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Response of gazon grass plants to compost, humic acid and bio-fertilizer

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ABSTRACT

The present study was carried out at New Minia city, Minia, Egypt during the two seasons 2017/2018 and 2018/2019 to evaluate the response of growth characters of gazon grass plant to organic fertilization by compost and humic acid (at 100 ml/m^2) as well as bio-fertilizer (Minia azoten). All vegetative growth parameters; covering density, plant height, fresh and dry weights of clipping gazon grass showed high significant response for compost, biofertilizer and/or humic acid treatments of the three clippings. The applied treatment of soaked compost (4-liter) and humic acid combined with biofertilizer recorded the highest values of all vegetative growth parameters compared to control of the three clippings in both seasons. The combination of the high level of soaked compost + humic acid + biofertilizer recorded the highest values of growth parameters in all clippings of the two seasons compared to each of them alone and the control.

Keywords: gazon, organic, compost, humic acid, bio-fertilizer

INTRODUCTION

Gazon grass (*Lolium perenne* L.) is a turfgrass commonly planted in Egypt. Gazon grass plants are grown for reducing air temperature, create aesthetic front view as green carpet of trees, shrubs and flowers in gardens, acts as a cushion to reduce injuries in gardens, children's playgrounds and racing tracks and stabilizing slopes, tolerate successive mowing and walking, and is characterized by rapid growth and strong resistance to diseases.

Use of agrochemicals have caused exponentially to the environment pollution and showed adversely effect on human and animal health in addition to soil microbial. Moreover, to its high cost. All these problems have stimulated researchers to provide alternatives to agrochemicals (Javaid, 2010). Organic fertilizers (compost and humic acid) and bio-fertilizers are sources of these alternatives. Compost is composed of plant and animal waste only and is completely free of any chemicals with negative consequences on the environment, soil and humans. Evanylo *et al.* (2016) found that growth of tall fescue, perennial ryegrass, and Kentucky bluegrass were increased by adding composts. Compost benefits are increased with time. Bilgili *et al.* (2013) found that the monthly and/or spring + fall top dressing of compost increased the color and quality ratings of the turf mixture. Ntoulas *et al.* (2011) evaluated the influence of compost on the establishment rate of *Cynodon dactylon* and showed that the clipping dry weights were increased by using compost amendments. Dunifon *et al.* (2011) compared surface applications of compost on turfgrass stand of tall *Festuca arundinacea* Schreb. and *Festuca rubra* L. ssp. fallax (Thuill.) Nyman. They showed that higher percentages of ground coverage were reported by the compost. The surface additions of compost enhanced the stand and growth of fescue.

Humic acid is a natural organic compound fossilized for thousands of years extracted from special mines that has a biological and physiological effect on plants as well as a physical, chemical and biological effect on the soil. El-Sayed *et al*, (2008) studied the effect of spraying with humic acid on growth of seashore paspalum. The results showed that humic acid resulted in an improvement of covering rate, plant height, dry and fresh weights of herb, photosynthetic pigments (chlorophyll a, b and carotenoids content) in the leaves compared to control.

Recent scientific studies showed that soil fertility threatened due to the low content of organic matter and the lack of humic acid. Among the reasons of using humic acid as an organic fertilizer to improve soil fertility and plant growth are its high ability to improve the physical and chemical properties of the soil and increase the soil's ability to retain water, save irrigation water and drought resistant, in addition to that humic acid activates beneficial microorganisms. Organic fertilizers in combination with the bio-fertilizers produced the best outcomes in terms of plant growth, green cap and nutrient uptake of *Dactylis glomerata* L., *Lolium perenne* L., *Poa pratensis* L. and *Festuca arundinacea* Schreb (Visconti *et al.*, 2020). Abd El-Kafee *et al.* (2014) observed the positive effect of humic acid and effective microorganisms on the vegetative growth parameters of *Pelargonium graveolens* L. Xu *et al.* (2014) indicated that effective microorganisms + humic acid, could increase height of Gazania sunshine. The application of microbial agent and humic acid together had good synergistic action.

