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PHYSIOLOGICAL RESPONSE OF GAZANIA PLANTS TO GROWING MEDIA AND ORGANIC COMPOST

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ABSTRACT: This work was carried out during two successive seasons of 2017 and 2018 at the Nursery, Department of Floriculture, Ornamental Horticulture and Landscape Gardening, Faculty of Agriculture, Alexandria University, Egypt to investigate the effect of different growing media (calcareous + sand + peat moss at the rate 70 and 40%) and two types of organic compost (rice straw and sugar beet at 30 and 60%) and their interaction on the growth and flowering of *Gazania splendens* plants. The experimental design in split-plot arrangement, with four replications, in both seasons. The growing media were laid out in the main plots and sub-plots included the different organic composts. Three pots were used as a plot for each treatment. The means of the individual factors and their interactions were compared by L.S.D. test at 5% level of probability. The obtained results can be summarized as follows; most vegetative growth characteristics such as: number of tillers (54.74), number of leaves (239.76) and leaves fresh weight (100.29 g) were significantly affected by organic compost at 60% sugar beet with peat moss treatment, flowers characteristics (inflorescences diameter (9.34 cm) and number of inflorescences (14.87), and inflorescences dry weights (0.459 g), responded significantly to the interaction between the different media and organic compost, the highest significant values were obtained by organic compost at 30 and/ or 60% sugar beet and peat moss. Total chlorophyll (56.23 mg/g f.w.), nitrogen (3.42%), phosphorus (0.74%) in the leaves were the highest with 60% sugar beet and 40% peat moss in both seasons. However, potassium (2.85%) in the leaves gave the highest significant values by 60% sugar beet with calcareous soil (40%) for both seasons. It can be recommended that producing high quality of *Gazania splendens* plants for different decorative purposes in landscaping can be accomplished by growing plants in the mixture of peat moss (40%) with organic compost at rate 60% sugar beet led to improve its characteristics.

Key words: Gazania, growing media, organic compost, soil amendments, sugar beet, rice straw, perennial plants, Asteraceae.

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INTRODUCTION

Gazania rigens (*G. splendens*) is an herbaceous perennial plant named for a flower shape resembling a medal (Zeng *et al*., 2016). It is a member of the family Asteraceae, native to South Africa. This plant has become very attractive to domestic producers in the last few years because of its ornamental and medicinal properties, the plants prefer a sunny locations and are tolerant of dryness and poor soils. Plants are salt tolerant and can be used in coastal regions very effectively (Ball, 1991). It is spreading low-growing, half-hardy perennial, growing to 50 cm (20 in) tall and wide, with blue-grey foliage and brilliant yellow, daisy-like composite flower heads throughout the summer (Sardoei *et al.*, 2014).

Most of the newly reclaimed soils in Egypt are sandy and calcareous soils that are of poor available nutrients, to increase their productivity, organic matter application plays an important role to retain the inorganic elements in complex and chelate forms. In this accord, organic manures are well established to be involved in fertilization of plants in almost worldwide, due to their beneficial effects on soil physico-chemical and biological characteristics, which in turn influence the growth and increase plants production (Youssef *et al*., 2001).

The utilization of agricultural wastes in producing organic fertilizers minimizes the environmental pollution and overcomes the organic matter deficiency. Recycling the agricultural wastes through composting process under aerobic conditions converts them to stabilized and useful compost product (Osman *et al.*, 2008). In Egypt, recycling rice straw and organic wastes is of great concern as well as improvement of soil properties. Rice straw compost could improve both organic waste recycling and soil quality. Rice straw has become a very serious problem in Egypt due to the huge production of straw of about 20 million tons yearly. Being a suitable material for insects and pests, rice straw is considered a problem for the farmers who store it near their houses or fields. The farmers then burn the straw causing black clouds and severe pollution in the Egyptian atmosphere (Afify *et al*., 2002).

Soil amendments are offered with the promise of improving soil fertility characteristics, such as reducing or eliminating the need for fertilizer elements, making native soil elements more available to plants, providing balanced soil fertility, or inoculating soil with proper or improved strains of bacteria, enzymes or hormones (Davis and Wilson, 2005). Sugar beet residual compost is processed as a local organic material. Sugar beet residual compost is an important issue in ornamental plants production. (Soliman, 2005), mainly due to its enrichment with S, N, P and K mineral elements. Composting is generally defined as the biological oxidative decomposition of organic constituents in wastes under controlled conditions which allow development of aerobic microorganisms that convert biodegradable organic matter into a final product sufficiently stable for storage and application without adverse environmental effects. The main products of aerobic composting are CO_2, H_2O, mineral ions and humus. During composting, organic matter is transformed into a humus-rich product by the action of microorganisms and their enzymes (Vargas-Garcia *et al*., 2010). Microbes and their secreted enzymes play a key role in biological and bio-chemical transformations of compost matrixes in the composting process (Guo *et al*., 2012).

So, the main objective of the present investigation was to evaluate the individual and combined effects of three selected growing media and two selected organic compost throughout the growing seasons on growth, flowering as well as the chemical constitutes of Gazania plants.

MATERIALS AND METHODS

The pot experimental was carried out during two successive growing seasons of

2017 and 2018 at the Nursery, Department of Floriculture, Ornamental Horticulture and Landscape Gardening, Faculty of Agriculture, Alexandria University, Egypt. The rooted cuttings of *Gazania splendens* were obtained from the Nursery, Department of Floriculture, Ornamental Horticulture and Landscape Gardening, Faculty of Agriculture, Alexandria University, Egypt. These rooted cuttings were similar in their shape and size with an average length of 10 cm and contained 5 leaves for each one. The rooted cuttings were transplanted on 10th April for the two seasons in 25 cm diameter clay pots (one plant/pot) using the different growing media. The planted Gazania were placed in a partial shade place for three weeks and watered as needed according to the climatic conditions. These plants were left for another 45 days after planting to grow vegetatively by early removing all formed flower buds, then they were arranged in the experiment. Calcareous soil was brought from the Northern Western Coast 37.5 km far off Alexandria City, while, sandy soil was brought from a sand storehouse in Alexandria city. Peat moss was brought from a commercial store in Alexandria city. Then it was mixed with different ratios (30 % and 60%) of the two organic compost, sugar beet compost and rice straw compost. Rice straw compost was obtained from Rice Research and Training Center (RRTC), Sakha, Kafr El-Sheikh, Egypt. Sugar beet compost was obtained from El Noor for Chemicals and Fertilizers, Industrial zone, Nubariya, Cairo-Alexandria desert road, Egypt. Chemical analysis of the two organic compost are presented in Table (1), Physical and chemical properties of the growing media used in the study are presented in Table (2). The components of the used organic compost treatments are shown in Table (3).

