control	14.1	18.5	20.5	16.4	17.4
Moringa extract at 10 g/L	21.3	24.4	31.1	23.0	25.0
Moringa extract at 20 g/L	21.6	26.2	33.1	24.6	26.4
Yeast extract at 5 g/L	19.7	23.1	27.8	21.7	23.1
Yeast extract at 10 g/L	22.6	26.9	33.7	25.5	27.2
Garlic extract at 25 ppm	20.9	23.5	29.4	22.5	24.1
Garlic extract at 50 ppm	24.7	29.7	37.0	28.7	30.0
Seaweed extract at 1 m/L	21.1	23.7	30.2	22.9	24.5
Seaweed extract at 2 m/L	26.0	31.6	39.2	30.0	31.7
Mean (A)	21.3	25.3	31.3	23.9	
L.S.D. at 5%	A = 1.5		B = 1.7	A×B = 3.3	

The important role of moringa extract in improving seed yield has been discussed by Rady *et al*. (2015) on common bean and Maishanu *et al.* (2017) on cowpea. The enhancing seed yield due to the application of yeast extract was also insured by Amer (2004) on common bean. The beneficial role of garlic extract in increasing seed yield has been described by Ahmed *et al*. (2005) on pea

and Mohamed *et al.* (2020) on faba bean. The efficiency of seaweeds extract on increasing seed yield has been proved by Vijayanand *et al*. (2014), Thirumaran *et al.* (2009) and Khater and Rania (2016) on guar. With respect to the combined effect, it was statistically significant on seed yield/plant per feddan of guar, during the two experimental seasons. Clearly, supplemented the plants with all combined treatments, in the two seasons, resulted in a significant increase in seed yield/plant and per feddan, except for the treatment of cattle manure at the low level (5 m^3/feddan) with stimulant substances, in the first season and, also the treatment of cattle manure at the high one (15 m^3/feddan) plus stimulant substances, in both seasons, as compared to untreated plants. The most effective treatments were obtained when adding cattle manure at 10 m^3/feddan with seaweeds extract at 2 ml/l, followed by the same level of manure garlic extract at 50 ppm, in combination with those detected by other combination treatments, during the two seasons. moreover, these aforementioned superior treatments amounted 703.3, 673.3, 653.3 and 616.7 Kg/feddan seeds, in relative to control gave 410.0 and 341.7 kg feddan seeds, in the first and second seasons, respectively, as clearly shown in Tables (9 and 10).

Table (10): Effect of cattle manure levels, stimulant substances and their interactions on seed yield (kg)/feddan of guar plants, during 2020 and 2021 seasons.

Some stimulant substances (B)	Cattle manure levels (A)				
	Control	5 m^3/feddan	10 m^3/feddan	15 m^3/feddan	Mean (B)
	First season (2020)				
Control	321.7	371.7	410.0	365.0	367.1
Moringa extract at 10 g/L	431.7	491.7	601.7	480.0	501.3
Moringa extract at 20 g/L	441.7	521.7	631.7	485.0	520.0
Yeast extract at 5 g/L	391.7	450.0	506.7	425.0	443.4
Yeast extract at 10 g/L	468.3	530.0	653.3	515.0	541.7
Garlic extract at 25 ppm	413.3	460.0	543.3	440.0	464.2
Garlic extract at 50 ppm	471.7	553.3	673.3	543.3	560.4
Seaweed extract at 1 m/L	420.0	476.7	588.3	453.3	484.6
Seaweed extract at 2 m/L	495.0	595.0	703.3	565.0	589.6
Mean (A)	428.3	494.5	590.2	474.6	
L.S.D. at 5%	A = 20.0 B = 27.0 A×B = 54.0				
	Second season (2021)				
Control	235.0	308.3	341.7	273.3	289.6
Moringa extract at 10 g/L	355.0	406.7	518.3	383.3	415.8
Moringa extract at 20 g/L	360.0	436.7	551.7	410.0	439.6
Yeast extract at 5 g/L	328.3	385.0	463.3	361.7	384.6
Yeast extract at 10 g/L	376.7	448.3	561.7	425.0	452.9
Garlic extract at 25 ppm	348.3	391.7	490.0	375.0	401.3
Garlic extract at 50 ppm	411.7	495.0	616.7	478.3	500.4
Seaweed extract at 1 m/L	351.7	395.0	503.3	381.7	407.9
Seaweed extract at 2 m/L	433.3	526.7	653.3	500.0	528.3
Mean (A)	355.6	421.5	522.2	398.7	
L.S.D. at 5%	A = 23.0 B = 25.2 A×B = 50.4				