Biofertilizers are a mix of effective microorganisms such as species of photosynthetic bacteria, lactobacilli, yeasts and actinomycetes that provide one or more nutrients necessary for plant growth in available form for plant absorption, and bio-fertilizers are one of the types of environmentally friendly fertilizers that are used in world wide. El-Sayed (2012) investigated the response of *Paspalum vaginatum* Swartz to some natural activators. The results showed that all vegetative growth traits and the content of chlorophyll a, b and carotenoids in the leaves were significantly improved over control in response to individual kristalon or EM combined treatments in both seasons. Ali *et al*. (2018) studied the effect of compost, NPK and/or effective microorganisms (E.M.) on the performance of bermuda grass grown in sandy soil. They revealed that the high compost level + 75 % NPK + E.M. caused high significant in all studied vegetative growth characters and the three photosynthetic pigments.

The present study aimed to evaluate the response of growth characters of gazon grass plant to organic fertilization by compost, humic acid and bio-fertilizer.

MATERIALS AND METHODS

The present study was carried out at new Minia city, Minia, Egypt during the two seasons of 2017/2018 and 2018/2019 to investigate the response of growth characters of gazon grass plant to organic fertilization by compost, humic acid and bio-fertilization.

Gazon grass plant was sown on 1 December of the two seasons with seeding rate (30 g./m^2) in sandy soil. The physical and chemical analyses of the soil used in the experiment are presented in Table (1).

Table (1). The physical and chemical analyses of the soil used in the study.

Chemical analysis									
pH	EC dSm -1	Cations (meq/l)			K ppm	Anions (meq/l)			
		Ca	Mg	Na		Cl	CO_3	HCO_3	SO_4
8.58	75	0.36	0.17	0.23	5	0.36	0.00	0.75	0.12
Physical analysis									
Clay %	3.16	Silt %	8.00	Sand %	88.84				

Seeds of gazon grass was obtained from Hamza Co., Giza, Egypt. Seeds were broadcasted in the experimental plot 1 m^2. The experiment was regularly irrigated as needed to keep the soil surface moist until complete seedling emergence. The experiment was including 12 treatments, which were arranged in a split plots in a complete randomized block design with three replicates. The three plant compost treatments; control, 2-liter soaked compost (2LSC) and 4-liter soaked compost (4LSC) were allocated in the main plots. All treatments were applied three times after 25 days from sowing date and nearly each one-month thereafter. Treatments were applied with the previous irrigation for each clipping. The four treatments of humic acid and/or biofertilizer: control, bio-fertilizer (BIO), humic acid (HA) and bio fertilizer + humic acid (BIO + HA) were randomly allocated in the sub plots.

Soaked compost treatments were prepared according to (Ali, 2009) by adding 100 kg. compost: 1000-liters fresh water then compost solution was lifted in water for 48 hours. After that soaked compost was diluted by 1-litre soaked compost with 200-litre fresh tap water. The two treatments of soaked compost were taken from the diluted compost solution (1-litre soaked compost: 200-litre water) by 2-litre soaked compost and 4-litre soaked compost. Humic acid in liquid form was added by 100 ml/m^2. Bio-fertilizer under the trade name of Minia Azotein (M.A.) is a bio-fertilizer containing nitrogen fixing bacteria (1 ml=107 cells of bacteria (Ali *et al.*, 2018). Minia azoten added by 100 ml/m^2. The source of Minia azoten was the unit of bio fertilizer production Fac. of Agric, Minia University, El-Minia Egypt. The compost under trade name Obour compost was obtained from Minia Composting Facility in new Minia city. All treatments applied three times after 25 days from sowing date and nearly each one-month thereafter.

The following data were recorded for three clippings at 15 January, 15 February and 15 March of 1st, 2nd and 3rd clippings, respectively in the two seasons. Clapping the plants was done at 3 cm above soil surface. All plants from each sub plot 1 m^2 in the three clippings were taken to determine covering density (CD) % measured by quadrae frame according to El-Tantawy et al. (1993), plant height (PH) in cm, fresh weight (FW) in g. and dry weights of clipping gazon grass (DW) in g.

The collected data were subjected to the statistical analysis and means were compared using the L.S.D. at 5% as described by Gomez and Gomez (1984). This statistical analysis was done by using the computer program MSTATC (1990) software version (4).

RESULTS AND DISCUSSION

1- Vegetative growth parameters:

All vegetative growth parameters showed high significant response for compost, biofertilizer and/or humic acid fertilization treatments of the three clippings of the grass in 1st (2018) and 2nd (2019) seasons, as indicated from LSD values (Tables 2, 3, 4 and 5).