The degree of air temperature and relative humidity (%) at the Nursery, Department of Floriculture, Ornamental Horticulture and Landscape Gardening, Faculty of Agriculture, Alexandria University, Egypt. districts were recorded daily during the growing period of two seasons (6 months) for each and the monthly average of them are presented in Table (4).

Table 1. Chemical analysis of the organic materials.

Organic materials	C %	N %	C:N Ratio	P %	K %
Rice straw compost	30	1.80	16.67	0.59	0.81
Sugar beet compost	11.05	0.56	20	0.57	0.75

Table 2. Some physical and chemical characteristics of sand, calcareous soil and peat-moss.

Soil characteristics	Sandy soil	Calcareous soil	Peat moss
pH	8.1	8.3	6.86
EC (dSm^{-1}) *	1.1	3.2	0.6
Total $CaCO_3$ (%)	18.6	26.5	N.D.
TOC (%)	0.26	1.28	0.10
Particle size percent (%)			
Sand	83.8	39.6	N.D.
Silt	5.2	5.2	N.D.
Clay	11	55.2	N.D.
Soil texture	Loamy sand	Sandy clay loam	N.D.
Available macro and micro nutrients (mg kg^{-1})			
N	83.2	157.4	4200
P	13.3	13.8	300
K	109.2	281.2	900

***Saturated soil paste extract.**

Table 3. The components of the used organic compost treatments.

Treatment No.	Medium components		
	Sandy soil	Calcareous soil	Peat moss
OC_{T1}	100%	100%	100%
OC_{T2}	30% rice straw compost + 70% sandy soil	30% rice straw compost + 70% calcareous soil	30% rice straw compost + 70%peat moss
OC_{T3}	60% rice straw compost + 40% sandy soil	60% rice straw compost + 40% calcareous soil	60% rice straw compost + 40% peat moss
OC_{T4}	30% sugar beet compost + 70% sandy soil	30%Sugar beet compost + 70% calcareous soil	30% sugar beet compost + 70% peat moss
OC_{T5}	60% sugar beet compost + 40% sandy soil	60% sugar beet compost + 40% calcareous soil	60% sugar beet compost + 40% peat moss

Table 4. The average temperature throughout the growing period of Gazania plants during the two seasons of 2017 and 2018 at Elshatby, Alexandria Governorate.

Month	First season 2017			Second season 2018		
	Temperature (°C)		Relative humidity (%)	Temperature (°C)		Relative humidity (%)
	Min.	Max.		Min.	Max.	
April	16	27	54	17	28	60
May	19	29	53	20	32	61
June	23	31	57	24	31	59
July	27	32	56	25	33	64
August	30	33	58	30	33	62
September	25	36	53	26	29	60
October	20	28	51	21	29	63
November	17	21	56	17	26	58

The experimental layout was designed to provide split plot design containing four replicates. Main plot was the different media, while organic compost treatments were the sub plot. Each replicate contained 15 treatments (5 organic compost treatments × 3 different media). Three pots were used as plot for each treatment. The means of the individual factors and their interactions were compared by L.S.D. test at 5% level of probability (Gomez and Gomez, 1984).

Data recorded for the vegetative growth parameters included; number of tillers, number of leaves, leaves fresh weight (g) and total plant fresh weight (g). The flowering data were; inflorescences diameter (cm), number of inflorescences and inflorescences dry weights (g). Data recorded for the chemical composition included; leaf total chlorophyll content (SPAD units) were measured according to method described by (Yadava, (1986) using Minolta SPAD chlorophyll Meter Model No. 502. The nitrogen (%) of the dried leaves was determined according to methods described by Evenhuis and Dewaard, (1980). While the potassium and phosphorus (%) were determined according to the method described by Chapman and Pratt (1961).

RESULTS AND DISCUSSION

Vegetative growth characteristics:

1. Number of tillers/plant:

Data presented in Table (5) showed that media had insignificant effects on that trait in the two seasons of study, while compost treatments and the interaction between media and compost treatments had significant effect on number of tillers/plant in the two seasons of study. With regard to different media, the results presented in Table (5) showed that calcareous and peat moss media

Table 5. Effect of different media, organic compost and their interaction on number of tillers/plant of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost treatments (B)	Media (A) Sandy	Calcareous	Peat moss	Mean (B)
		First season		
OC_{T1}	13.13	13.52	11.67	12.77
OC_{T2}	15.44	17.20	16.15	16.27
OC_{T3}	16.42	17.01	21.59	18.34
OC_{T4}	15.93	22.91	18.37	19.07
OC_{T5}	22.37	20.83	24.16	22.46
Mean (A)	16.66	18.30	18.39	
$LSD_{0.05}$	A= N.S	B= 1.57	A×B= 2.72	
		Second season		
OC_{T1}	16.62	17.12	14.77	16.17
OC_{T2}	19.55	21.77	20.44	20.59
OC_{T3}	20.79	21.53	27.33	23.22
OC_{T4}	20.17	29.00	23.25	24.14
OC_{T5}	28.32	26.37	30.58	28.43
Mean (A)	21.09	23.16	23.28	
$LSD_{0.05}$	A= N.S	B= 1.99	A×B= 3.45	

*** N.S: not significant.**

gave higher, though insignificant, number of tillers/plant than sandy soil in both seasons. Means of organic compost treatments at 60% sugar beet produced the highest number of tillers/plant as 22.46 and 28.43 in the two successive seasons, respectively, while the lowest values resulted from the treatment without any organic compost as 12.77 and 16.17 tillers/plant in both seasons, respectively. For the interaction effect on that character, organic compost treatments gave different values with the media used. OC_{T1} gave low number of tillers/plant with all media. Moreover, OC_{T3} gave statistically similar values in sandy and calcareous media, while it gave significantly higher value with peat moss. OC_{T4} had significantly low value in sandy medium as 15.93, 20.17 as compared to calcareous (22.91, 29.00), which was, also significantly higher than peat moss (18.37, 23.25). The highest values of 24.16 and 30.58 were obtained using OC_{T5} and peat moss, in the two seasons, respectively. This improvement in the number of tillers/plant may be attributed to some changes in soil physical and chemical properties of the media through increasing the organic matter and supplying the peat moss.These results were in agreement with those obtained by Singh (1999) on wheat and El-Nady (2015) on *Cymbopogon flexuosus* plants.