3.5 Guran percentage

The given results in Table (11) exhibited that guran percentage in the seeds of guar was positively responded to the addition of cattle manure, during the two experimental seasons. Clearly, supplying guar plants with such manure at all levels, resulted in a significant increase in guran percentage, during both seasons, as compared to the check treatment. Moreover, plants treated with the moderate level of cattle manure (10 m^3/feddan) registered the highest guran percentage reached 14.48 and 14.25% over unfertilized ones, in the two seasons, respectively. The stimulation in guran percentage as a result of applying organic manures has been studied by Abdou *et al.* (2017) and Shehata *et al.* (2017) on guar. As for stimulant substance treatments, data in Table (11) revealed that guran percentage in guar seeds was significantly affected by foliar spray with the four tested stimulant substances, during the two seasons. Obviously, such trait was significantly augmented due to spraying all these substances, at all concentrations, comparing to control, in the two seasons. Apparently, the use of seaweeds extract at a 2 ml/l, proved to be more effective in increasing guran percentage than those detected by other treatments and control, during the two growing seasons. Numerically, this above-mentioned superior treatment increased guran percentage by 28.78 and by 28.79% over untreated plants, in the first and second seasons, respectively. The positive effect of moringa extract in enhancing guran percentage was also reported by Abdou *et al.* (2017) on guar. The role of yeast extract in improving guran percentage was also pointed out by Shehata (2017) on guar. The increments of guran percentage due to adding garlic extract has been described by Abdou *et al.* (2017) on guar. The unique role of seaweed extract in augmenting guran percentage was also demonstrated by Khater and Rania (2016) on cluster bean. Accordingly, the combined between the two examined factors on guran percentage in guar seeds had statistically significant effect, during the two growing seasons (Table 11). The application of all combined treatments caused a significant augment in such parameter, as compared to untreated plants, during both seasons. Obviously, the maximum values of guran were given by supplying the plants with cattle manure at the moderate level (10 m^3/feddan) in combination with seaweeds extract at 2 ml/l followed by the same level of such manure + garlic extract at 50 ppm, in comparison with those revealed by other combination treatments, during the two experimental seasons.

Table (11): Effect of cattle manure levels, stimulant substances and their interactions on guran percentage of guar plants, during 2020 and 2021 seasons.

Some stimulant substances (B)	Cattle manure levels (A)				
	Control	5 m^3/feddan	10 m^3/feddan	15 m^3/feddan	Mean (B)
	First season (2020)				
Control	10.42	11.56	12.66	11.48	11.53
Moringa extract at 10 g/L	12.53	13.46	14.26	13.09	13.34
Moringa extract at 20 g/L	12.78	13.54	14.33	13.44	13.52
Yeast extract at 5 g/L	11.30	12.25	12.81	12.18	12.14
Yeast extract at 10 g/L	13.28	14.37	15.12	14.08	14.21
Garlic extract at 25 ppm	11.66	12.69	13.17	12.37	12.47
Garlic extract at 50 ppm	13.49	14.62	15.60	14.58	14.57
Seaweed extract at 1 m/L	12.07	12.78	13.53	12.77	12.79
Seaweed extract at 2 m/L	13.70	14.93	15.87	14.88	14.85
Mean (A)	12.36	13.36	14.15	13.21	
L.S.D. at 5%		A = 0.17	B = 0.29	A×B = 0.58	
	Second season (2021)				
Control	10.33	11.42	12.57	11.39	11.43
Moringa extract at 10 g/L	12.47	13.41	14.09	13.02	13.25
Moringa extract at 20 g/L	12.76	13.48	14.23	13.37	13.46
Yeast extract at 5 g/L	11.21	12.17	12.67	12.07	12.03
Yeast extract at 10 g/L	13.24	14.29	14.93	14.05	14.13
Garlic extract at 25 ppm	11.53	12.51	13.06	12.28	12.35
Garlic extract at 50 ppm	13.38	14.46	15.44	14.40	14.42
Seaweed extract at 1 m/L	11.94	12.68	13.49	12.66	12.69
Seaweed extract at 2 m/L	13.62	14.77	15.76	14.71	14.72
Mean (A)	12.28	13.24	14.03	13.11	
L.S.D. at 5%		A = 0.18	B = 0.22	A×B = 0.44	

3.6 Guran yield (g)/plant and (Kg) per feddan

The listed data in Tables (12 and 13) postulated that guran yield/plant and per feddan of guar were significantly influenced by the application of cattle manure, in both seasons. Fertilizing guar plants with such manure at all levels led to a significant increase in guran yield/plant and per feddan, in the two seasons, comparing to the check treatment. Obviously, the use of cattle manure at the moderate level (10 m^3/feddan) produced the highest guran yield/plant and per feddan as ranged 57.8 and 67.6 % over unfertilized ones, in the first and second seasons, respectively. In this connection, this previous superior treatment yielded 84.4 and 74.1 Kg/feddan guran, in relative to control (53.5 and 44.2) Kg/feddan guran, in the two seasons, respectively. The efficiency of organic manures on augmenting guran yield has been insured by Gomaa and Mohamed (2007), Shehata (2013) and Patel *et al*. (2010) on guar. Regarding stimulant substance treatments, it could be noticed that spraying these materials positively affected guran yield/plant and per feddan of guar, during the two consecutive seasons (Tables 12 and 13). It appears that foliar spray with these studied substances, at all concentrations, resulted in a significant increase in these traits, as compared to no sprayed ones, during the two growing seasons. Moreover, plants treated with 2 ml/l