Covering density was gradually increased from the 1st until 3rd clipping as a result of application of the compost treatments before irrigation of each clipping (Table, 2). The high level of soaked compost (4-liter) recorded the highest covering density in comparison with the control of the three clippings in both seasons, indicating the important role of nutrients presents in compost for promoting high covering density. Visconti *et al.* (2020) found that green cap for turfgrass; *Dactylis glomerata L., Lolium perenne L., Poa pratensis L.* and *Festuca arundinacea Schreb* was improved by compost amendment.

The treatment of humic acid plus biofertilizer (BIO+HA) was recorded the highest covering density of gazon grass in all clippings of the two seasons compared to each of them alone and the control (Table, 2). These results refer to the beneficial effect of humic acid - bio fertilizer interaction on covering density. El-Sayed (2008) recommended to spray of paspalum plants with humic acid at 10 ml/l to achieve the high of growth and quality.

In the two seasons, the both interactions 4LSC-BIO and 2LSC-(BIO+HA) recorded covering density with no significant difference in the first two clippings compared to each of them alone and the control. Indicating that positive effect of humic acid could be contribute to the second half of soaked compost in case of using half level-soaked compost (2-litre) (Table 2). The high level of soaked compost 4-litre combined with biofertilizer was compensate absence of humic acid in the treatment to achieve high covering density % in the first two clippings. The two interactions BIO+HA and 2LSC-BIO gave nearly same covering density without significant difference in 3rd clipping. Moreover, control treatment and each of them separately 2LSC, BIO and HA were recorded covering density lower than the interaction in all clippings (Table 2). This mean that humic acid gave the same effect of low-level soaked compost 2-litre. This result is confirmed in clippings two and three, where the two treatments 2LSC and humic acid gave covering density of clipping two and three without significant difference. Abd El-Kafee *et al.* (2014) observed the positive effect of humic acid and effective microorganisms on the vegetative growth parameters of *Pelargonium graveolens* L.

Data presented in Table (3) indicated significant effect of compost, biofertilizer and/or humic acid treatments as well as their interactions on plant height of the three clippings of gazon grass in in 1st (2018) and 2nd (2019) seasons, except for the interaction in 1st clipping in 2nd season. The treatment of 4-litre soaked compost gave the highest plant height in all three clippings, in the two seasons. Lian *et al*. (2007) showed that the domestic rubbish compost mixed with haulm increased plant height of *Lolium perenne* L and *Festuca arundinacea* L.

Application of humic acid and bio fertilizer together recorded the tallest gazon grass plants followed by biofertilizer only then humic acid only. While, the control treatment gave the shortest gazon grass plant in all clippings of the two seasons (Table, 3). These results indicated the stimulated positive effect of humic acid and Minia azoten biofertilizer on plant height of gazon grass plants. Abd El-Kafee *et al.* (2014) found that the highest plant height of *Pelargonium graveolens* L, in both seasons, was recorded from the application of humic acid at 5 liters/fed. Xu *et al.* (2014) indicated that effective microorganisms + humic acid, could increase height of Gazania sunshine compared to the control treatment. The application of microbial agent and humic acid together had good synergistic action.

The highest values of plant height of gazon grass plants were obtained from applying the combination treatment between the high level of soaked compost 4-litre with biofertilizer+ humic acid (Table, 3).

Table (2). Effect of compost (A), biofertilizer and/or humic acid (B) treatments on covering density% of three clippings of gazon grass in 1st (2017/2018) and 2nd (2018/2019) seasons.