2. Number of leaves/plant:

Data presented in Table (6) showed that peat moss and calcareous gave high number of leaves/plant with values of 176.12, 222.94 in peat moss and 170.82, 216.23 in calcareous medium than sandy soil, in the two seasons, respectively. Means of compost treatments either 30% or 60% sugar beet compost produced the highest number of leaves as 202.97, 256.93 and 192.57, 243.76 in the two seasons, respectively, as compared to the other compost treatments. Concerning the interaction between the two studied factors, i.e. organic compost and media, data showed that OC_{T1} produced the lowest number of leaves/plant with all media in the two seasons. Moreover, OC_{T3} showed insignificant response to type of media.

Table 6. Effect of different media, organic compost and their interaction on number of leaves/plant of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost treatments (B)	Media (A) Sandy	Calcareous	Peat moss	Mean (B)
		First season		
OC_{T1}	95.33	123.10	119.22	112.54
OC_{T2}	108.23	145.10	174.42	142.58
OC_{T3}	186.58	191.97	178.87	185.81
OC_{T4}	187.85	224.61	196.45	202.97
OC_{T5}	196.71	169.35	211.63	192.57
Mean (A)	154.94	170.82	176.12	
$LSD_{0.05}$	A= 14.75	B= 14.07	A×B= 24.39	
		Second season		
OC_{T1}	120.67	155.78	150.91	142.46
OC_{T2}	137.00	183.66	220.78	180.48
OC_{T3}	236.18	243.00	226.42	235.20
OC_{T4}	237.78	284.32	248.67	256.93
OC_{T5}	249.00	214.37	267.89	243.76
Mean (A)	196.13	216.23	222.94	
$LSD_{0.05}$	A= 18.67	B=17.81	A×B=30.88	

However, OC_{T4} gave low values in sandy and peat moss media compared to calcareous. OC_{T5} gave significantly higher number of leaves/plant in peat moss medium (211.63 and 267.89, respectively) as compared to the calcareous soil. This increase in the leaves number of gazania plants may be due to cell multiplication, cell enlargement and cell differentiation, which have resulted in increasing number and area of the leaves, and it may have been related to the favorable effects of such amendments on soil physical and chemical properties besides their nutrients content. Many researches obtained similar results as Sherif and EL-Naggar (2005) on *Zantedeschia aethiopica*, and Soliman *et al.* (2013) on *Gardenia jasminoides*.

3. Leaves fresh weight/plant (g):

Data presented in Table (7) showed that calcareous and peat moss gave highest values of 54.99,70.51 g and 54.25,69.55 g, respectively, in the both seasons, whereas the lowest values were recorded in sandy soil. Means of compost treatments indicated that organic compost at 60% sugar beet produced the highest leaves fresh weight/plant as 74.89 and 96.02 g in both seasons, respectively, while the lowest values resulted from the treatment without any organic compost OC_{T1} giving values of 30.13 and 38.63 g, respectively, in the two seasons. For the interactions effect on the leaves fresh weight/plant (g), means presented in Table (7) showed that organic compost treatments gave different values with the media used. OC_{T1} without any organic compost produced less leaves fresh weight/plant with all media, while it gave heaviest values of leaves fresh weight/plant as 87.89 and 112.68 from using OC_{T5} and peat moss, in the two seasons, respectively, as compared to the other media. Concerning pot media, peat moss showed better leaves fresh weight. The favorable effect of peat moss was mainly due to its higher organic matter content and lower pH value and electrical conductivity EC, and enhancing the accumulation of biosynthesis and for increasing the fresh weight of leaves.

Table 7. Effect of different media, organic compost and their interaction on the leaves fresh weight/plant (g) of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost treatments (B)	Media (A)			Mean (B)
	Sandy	Calcareous	Peat moss	
	First season			
OC_{T1}	35.88	35.40	19.10	30.13
OC_{T2}	36.36	40.58	48.20	41.71
OC_{T3}	65.05	62.58	54.12	60.58
OC_{T4}	53.31	66.22	61.93	60.49
OC_{T5}	66.60	70.21	87.89	74.89
Mean (A)	51.44	54.99	54.25	
$LSD_{0.05}$	A= 1.86 B= 3.23 A×B= 5.60			
	Second season			
OC_{T1}	46.00	45.39	24.49	38.63
OC_{T2}	46.62	52.02	61.80	53.48
OC_{T3}	83.40	80.23	69.39	77.67
OC_{T4}	63.34	84.90	79.40	77.55
OC_{T5}	85.38	90.01	112.68	96.02
Mean (A)	65.95	70.51	69.55	
$LSD_{0.05}$	A= 2.38 B=4.14 A×B=7.18			

These results were in harmony with, Soliman (2005) on *Lawsonia alba*, Lam. and Hendawy *et al.* (2015) on *Plantago arenaria*.

4. Leaves dry weight/plant (g):

Data presented in Table (8) showed that media had insignificant effects on that trait, while compost treatments and the interaction between different media and compost treatments had significant effect on leaves dry weight/plant (g) in the two seasons of study. With regard to different media, peat moss and sandy gave the heavier leaves dry weight, though insignificant, than calcareous in both seasons. Organic compost at 60% sugar beet compost, 60% rice straw and 30%sugar beet compost gave statistically the highest values for leaves dry weight/plant in both seasons. For the interaction, organic compost responded significantly and differently to media. OC_{T3} showed significant response to media type which gave higher value in peat moss and calcareous media as compared to sandy soil. Meanwhile, OC_{T4} had significantly lower value in calcareous and sandy media, while it