seaweeds extract proved to be more effective in increasing guran yield/plant and per feddan than those detected by other treatments and control, in both seasons. Numerically, this above-mentioned superior treatment augmented these aspects by 107.3 and by 134.4% over untreated plants, in both seasons, respectively. In connection, also this previous superior treatment produced 88.1 and 78.3 Kg/feddan guran, while control recorded 42.5 and 33.4 Kg/feddan guran, during the two consecutive seasons, respectively.

Table (12): Effect of cattle manure levels, stimulant substances and their interactions on guran yield(g) /plant of guar plants, during 2020 and 2021 seasons.

Some stimulant substances (B)	Cattle manure levels (A)				
	Control	5 m^3/feddan	10 m^3/feddan	15 m^3/feddan	Mean (B)
	First season (2020)				
Control	2.01	2.58	3.11	2.51	2.55
Moringa extract at 10 g/L	3.25	3.97	5.15	3.77	4.04
Moringa extract at 20 g/L	3.39	4.24	5.43	3.91	4.24
Yeast extract at 5 g/L	2.66	3.31	3.89	3.11	3.24
Yeast extract at 10 g/L	3.73	4.57	5.93	4.35	4.65
Garlic extract at 25 ppm	2.89	3.50	4.29	3.27	3.49
Garlic extract at 50 ppm	3.82	4.85	6.30	4.75	4.93
Seaweed extract at 1 m/L	3.04	3.66	4.78	3.47	3.74
Seaweed extract at 2 m/L	4.07	5.33	6.70	5.04	5.29
Mean (A)	3.21	4.00	5.06	3.80	
L.S.D. at 5%		A = 0.22	B = 0.34	A×B = 0.68	
	Second season (2021)				
Control	1.46	2.11	2.58	1.87	2.01
Moringa extract at 10 g/L	2.66	3.27	4.38	2.99	3.33
Moringa extract at 20 g/L	2.76	3.53	4.71	3.29	3.57
Yeast extract at 5 g/L	2.21	2.81	3.52	2.62	2.79
Yeast extract at 10 g/L	2.99	3.84	5.03	3.58	3.86
Garlic extract at 25 ppm	2.41	2.94	3.84	2.76	2.99
Garlic extract at 50 ppm	3.30	4.29	5.71	4.13	4.36
Seaweed extract at 1 m/L	2.52	3.01	4.07	2.90	3.13
Seaweed extract at 2 m/L	3.54	4.67	6.18	4.41	4.70
Mean (A)	2.65	3.39	4.45	3.17	
L.S.D. at 5%		A = 0.23	B = 0.25	A×B = 0.50	

Regarding the interaction, it is statistically significant effect on guran yield/plant and per feddan of guar, during the two growing seasons. Clearly, supplying the plants with all combined treatments caused a significant increase in guran yield/plant and per feddan, in the two seasons, except for the treatment of cattle manure at the high level (15 m^3/feddan) with stimulant substances for the two reasons and also cattle manure at 5 m^3/feddan + stimulant substances, as well as such manure plus yeast extract at 5 g/l, in the first season, as compared to untreated plants. Obviously, the addition of cattle manure at the moderate level (10 m^3/fed.) in combination with seaweeds extract at 2 m/l, followed by the same treatment of such manure with garlic extract at 50 ppm proved to be more effective in augmenting guran yield/plant and per feddan than those given by other

combination treatments during the two consecutive seasons. Moreover, these previous superior treatments yielded 111.7, 105.0, 103.0 and 95.2 Kg/feddan guran, in relative to control registered 51.8 and 43.0 Kg/feddan guran, during the two seasons, respectively, as clearly declared in Tables (12 and 13).

Table (13): Effect of cattle manure levels, stimulant substances and their interactions on guran yield(kg)/feddan of guar plants, during 2020 and 2021 seasons.