	1st season 2017/2018				2nd season 2018/2019			
Treatments	Control	2LSC	4LSC	Mean	Control	2LSC	4LSC	Mean
	Clipping 1							
Control	15.00 K	20.67 i	34.67 f	23.45d	13.33i	21.67g	31.67e	22.22d
BIO	21.67 h	39.00e	50.67b	37.11b	29.00f	41.67d	53.00b	41.22b
HA	18.67 j	26.00 g	43.00c	29.22c	17.33h	28.67f	44.67c	30.22c
BIO+HA	40.00 d	50.67b	59.67a	50.11a	43.00cd	52.33b	63.00a	52.78a
Mean	23.84c	34.09b	47.00a	34.97	25.67c	36.09b	48.09a	36.61
	A	B	A.B		A	B	A.B	
L.S.D.5%	1.44	0.99	0.85		0.44	1.10	1.91	
	Clipping 2							
Control	17.33 h	21.67 g	40.00d	26.33d	16.67g	26.33f	39.00d	27.33d
BIO	29.67 f	39.33d	53.33b	40.78b	31.67e	45.67c	59.00b	45.45b
HA	22.33 g	31.67e	45.33c	33.11c	24.00f	33.33e	47.33c	34.89c
BIO+HA	45.00 c	54.00b	66.00a	55.00a	48.67c	57.67b	67.33a	57.89a
Mean	28.58c	36.67b	51.17a	38.81	30.25c	40.75b	53.17a	41.39
	A	B	A.B		A	B	A.B	
L.S.D.5%	2.48	0.96	0.83		1.00	1.43	2.47	
	Clipping 3							
Control	21.33 i	24.67h	42.67e	29.56d	22.33i	29.33h	44.67f	32.11d
BIO	39.67 f	50.33d	64.00b	51.33b	41.00g	53.33e	67.00b	53.78b
HA	29.00 g	39.33 f	51.33d	39.89c	28.33h	40.67g	56.33d	41.78c
BIO+HA	51.33 d	60.67 c	71.33a	61.11a	53.33e	62.33c	72.67a	62.78a
Mean	35.33c	43.75b	57.33a	45.47	36.25c	46.42b	60.17a	47.61
	A	B	A.B		A	B	A.B	
L.S.D.5%	1.51	1.42	2.46		0.60	1.38	2.38	

Table (3). Effect of compost (A), biofertilizer and/or humic acid (B) treatments on plant height (cm) of three clippings of gazon grass in 1st (2017/2018) and 2nd (2018/2019) seasons.

Treatments	1st season 2017/2018				2nd season 2018/2019			
	Control	2LSC	4LSC	Mean	Control	2LSC	4LSC	Mean
	Clipping 1							
Control	5.00 i	7.33 hi	9.67gh	7.33d	6.67	9.00	12.33	9.33d
BIO	13.00 f	19.67 bc	21.67 ab	18.11b	17.33	21.33	26.00	21.55b
HA	11.00 fg	17.00 de	19.00 cd	15.67c	14.00	17.33	21.33	17.55c
BIO+HA	15.67 e	19.67 bc	24.00 a	19.78a	20.3	26.67	28.67	25.21a
Mean	11.17c	15.92b	18.59a	15.22	14.58c	18.58b	22.08a	18.41
	A	B	A.B		A	B	A.B	
L.S.D.5%	2.04	1.10	2.62		1.06	1.78	ns	
	Clipping 2							
Control	7.33 g	9.67 g	13.33 f	10.11d	5.33g	8.00f	9.33f	7.55c
BIO	17.67 de	23.33 c	27.33 ab	22.78b	14.67d	18.67c	22.00f	18.45b
HA	13.67 f	17.33 e	25.00 bc	18.67c	11.33e	20.33bc	21.00f	17.55b
BIO+HA	20.00 d	28.33 a	29.00 a	25.78a	16.33d	22.00b	24.67a	21.00a
Mean	14.67c	19.67b	23.67a	19.33	11.92c	17.25b	19.25a	16.14
	A	B	A.B		A	B	A.B	
L.S.D.5%	0.52	1.51	2.62		1.51	1.01	1.75	
	Clipping 3							
Control	7.00 i	9.00 h	13.33 g	9.78d	5.33g	8.33f	10.00e	7.89d
BIO	19.00 de	18.67 ef	26.67 b	21.45b	16.00c	22.33b	23.00b	20.44b
HA	14.67 g	17.00 f	24.67 c	18.78c	12.33d	21.67b	22.00b	18.67c
BIO+HA	20.67 d	27.67 ab	28.67 a	25.67a	16.33c	23.00b	25.33a	21.55a
Mean	15.34c	18.09b	23.34a	18.92	12.50c	18.83b	20.08a	17.14
	A	B	A.B		A	B	A.B	
L.S.D.5%	2.34	1.08	1.87		1.17	0.89	1.53	

The gradually increase in clipping fresh weight was found parallel with the increase of soaked compost level in all clippings in 1st and 2nd seasons. The heaviest fresh weight of clipping was recorded from applying the highest level of compost (4LSC) in all clippings of the two seasons (Table, 4).

Bio fertilizer - humic acid combination recorded the heaviest fresh weight of the first, second and third clippings of both seasons, reflecting the significant effect of mixing bio fertilizer and humic acid in increasing of clipping fresh weight of gzaon grass plants (Table, 4). Application of biofetilizer only gave higher clipping fresh weight than humic acid only for clipping 1, 2 and 3. While, the control was recorded the lowest fresh weight in all clippings. These findings are in harmony with those reported by El-Sayed (2008) on seashore paspalum, Abd El-Kafee *et al.* (2014) on *Pelargonium graveolens* L. and Nikbakht *et al.* (2014) on perennial ryegrass.