Table 8. Effect of different media, organic compost and their interaction on the leaves dry weight/plant (g) of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost treatments (B)	Media (A)			Mean (B)
	Sandy	Calcareous	Peat moss	
		First season		
OC_{T1}	11.47	10.60	7.02	9.69
OC_{T2}	11.32	11.91	12.07	11.76
OC_{T3}	13.91	15.07	16.71	15.23
OC_{T4}	14.91	14.41	15.89	15.07
OC_{T5}	15.78	14.03	17.88	15.90
Mean (A)	13.48	13.20	13.91	
$LSD_{0.05}$	A= N.S	B= 1.69	A×B=2.94	
		Second season		
OC_{T1}	14.70	13.59	9.00	12.43
OC_{T2}	14.51	15.27	15.47	15.08
OC_{T3}	17.83	19.32	21.42	19.53
OC_{T4}	19.12	18.48	20.37	19.32
OC_{T5}	20.23	17.99	22.93	20.39
Mean (A)	17.28	16.93	17.84	
$LSD_{0.05}$	A= N.S	B= 2.17	A×B=3.77	

*** N.S: not significant.**

gave significantly higher value in peat moss, in the two seasons. OC_{TI} gave less heavy leaves dry weight in peat moss medium without any organic compost compared to calcareous and sandy media, as it reached only 7.02 and 9.00, in the two seasons, respectively. The highest values were obtained using OC_{T5} with peat moss and sandy soil, in the two seasons. This increase in leaves dry weight may be due to increment in number of leaves and leaf area. These results were in harmony with Algur and Kadioğlu (1992) on *Helianthus annus*, and Youssef (2008) on *Pelargonium zonale*.

Flowering characteristics:

1. Inflorescence diameter (cm):

Results presented in Table (9) indicated that inflorescences diameter gave the significantly highest value of 8.65 and 8.29 cm for peat moss in September in both seasons, respectively. On the other hand, the lowest values were recorded in calcareous soil (4.76cm in August 2017and 6.01 cm in November 2018). The treatment of OC_{T5} (60% sugar beet) gave the significantly highest values of 8.84 and 8.82 cm in September 2017 and 2018 respectively, while the lowest values were recorded for control (4.68 cm in August 2017 and 5.91 cm in November 2018), Table (10). Means of inflorescence diameter as affected by growing media and organic compost treatments, in the two seasons, are presented in Table (11) The results indicated that OC_{T4} showed fairly constant response to the three growing media in all months, whereas all other compost treatments showed significantly higher values of inflorescence diameter in peat moss media than sandy or calcareous media. The highest value, in all months, was obtained with OC_{T5} at peat moss medium, whereas the lowest values were recorded for OC_{T1} in calcareous media. These results may be related to the presence of compost at a suitable ratio which led to improve the soil characters and provide the plants with minerals, consequently the vegetative growth parameters of the used plants would be increased and thus their flower quality was improved. Many researches obtained similar results such as EL-Sayed (1991) on *Chrysanthemum* and *Dianthus*, Abdul-Hafeez *et al*. (2015) on *Gardenia jasminoides,* and Idrovo *et al.* (2019) on *Rosa hybrida.*

2. Number of inflorescences/plant:

Number of inflorescences/plant was higher in peat moss, significantly or insignificantly, in all months except October where calcareous medium gave significantly higher values Table (12). Concerning organic compost treatments Table (13), OC_{T5} and OC_{T4} gave higher number of inflorescences/plant in all months, except in October where OC_{T3} produced the highest value for that trait in the two seasons. With regard to compost treatment and media interaction, data in Table (14) indicated that the interaction between the two studied factors varied with the month. In June, OC_{T1} gave stable response to all three media, and the highest value for number of inflorescences/plant was obtained with OC_{T5} and peat moss media.

Table 9. Effect of different media on inflorescences diameter (cm) of *Gazania splendens* during 2017 and 2018 seasons.

Media	June		July		August		September		October		November	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
Sand	6.53	7.25	5.80	6.90	5.07	6.66	7.97	7.74	6.89	6.87	6.16	6.46
Calcareous	6.12	6.80	5.44	6.45	4.76	6.36	7.48	7.36	6.46	6.51	5.78	6.01
Peat moss	7.08	7.86	6.29	7.51	5.50	6.96	8.65	8.29	7.47	7.72	6.68	7.07
L.S.D$_{0.05}$	0.394	0.439	0.351	0.439	0.307	0.359	0.483	0.440	0.417	0.317	0.373	0.439

Table 10. Effect of organic compost on inflorescences diameter (cm) of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost Treatments	June		July		August		September		October		November	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
OC$_{T1}$	6.02	6.69	5.35	6.35	4.68	6.35	7.36	7.37	6.36	6.71	5.69	5.91
OC$_{T2}$	6.35	7.06	5.64	6.71	4.94	6.37	7.76	7.37	6.70	6.63	6.00	6.27
OC$_{T3}$	6.33	7.03	5.63	6.68	4.92	6.38	7.74	7.30	6.68	6.83	5.98	6.25
OC$_{T4}$	6.91	7.68	6.14	7.33	5.38	6.85	8.45	8.11	7.30	7.09	6.53	6.89
OC$_{T5}$	7.24	8.04	6.44	7.69	5.63	7.37	8.84	8.82	7.64	7.91	6.84	7.26
L.S.D$_{0.05}$	0.228	0.254	0.203	0.254	0.177	0.255	0.279	0.260	0.241	0.399	0.215	0.254

Table 11. Effect of different media, organic compost and their interaction on inflorescences diameter (cm) of *Gazania splendens* during 2017 and 2018 seasons.