Some stimulant substances (B)	Cattle manure levels (A)				
	Control	5 m^3/feddan	10 m^3/feddan	15 m^3/feddan	Mean (B)
	First season (2020)				
Control	33.5	43.0	51.8	41.8	42.5
Moringa extract at 10 g/L	54.2	66.2	85.8	62.8	67.3
Moringa extract at 20 g/L	56.5	70.7	90.5	65.2	70.7
Yeast extract at 5 g/L	44.3	55.2	64.8	51.8	54.0
Yeast extract at 10 g/L	62.2	76.2	98.8	72.5	77.4
Garlic extract at 25 ppm	48.2	58.3	71.5	54.5	58.1
Garlic extract at 50 ppm	63.7	80.8	105.0	79.2	82.2
Seaweed extract at 1 m/L	50.7	61.0	79.7	57.8	62.3
Seaweed extract at 2 m/L	67.8	88.8	111.7	84.0	88.1
Mean (A)	53.5	66.7	84.4	63.3	
L.S.D. at 5%	A = 3.5 B = 4.2 A×B = 8.4				
	Second season (2021)				
Control	24.3	35.2	43.0	31.2	33.4
Moringa extract at 10 g/L	44.3	54.5	73.0	49.8	55.4
Moringa extract at 20 g/L	46.0	58.8	78.5	54.8	59.5
Yeast extract at 5 g/L	36.8	46.8	58.7	43.7	46.5
Yeast extract at 10 g/L	49.8	64.0	83.8	59.7	64.3
Garlic extract at 25 ppm	40.2	49.0	64.0	46.0	49.8
Garlic extract at 50 ppm	55.0	71.5	95.2	68.8	72.6
Seaweed extract at 1 m/L	42.0	50.2	67.8	48.3	52.1
Seaweed extract at 2 m/L	59.0	77.8	103.0	73.5	78.3
Mean (A)	44.2	56.4	74.1	52.9	
L.S.D. at 5%	A = 3.8 B = 3.9 A×B = 7.8				

From the obtained results, it could be discussed as follows: The augment in the plant growth traits, seed yield, guran percentage and guran yield of guar in this investigation resulting from the addition of cattle manure as organic manures reflect the positive, physiological and biological roles of organic manures which were examined by many authors such as, Bohn *et al*. (1985) suggested that organic manures play an important roles as a main source of some macronutrients (N, P and S) and, also high amounts of both elements (B and Mo). Besides, organic matter is a source of energy for Azotobacter growth. Dhull *et al*. (2004) stated that microbial biomass was stimulated by applying organic manures. Furthermore, organic matter is considered as the basis of soil fertility. The stimulation in the examined aspects due to foliar spray with moringa extract could be explored in the light of the beneficial roles of moringa extract which were exhibited by some investigations for examples: moringa leaf extract is rich

in phytohormones namely, zeatin, GA and IAA (Fuglie, 1999). It contains macro and micronutrients, plant growth substances, amino acids, antioxidants and allele chemical vitamins (Dhakar, *et al*., 2013). Moreover, moringa leaf extract is vital role in a biostimulant because it contains essential nutrients, phenols, phytohormones, antioxidants and acrobats (Rady and Mohamed, 2015). The promotion of the studied characteristics as a result of foliar spray with yeast extract may be due to the important roles of yeast extract which were explained by many researchers like, Nagodo (1991) mentioned that active yeast extract plays an important role as a good source of many natural growth hormones (cytokinins), a lot of vitamin B, nutritional elements such as, P, K, S, Ca, Na and Mg, nucleic acids, proteins, lipids and carbohydrates. Yeast contains some growth substances like auxin (Kihlberg, 1972; Moor, 1979) and it contains cytokinins (Ferguson *et al*., 1986). The application of garlic extract in this work led to an increase in the tested parameters may be attributed to the important roles of garlic extract which were studied by some workers as follows: dry garlic powder contains moisture, protein, fat, crude fiber, volatile oil, carbohydrates, total ash, vitamin C, selenium, zinc and sulphur compounds (Alliin and Glutamyl-S-allyl-L-cysteine (Mariam and Devi, 2016). Furthermore, Sajid *et al*. (2014) reported that garlic contains moisture, protein, fiber, ash, ether extract and nitrogen free extract. The studied traits in the present research were augmented from spraying seaweeds extract may be due to the positive, physiological and biologically roles of seaweeds extract which were described by many investigators such as, Ho *et al*. (2003) and Fornes *et al.* (1993) pointed out that seaweeds extract has been excellent natural fertilizer and are good source of organic matter. Also, it contains high concentrations of elements namely, N, P, K, S, Ca, Mg, Zn, Mn, Fe and C. In addition, Osman and Salem (2011) concluded that seaweeds extract plays an important role as a good source of bioactive compounds like, mineral, vitamins, protein, essential fatty acids, carotenoids and dietary fiber. From the revealed results, it could be recommended to supply the soil of guar (*Cyamopsis tetragonoloba* L.) plants with cattle manure at 10 m^3/feddan and foliar spray with seaweeds extract at 2 ml/l or with foliar spray with garlic extract at 50 ppm to enhance the growth, seed yield and guran percentage, as well as, guran yield under this research conditions.

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