The heaviest fresh weights of clippings gazon grass plants were obtained from 4-litre soaked compost + (biofertilizer + humic acid) interaction of 1st, 2nd and 3rd clippings of the two seasons compared to other interactions and control treatments. Application of the two treatments 2-litre soaked compost–humic acid and biofertilizer only gave clipping fresh weight without significant differences among the three clippings in 2nd season. This indicated that biofertilizer only could be compensate the low level-soaked compost 2-litre presents with humic acid. The interactions of both of 2LSC with biofertilizer and 4LSC with humic acid increased in clipping fresh weight without significant differences of clipping 3 in 2nd season, compared to the control (Table, 4). Reflecting, the positive effect of biofertilizer with the low level-soaked compost 2-litre in improving clipping fresh weight and saved 50% of compost.

The high compost level (4-litre) soaked compost gave the heaviest dry weight of all clippings followed by the treatment 2-lire soaked compost compared to the control in the two seasons (Table, 5). Ntoulas *et al.* (2011) found that the clipping dry weight of *Cynodon dactylon* was increased by compost amendments.

Dry weight of clippings had the same trend of fresh weight of clippings in all treatments. Where, biofertilizer only gave the second heaviest dry weight after the combination of BIO+HA but still higher than the only humic acid treatment compared with the control of all three clippings in the two seasons (Table, 5). The stimulating effect of humic acid on dry weight was observed by El-Sayed (2008) on seashore paspalum and Nikbakht *et al.* (2014) on perennial ryegrass.

The high level of soaked compost (4-litre) with biofertilizer plus humic acid recorded the heaviest clipping dry weight of all clippings compared to other treatments and control in the two seasons except for 2nd clipping in 2nd season (Table, 5).

Table (4). Effect of compost (A), biofertilizer and/or humic acid (B) treatments on fresh weight (g.) of three clippings of gazon grass in 1st (2017/2018) and 2nd (2018/2019) seasons.

Treatments	1st season 2017/2018				2nd season 2018/2019			
	Control	2LSC	4LSC	Mean	Control	2LSC	4LSC	Mean
	Clipping 1							
Control	43.33 f	73.33 f	101.67ef	72.78d	54.00i	82.33hi	106.00gh	80.78d
BIO	165.00de	360.00c	646.67 b	390.56b	164.00ef	376.67c	646.67b	395.78b
HA	115.00ef	220.00d	395.00 c	243.33c	128.33fg	170.00e	385.00c	227.78c
BIO+HA	218.33 d	573.33b	1183.33a	658.33a	210.00d	676.67b	1503.33a	796.67a
Mean	135.42c	306.67c	581.67a	341.25	139.08c	326.42b	660.25a	375.25
	A	B	A.B		A	B	A.B	
L.S.D.5%	24.27	45.33	78.51		42.03	21.92	37.97	
	Clipping 2							
Control	60.00 i	86.67 hi	125.00 hi	90.56d	71.67i	95.00hi	141.67h	102.78d
BIO	255.00 g	853.33c	1116.67b	741.67b	438.33f	773.33e	1196.67c	802.78b
HA	145.33 h	380.00f	623.33 d	382.89c	310.00g	463.33f	870.00d	547.78c
BIO+HA	476.67 e	1133.33b	1510.00a	1040.00a	480.00f	1400.00b	1710.00a	1196.67a
Mean	234.25c	613.33b	843.75a	563.78	325.00c	682.92b	979.59a	662.50
	A	B	A.B		A	B	A.B	
L.S.D.5%	35.91	48.06	83.24		39.20	39.39	68.22	
	Clipping 3							
Control	74.67 h	106.67 h	133.33 h	104.89d	85.00i	98.33i	153.33h	112.22d
BIO	370.00 f	1216.67d	1406.67b	997.78b	506.67f	953.33d	1170.00c	876.67b
HA	263.33 g	398.33 f	723.33 e	461.66c	351.00g	531.67ef	936.67d	606.45c
BIO+HA	710.00 e	1316.67c	2516.67a	1514.45a	550.00e	1500.00b	1863.33a	1304.44a
Mean	354.50c	759.59b	1195.00a	769.70	373.17c	770.83b	1030.83a	724.94
	A	B	A.B		A	B	A.B	
L.S.D.5%	44.82	46.62	80.75		23.93	19.49	33.75	

Table (5). Effect of compost, biofertilizer and/or humic acid treatments on dry weight (g.) of three clippings of gazon grass in 1st (2018) and 2nd (2019) seasons.