Interaction	Inflorescences diameter (cm)											
	June		July		August		September		October		November	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
M$_1$ * OC$_{T1}$	6.03	6.70	5.36	6.35	4.69	6.08	7.30	7.21	6.36	6.47	5.69	5.91
M$_1$ * OC$_{T2}$	6.54	7.27	5.82	6.92	5.09	6.59	8.00	7.66	6.91	6.67	6.18	6.48
M$_1$ * OC$_{T3}$	6.34	7.04	5.63	6.69	4.92	6.36	7.74	7.30	6.69	6.65	5.98	6.25
M$_1$ * OC$_{T4}$	6.96	7.73	6.18	7.38	5.41	7.10	8.50	7.93	7.34	7.08	6.57	6.94
M$_1$ * OC$_{T5}$	6.75	7.50	6.00	7.15	5.25	7.17	8.25	8.58	7.12	7.49	6.37	6.71
M$_2$ * OC$_{T1}$	4.80	5.33	4.26	4.98	3.73	5.83	5.86	6.39	5.06	5.95	4.53	4.54
M$_2$ * OC$_{T2}$	5.78	6.43	5.14	6.08	4.50	6.07	7.07	6.78	6.10	5.76	5.46	5.64
M$_2$ * OC$_{T3}$	5.98	6.64	5.31	6.29	4.65	6.08	7.30	6.94	6.31	6.53	5.64	5.85
M$_2$ * OC$_{T4}$	6.85	7.61	6.09	7.26	5.32	6.65	8.37	7.99	7.23	6.58	6.47	6.82
M$_2$ * OC$_{T5}$	7.19	7.99	6.39	7.64	5.59	7.19	8.79	8.69	7.59	7.72	6.79	7.20
M$_3$ * OC$_{T1}$	7.25	8.05	6.44	7.70	5.63	7.13	8.85	8.51	7.64	7.70	6.84	7.26
M$_3$ * OC$_{T2}$	6.70	7.47	5.98	7.12	5.23	6.45	8.22	7.66	7.10	7.45	6.35	6.68
M$_3$ * OC$_{T3}$	6.68	7.42	5.94	7.07	5.19	6.68	8.17	7.66	7.05	7.30	6.31	6.63
M$_3$ * OC$_{T4}$	6.94	7.71	6.17	7.36	5.39	6.79	8.48	8.42	7.32	7.60	6.55	6.92
M$_3$ * OC$_{T5}$	7.77	8.64	6.91	8.29	6.04	7.76	9.50	9.18	8.20	8.53	7.34	7.85
LSD$_{0.05}$	0.39	0.44	0.35	0.44	0.31	0.44	0.48	0.44	0.41	0.69	0.37	0.44

Table 12. Effect of different media on number of inflorescences/plant of *Gazania splendens* during 2017 and 2018 seasons.

Media	June		July		August		September		October		November	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
Sand	1.58	1.21	2.17	1.86	1.99	1.58	1.70	1.32	1.32	1.09	2.70	1.60
Calcareous	1.96	1.56	2.27	1.92	2.43	2.09	1.97	1.72	1.84	1.65	1.95	1.36
Peat moss	2.43	1.98	2.41	1.95	2.24	1.91	1.82	1.50	1.49	1.32	3.25	1.77
L.S.D$_{0.05}$	0.25	0.21	N.S	N.S	0.33	0.38	N.S	N.S	0.24	0.22	0.43	0.14

*** N.S: not significant.**

Table 13. Effect of organic compost on number of inflorescences/plant of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost Treatments	June		July		August		September		October		November	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
OC$_{T1}$	1.68	1.33	1.98	1.71	1.75	1.55	1.74	1.44	1.30	1.14	1.41	1.19
OC$_{T2}$	1.78	1.42	2.04	1.74	2.03	1.57	1.67	1.31	1.47	1.24	1.83	1.32
OC$_{T3}$	1.84	1.45	2.31	1.94	2.46	2.07	1.95	1.62	1.82	1.60	2.58	1.57
OC$_{T4}$	2.27	1.78	2.40	1.97	2.34	1.94	1.88	1.53	1.58	1.38	3.50	1.85
OC$_{T5}$	2.36	1.94	2.68	2.20	2.52	2.17	1.94	1.67	1.60	1.41	3.83	1.93
L.S.D$_{0.05}$	0.40	0.40	0.37	N.S	0.34	0.35	N.S	N.S	0.26	0.24	0.62	0.20

*** N.S: not significant.**

Table 14. Effect of different media, organic compost and their interaction on number of inflorescences/ plant of *Gazania splendens* during 2017 and 2018 seasons.

Interaction	Inflorescences diameter (cm)											
	June		July		August		September		October		November	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
M$_1$ * OC$_{T1}$	1.77	1.44	2.14	1.83	2.03	1.69	1.84	1.53	1.40	0.96	1.50	1.23
M$_1$ * OC$_{T2}$	1.26	0.92	1.92	1.79	1.61	1.21	1.40	0.96	1.09	0.70	1.50	1.20
M$_1$ * OC$_{T3}$	1.18	0.83	2.03	1.69	1.94	1.50	1.83	1.41	1.53	1.38	2.75	1.65
M$_1$ * OC$_{T4}$	1.49	1.09	1.92	1.57	1.96	1.51	1.50	1.06	1.18	1.18	3.50	1.86
M$_1$ * OC$_{T5}$	2.18	1.76	2.81	2.42	2.44	1.98	1.92	1.63	1.40	1.18	4.25	2.05
M$_2$ * OC$_{T1}$	1.79	1.49	2.10	1.92	1.94	1.98	1.98	1.71	1.40	1.27	1.00	1.02
M$_2$ * OC$_{T2}$	1.82	1.48	2.10	1.69	2.39	1.70	1.97	1.69	1.90	1.78	1.50	1.20
M$_2$ * OC$_{T3}$	1.73	1.40	2.30	1.90	2.65	2.25	1.92	1.63	2.05	1.78	1.55	1.20
M$_2$ * OC$_{T4}$	2.48	1.89	2.75	2.37	2.80	2.37	2.41	2.14	2.16	1.86	3.00	1.71
M$_2$ * OC$_{T5}$	1.97	1.55	2.09	1.68	2.36	2.10	1.62	1.40	1.69	1.56	2.75	1.64
M$_3$ * OC$_{T1}$	1.47	1.05	1.67	1.38	1.27	0.96	1.37	1.18	1.09	1.18	1.75	1.31
M$_3$ * OC$_{T2}$	2.27	1.86	2.10	1.71	2.10	1.78	1.63	1.22	1.40	1.22	2.50	1.57
M$_3$ * OC$_{T3}$	2.62	2.11	2.60	2.20	2.77	2.43	2.09	1.62	1.87	1.62	3.50	1.86
M$_3$ * OC$_{T4}$	2.84	2.34	2.53	1.97	2.26	1.91	1.72	1.09	1.40	1.09	4.00	1.99
M$_3$ * OC$_{T5}$	2.93	2.50	3.14	2.48	2.76	2.42	2.26	1.47	1.69	1.47	4.50	2.11
LSD$_{0.05}$	0.70	0.69	0.64	N.S	N.S	0.61	0.54	0.58	N.S	N.S	N.S	N.S

*** N.S: not significant.**

However, in September, the highest value for that trait was obtained from OC_{T4} with calcareous medium. Perner *et al*. (2007) proposed that this effect was due to the higher water holding capacity of peat moss-based substrates with higher compost addition rate. Previous researches reported similar variability in number of inflorescences between different treatments El-Nagger and El-Nasharty (2009) on *Hippeastrum vittatum*, Soliman *et al.* (2013) on *Gardenia Jasminoides* and Abdul-Hafeez *et al*. (2015) on *Gardenia jasminoides*.

3. Inflorescence dry weights (g):

Dry weight of inflorescence Table (15), showed variable response to media in the two seasons. In the first season, sandy and peat moss media showed statistically comparable values for that character, whereas, in July, August and September 2018, peat moss was significantly superior to sandy and calcareous media for that character. With regard to the effect of compost treatment, the means presented in Table (16) showed that OC_{T1} gave the significantly lowest dry weight of inflorescence in all months of the two seasons of study. Treatments of OC_{T2} and OC_{T3} were similar in their effect on inflorescence dry weight and significantly higher than OC_{T1}. OC_{T5}which was60% sugar beet compost gave significantly heavier inflorescences than OC_{T4}in all months of the two seasons. The interaction between organic compost and media Table (17) varied with the season and month of inflorescence dry weight determination. In June OC_{T2} and OC_{T3} gave statistically similar response using the three media. OC_{T4} was superior in sandy medium, whereas both gave comparable means in calcareous and peat moss media. OC_{T1} gave heaviest inflorescences with peat moss compared to calcareous; OC_{T2} in sandy and peat moss media were superior to calcareous medium and OC_{T3} in peat moss was superior to both calcareous and sandy media. This result could be attributed to the high organic matter content of peat, which increases the microorganism's activity in the medium. These results of the study are in agreement with those of Atta-Alla *et al*. (2003) on *Gladiolus antakiensis*, Sherif and EL-Naggar (2005) on *Zantedeschia aethiopica*, and Mousa *et al.* (2015) on *Gardenia jaminoides.*

Chemical analysis:

1. Chlorophyll content in the leaves (SPAD unit):

Data presented in Table (18) showed that different media, compost treatments and their interactions had significant effects on that trait in the two seasons of study for chlorophyll content in leaves. With regard to different media, results presented in Table (18) showed that peat moss and calcareous media gave higher values of 45.22,56.52 and 45.10,56.37, respectively in the two summer seasons. Means of compost treatments effect Table (18) showed that organic compost at 60% sugar beet produced the highest chlorophyll content of 46.92 and 58.65 SPAD respectively, while the lowest values resulted from the treatment without any organic compost 41.57 and 51.96 SPAD in both seasons, respectively. For the interaction effect on that character, means presented in Table (18) showed that organic compost treatments gave different values with the media used. OC_{T3} gave statistically similar values in peat moss and calcareous media, while it gave lowest value with sandy medium. OC_{T4} had significantly high value in calcareous medium of 48.68 and 60.85 SPAD compared to sandy and peat moss media. Meanwhile, OC_{T5} gave significantly higher value of chlorophyll content with peat moss 49.98 and 62.48 SPAD, respectively. In the both seasons, such increase in photosynthetic pigments formation could be attributed to the difference in their composition. Similar results were noticed by other residues, Youssef (2008) with *Pentas laneceolata*, El-Naggar and El-Nasharty (2009) on *Hippeastrum vittatum*,

2. Nitrogen in the leaves (%):

Data presented in Table (19) showed that different media and compost treatment had

Table 15. Effect of different media on number of inflorescences/plant of *Gazania splendens* during 2017 and 2018 seasons.

Media	June		July		August		September		October		November	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
Sand	0.293	0.345	0.258	0.290	0.224	0.261	0.189	0.258	0.362	0.402	0.396	0.434
Calcareous	0.249	0.294	0.220	0.275	0.191	0.259	0.161	0.256	0.308	0.314	0.338	0.382
Peat moss	0.295	0.348	0.261	0.386	0.226	0.376	0.191	0.380	0.365	0.417	0.400	0.409
L.S.D$_{0.05}$	0.0137	0.0161	0.012	0.023	0.0104	0.022	0.0088	0.0193	0.0169	0.0109	0.0185	0.0154

Table 16. Effect of organic compost on inflorescences dry weight (g) of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost Treatments	June		July		August		September		October		November	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
OC$_{T1}$	0.252	0.296	0.222	0.300	0.192	0.280	0.163	0.276	0.311	0.346	0.341	0.378
OC$_{T2}$	0.264	0.311	0.233	0.314	0.202	0.294	0.171	0.287	0.327	0.356	0.358	0.391
OC$_{T3}$	0.269	0.316	0.237	0.305	0.205	0.288	0.174	0.286	0.332	0.367	0.364	0.396
OC$_{T4}$	0.288	0.339	0.254	0.312	0.220	0.296	0.186	0.302	0.326	0.389	0.390	0.419
OC$_{T5}$	0.323	0.380	0.285	0.354	0.247	0.337	0.209	0.343	0.399	0.432	0.437	0.460
L.S.D$_{0.05}$	0.0155	0.0183	0.0137	0.022	0.0119	0.0212	0.0101	0.0169	0.0192	0.0188	0.0210	0.0186

Table 17. Effect of different media, organic compost and their interaction on inflorescences dry weight (g) of *Gazania splendens* during 2017 and 2018 seasons.