Treatments	1st season 2017/2018				2nd season 2018/2019			
	Control	2LSC	4LSC	Mean	Control	2LSC	4LSC	Mean
	Clipping 1							
Control	10.67 j	17.00 ij	25.00 hi	17.56d	13.00h	20.33gh	26.33fg	19.89d
BIO	43.67 fg	80.00 e	159.67b	94.45b	40.33e	94.67c	96.00c	77.00b
HA	35.33gh	78.00 e	100.00d	71.11c	33.33ef	33.33ef	92.67c	53.11c
BIO+HA	54.33 f	146.33 c	295.00a	165.22a	52.00d	169.00b	395.67a	205.56a
Mean	36.00c	80.33b	144.92a	87.08	34.67c	79.33b	152.67a	88.89
	A	B	A.B		A	B	A.B	
L.S.D.5%	4.47	7.09	12.28		7.44	5.76	9.97	
	Clipping 2							
Control	19.33 h	28.66 h	40.00 h	29.33d	23.00h	29.33h	46.67h	33.00d
BIO	62.00 g	211.33 c	277.67b	183.67b	134.33e	189.33d	289.67c	204.44b
HA	37.00 h	94.33 f	155.00d	95.44c	79.33g	102.67fg	215.00d	132.33c
BIO+HA	116.67e	286.67 b	360.00a	254.45a	118.00ef	450.00a	418.33b	328.78a
Mean	58.75c	155.25b	208.17a	140.72	88.67c	192.83b	242.42a	174.64
	A	B	A.B		A	B	A.B	
L.S.D.5%	6.37	12.29	21.29		14.24	17.21	29.80	
	Clipping 3							
Control	24.00 h	32.00 h	42.67gh	32.89d	21.00j	24.00j	39.00i	28.00d
BIO	88.00 ef	286.67 c	350.00b	241.56b	122.00g	235.67d	287.33c	215.00b
HA	63.67 fg	99.30 e	177.33d	113.43c	85.00h	129.33fg	215.00e	143.11c
BIO+HA	167.67d	281.33 c	633.33a	360.78a	134.67f	375.00b	460.00a	323.22a
Mean	85.84c	174.83b	300.83a	187.16	90.67c	191.00b	250.33a	177.33
	A	B	A.B		A	B	A.B	
L.S.D.5%	21.54	16.52	28.61		7.12	4.61	7.98	

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استجابة نباتات الجازون للتسميد بالكمبوست وحمض الهيوميك والسماد الحيوى

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أجريت هذه الدراسة في مدينة المنيا الجديدة بمحافظة المنيا – مصر – خلال موسمين متتاليين 2018/2017 ، 2019/2018 لتقدير استجابة صفات نمو نباتات الجازون للتسميد العضوي بالكمبوست وحمض الهيوميك والسماد الحيوية ، اظهرت كل صفات النمو الخضري (كثافة التغطية ، ارتفاع النباتات ، الوزن الطازج ، الوزن الجاف لنباتات الحشة) استجابة عالية المعنوية للتسميد بالكمبوست وحمض الهيوميك والسماد الحيوي فى الثلاثة حشات ، وسجل المستوى العالى من منقوع الكمبوست (4 لتر) وحمض الهيوميك كل منهما مجتمعاً مع السماد الحيوي اعلى قيم لكل صفات النمو الخضري بالمقارنة بالكونترول في الثلاثة حشات فى كلا الموسمين ، كما سجل الجمع بين الثلاثة انواع من التسميد 4 لتر منقوع الكمبوست + حمض الهيوميك + السماد الحيوي اعلى قيم لصفات النمو الخضري فى كل الحشات فى كلا الموسمين مقارنة بكل منهما بمفردة وبالكونترول.

توصى الدراسة بتسميد نباتات الجازون بخليط 4 لتر منقوع الكمبوست وحمض الهيوميك بتركيز 100 ملليلتر/م^2 والسماد الحيوي 100 ملليلتر/م^2 للحصول على اعلى صفات نمو خضري لنباتات الجازون