	Inflorescences diameter (cm)											
Interaction	June		July		August		September		October		November	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
M$_1$ * OC$_{T1}$	0.238	0.280	0.210	0.271	0.182	0.242	0.154	0.240	0.294	0.337	0.322	0.369
M$_1$ * OC$_{T2}$	0.284	0.335	0.251	0.322	0.217	0.293	0.184	0.291	0.351	0.377	0.385	0.424
M$_1$ * OC$_{T3}$	0.301	0.355	0.266	0.300	0.230	0.271	0.195	0.268	0.372	0.415	0.408	0.444
M$_1$ * OC$_{T4}$	0.318	0.375	0.281	0.276	0.243	0.247	0.206	0.244	0.393	0.435	0.431	0.464
M$_1$ * OC$_{T5}$	0.323	0.380	0.285	0.281	0.247	0.252	0.209	0.249	0.399	0.445	0.437	0.469
M$_2$ * OC$_{T1}$	0.223	0.262	0.196	0.243	0.170	0.222	0.144	0.219	0.275	0.282	0.301	0.351
M$_2$ * OC$_{T2}$	0.225	0.365	0.198	0.246	0.172	0.226	0.145	0.223	0.278	0.285	0.304	0.353
M$_2$ * OC$_{T3}$	0.218	0.257	0.193	0.238	0.167	0.225	0.141	0.222	0.270	0.280	0.296	0.346
M$_2$ * OC$_{T4}$	0.269	0.317	0.238	0.298	0.206	0.287	0.174	0.284	0.333	0.337	0.365	0.406
M$_2$ * OC$_{T5}$	0.312	0.367	0.275	0.348	0.238	0.335	0.202	0.332	0.385	0.387	0.422	0.456
M$_3$ * OC$_{T1}$	0.295	0.347	0.260	0.386	0.225	0.376	0.191	0.366	0.364	0.417	0.399	0.414
M$_3$ * OC$_{T2}$	0.284	0.335	0.251	0.373	0.217	0.363	0.184	0.345	0.351	0.404	0.385	0.395
M$_3$ * OC$_{T3}$	0.286	0.337	0.253	0.376	0.219	0.366	0.185	0.369	0.354	0.407	0.388	0.397
M$_3$ * OC$_{T4}$	0.276	0.325	0.243	0.373	0.211	0.353	0.178	0.377	0.341	0.394	0.373	0.385
M$_3$ * OC$_{T5}$	0.335	0.395	0.296	0.433	0.256	0.423	0.217	0.446	0.414	0.464	0.454	0.455
LSD$_{0.05}$	0.0268	0.031	0.0205	0.0379	0.0202	0.0365	0.0169	0.029	0.0332	0.0323	0.0362	0.0321

Table 18. Effect of different media, organic compost and their interaction on the total chlorophyll content (SPAD) in leaves of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost treatments (B)	Media (A) Sandy	Calcareous	Peat moss	Mean (B)
		First season		
OC_{T1}	43.98	39.16	41.55	41.57
OC_{T2}	41.78	45.66	44.33	43.93
OC_{T3}	42.96	45.30	47.46	45.24
OC_{T4}	44.18	48.68	42.78	45.21
OC_{T5}	44.10	46.69	49.98	46.92
Mean (A)	43.40	45.10	45.22	
$LSD_{0.05}$	A= 1.64	B= 1.32	A×B=2.30	
		Second season		
OC_{T1}	54.98	48.95	51.94	51.96
OC_{T2}	52.23	57.08	55.41	54.91
OC_{T3}	53.70	56.62	59.32	56.55
OC_{T4}	55.22	60.85	53.47	56.51
OC_{T5}	55.11	58.36	62.48	58.65
Mean (A)	54.25	56.37	56.52	
$LSD_{0.05}$	A= 2.05	B= 1.65	A×B=2.87	

Table 19. Effect of different media, organic compost and their interaction on nitrogen in the leaves (%) of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost treatments (B)	Media (A) Sandy	Calcareous	Peat moss	Mean (B)
		First season		
OC_{T1}	1.89	1.69	2.05	1.88
OC_{T2}	2.16	1.99	2.23	2.13
OC_{T3}	2.11	2.17	2.28	2.19
OC_{T4}	2.28	2.31	2.44	2.34
OC_{T5}	2.49	2.48	2.71	2.56
Mean (A)	2.19	2.13	2.34	
$LSD_{0.05}$	A= 0.167	B= 0.136	A×B= N.S	
		Second season		
OC_{T1}	1.50	1.27	2.60	1.79
OC_{T2}	1.60	1.37	2.80	1.92
OC_{T3}	1.75	1.32	2.97	2.01
OC_{T4}	1.92	1.47	3.12	2.17
OC_{T5}	2.05	1.65	3.42	2.37
Mean (A)	1.76	1.42	2.98	
$LSD_{0.05}$	A=0.231	B=0.077	A×B=0.134	

*** N.S: not significant.**

significant effects on that trait in the two seasons of study, while the interactions between media and compost treatments were insignificant in the first season. With regard to the different media, the results presented in Table (19) showed that peat moss and sandy media gave highest nitrogen % in the leaves values of 2.34, 2.98% and 2.19, 1.76%, in the two seasons, respectively. Means of compost treatments Table (19) indicated that organic compost at 60 % sugar beet produced the highest values of nitrogen in leaves as 2.56, 2.37% in the two seasons, respectively. For the interaction effect on that character, the values shown in Table (19), revealed that organic compost treatments gave significant effect only in the second season. OC_{T1}gave low values of nitrogen in the leaves, while the highest value 3.42% was obtained from using OC_{T5} and peat moss compared to calcareous and sandy soil, in the second season. Organic matters such as compost could improve soil structure, improving root development, providing plant nutrients and enhancing nutrient uptake by plants. The present results were in agreement with those obtained by Youssef *et al*. (1998) on *Ocimum basilicum*, Gad (2003) on *Schefflera actinophylla*, and El-Sayed *et al.* (2012) on *Freesia refracta*.

3. Phosphorus in the leaves (%):

Data presented in Table (20) showed that different media, compost treatment and their interactions had significant effects on phosphorus for that trait in the two seasons of study. With regard to different media effect on phosphorus in the leaves during 2017 and 2018 seasons of study data indicated that peat moss gave higher phosphorus % in the leaves as 0.51 and 0.69%, respectively, in both seasons than sandy and calcareous media. Means of compost treatments indicated that organic compost at 60% sugar beet produced the highest phosphorus in the leaves (0.57 and 0.77%), respectively in the two seasons. With regard to the mean values of phosphorus in the leaves (%) under the effect of different media and the compost treatment

Table 20. Effect of different media, organic compost and their interaction on phosphorus in the leaves (%) of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost treatments (B)	Media (A) Sandy	Calcareous	Peat moss	Mean (B)
	First season			
OC_{T1}	0.35	0.34	0.37	0.35
OC_{T2}	0.44	0.37	0.42	0.41
OC_{T3}	0.47	0.37	0.54	0.46
OC_{T4}	0.56	0.46	0.58	0.53
OC_{T5}	0.63	0.46	0.62	0.57
Mean (A)	0.49	0.40	0.51	
$LSD_{0.05}$	A= 0.15	B= 0.02	A×B= 0.040	
	Second season			
OC_{T1}	0.48	0.46	0.50	0.48
OC_{T2}	0.59	0.51	0.57	0.56
OC_{T3}	0.64	0.50	0.73	0.62
OC_{T4}	0.76	0.62	0.79	0.72
OC_{T5}	0.85	0.63	0.84	0.77
Mean (A)	0.66	0.54	0.69	
$LSD_{0.05}$	A= 0.02	B= 0.03	A×B= 0.059	

*** N.S: not significant.**

Table 21. Effect of different media, organic compost and their interaction on potassium in the leaves (%) of *Gazania splendens* during 2017 and 2018 seasons.

Organic compost treatments (B)	Media (A) Sandy	Calcareous	Peat moss	Mean (B)
	First season			
OC_{T1}	1.06	1.40	1.32	1.26
OC_{T2}	1.47	2.17	1.45	1.70
OC_{T3}	1.96	2.17	2.05	2.06
OC_{T4}	2.32	2.05	1.30	1.89
OC_{T5}	2.13	2.67	1.84	2.21
Mean (A)	1.79	2.09	1.59	
$LSD_{0.05}$	A=0.25	B= 0.30	A×B=0.59	
	Second season			
OC_{T1}	1.20	1.59	1.50	1.43
OC_{T2}	1.67	2.47	1.65	1.93
OC_{T3}	2.23	2.47	2.33	2.34
OC_{T4}	2.64	2.33	1.47	2.15
OC_{T5}	2.42	3.04	2.10	2.52
Mean (A)	2.03	2.38	1.81	
$LSD_{0.05}$	A= 0.29	B= 0.34	A×B= 0.52	

*** N.S: not significant.**

interactions in the two seasons, data showed that OC_{T1} gave low values of phosphorus in the leaves with all media. Meanwhile, OC_{T5} gave high values in sandy and peat moss media compared to calcareous medium. These result were in agreement with, Saadawy *et al.* (2005) on *Peperomia*, *Schefflera* and *Syngonium*, El-Sayed *et al.* (2012) on *Freesia refracta*, and Abdul-Hafeez *et al.* (2015) on *Gardenia jasminoides*.

4. Potassium in the leaves (%):

Data in Table (21) showed that different media, organic compost treatments and their interactions had significant effects on that trait in the two seasons of study. With regard to different media, results presented in Table (21) showed that peat moss and sandy media gave statistically similar values, while gave higher value with calcareous as 2.09 and 2.38%, respectively in the two seasons. Means of compost treatments Table (21) indicated that organic compost at 60%sugar beet and 60% rice straw gave highest percentage of potassium in leaves as 2.21, 2.52% and 2.06, 2.34%, respectively in the two seasons. With regard to the mean of potassium in leaves (%) under the effect of different media and the compost treatment interactions in the both seasons. Data showed that OC_{TI} gave stable response to all three media, whereas OC_{T4} had significantly highest percentage of potassium % in leaves in sandy medium compared to calcareous and sandy media. OC_{T5} gave low values with peat moss compared to calcareous and sandy soil. These result were in agreement with those of Abou-Hussien (2012) on *Origanum majorana*, Mazher *et al.* (2012) on *Amaranthus tricolor*, Abou Seedo *et al.* (2014) on *Salvia officinalis*, and Abdul-Hafeez *et al*. (2015) on *Gardenia jasminoides*.

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الأستجابة الفسيولوجية لنباتات الجازانيا لبيئات النمو والكمبوست العضوى

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أجرى هذا البحث لموسمين متتاليين ٢٠١٧-٢٠١٨ في مشتل الزهور ونباتات الزينة وتنسيق الحدائق، كلية الزراعة، جامعة الاسكندرية، مصر. كان الهدف من هذا البحث هو تحسين وتقييم خصائص التربة الجيرية والرملية المتوفرة في انحاء الجمهورية، مقارنة مع بيئة البيتموس عند معدل ٤٠ و ٧٠ %،وذلك باستخدام اثنين من محسنات التربة الطبيعية، كمبوست قش الارز وكمبوست بنجر السكر عند معدلات إضافة ٣٠ و ٦٠ % والتفاعل بينهم، وتأثير ذلك علي نمو وازهار نباتات الجازانيا *Gazania splendens* . صممت هذه التجربة على صورة القطع المنشقة Split plot , خصصت القطع الكبيرة (الرئيسية) Main plots لأنواع البيئات الثلاثة (رملية - جيرية - بيتموس) , في حين كانت معدلات الاضافات الاربع من الكمبوست ٣٠،٦٠٪ كمبوست قش الارز و٣٠ ،٦٠٪ كمبوست بنجر السكر هي عامل القطع الصغيرة (الفرعية) Sub plots. و قد أوضحت النتائج المتحصل عليها أن معظم صفات النمو الخضرى متمثلة فى عدد الخلفات ، عدد الأوراق، الوزن الطازج للاوراق تأثر معنوياً باستخدام كلا من٦٠٪ كمبوست بنجر السكر مع بيئة البيتموس، بينما كان اقل قيما باستخدام البيتموس فقط دون اضافة اي من انواع الكمبوست المستخدمة , كما أن معظم الصفات الزهرية متمثلة فى قطر النورات , عدد النورات والوزن الجاف للنورات حيث استجابت معنوياً للتفاعل بين انواع البيئات المختلفة والكمبوست المستخدم وتحققت أعلى القيم عند استخدام ٣٠ أو ٦٠٪ كمبوست بنجر السكر مع بيئة البيتموس. وكان أعلى زيادة معنوية فى محتوى الاوراق الطازجة من الكلوروفيلات الكلية (أ + ب) و كذلك تركيز الأوراق من النسبة المئوية للنيتروجين والفوسفور تحصل عليها باستخدام المعدل العالى من كمبوست بنجر السكر ٦٠٪ مع بيئة البيتموس ٤٠٪ , بينما كان أعلى محتوي من البوتاسيوم فى الأوراق باستخدام ٦٠٪ كمبوست بنجر السكر مع ٤٠٪ من بيئة التربة الجيرية و ذلك فى كلا الموسمين و من النتائج السابقة وتحت نفس الظروف يمكن التوصية بأضافة نسبة ٦٠٪ من كمبوست بنجر السكر فقط الي اي من انواع البيئات المختلفة وخصوصا بيئة البيتموس ٤٠٪ حيث ادي ذلك الي زيادة معنوية في معظم الصفات التي تم دراستها وذلك لتحقيق الهدف الرئيسي من الدراسة لانتاج جودة عالية من نبات الجازانيا.