



Effect of Growing Medium, Fertilization and Biostimulant Treatments on Growth and Flowering of Potted Gerbera (*Gerbera Jamesonii* Cv. Jaguar Yellow)

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Abstract

The current study was aimed to investigate the effect of different fertilization and biostimulant treatments on growth and flowering of Gerbera (*Gerbera jamesonii* cv. Jaguar Yellow) plant under unheated plastic greenhouse conditions. This study was carried out for two successive seasons of 2016/2017 and 2017/2018 at the farm of the Arid lands Agriculture graduated studies and Research Institute (ALARI), Shoubra Elkheima area, Qalyobia governorate, Egypt. The experiment were laid out in a completely randomized design (CRD) with 3 replications, and the end results have been subjected to analysis of variance (ANOVA). Freshly extracted gerbera seedling have been planted into pots filled with peatmoss + sand (1:1), peatmoss + sand + vermicompost (1:1:1), peatmoss + sand + compost (1:1:1) with or without 250ml of *Azotobacter* + *Azospirillum* mixture, as biostimulant, and slow-release NPK (4.2g) or fast-release NPK (2.5g) fertilizers to each plant, to determine the effect of fertilizer, biostimulant and growing medium types on the production of potted gerbera. Growth and flowering characteristics were measured. Results indicated that medium combination of sand + vermicompost + peatmoss (1:1:1) with biostimulant, regardless of the fertilizer type, gave significantly increased results in all measurements, compared to all other combinations. Plants grown in medium supplemented with biostimulant and fast-release fertilizer, gave flowers with good qualities While the medium

combination sand + vermicompost + peatmoss (1:1:1) with biostimulant in combination with either one of NPK mineral fertilizers (fast-release fertilizer and slow release fertilizer) gave significantly increased results in most parameters, shown in higher total vegetative and quality when combined with slow release fertilizer than fast-release fertilizer. Under this treatment, number of leaves per plant was (24.8), number of daughter plants/pot (5.3/plant), Leaf greenness (SPAD) (59.00), number of flower (1.28), flower head diameter (8.3 cm) and flower stalk diameter was (2.72 mm). These records were all significantly higher than other treatments.

Keywords: *Gerbera jamesonii* cv., Jaguar Yellow, Vermicompost, Compost, *Azotobacter*, *Azospirillum*

1 Introduction

Gerbera (*Gerbera jamesonii*) is one of the foremost critical cut-vegetation, efficiently developed under semi controlled conditions. Its advantage is due having huge range in coloration and shape of the blossom. The cut sprouts when placed in water, stay fresh for a reasonable period of time. Gerbera belongs to the family "*Compositae*". Plants are stemless and delicate lasting herbs, take off radical, petiole, lanceolate, profoundly lobed, and in some cases rough (Florance Flora 2018). This species has a splendid capacity and destiny for production and exportation and the perfect Gerbera flowers have a wide range of petal colorings as red, white,

orange, yellow etc., and the most popular cultivars are the red ones. Flowering time, flower yield per plant (5.5 to 8.0 flowers/per plant). Quality parameters, include stalk length, head diameter, may vary by means of developing seasons. Cultivation and production techniques include in soil or soilless systems (Moltay et al 1998, Maloupa and Gerasopoulos 1999, Özzambak, Zeybekoğlu 2004).

Growing medium plays a crucial position in seeds germination and for further boom and development of seedling. Among special media used is the vermicompost, which simultaneously provides sufficient oxygen and water to the roots, and is good storage of vitamins for the plant, balanced source of physical, chemical and biological necessities for good plant boom, lightweight to produce uniform plant growth (Atefe et al 2012). When vermicompost is mixed with peatmoss or different composted materials, the resulting product offers an excellent growing medium for plant life and facilitates them to propagate (Javed and Panwar 2013). Peatmoss improves water retention capability and has good nutrient content, infiltration rate, porosity, and hydraulic conductivity (Savithri and Khan 1993).

Use of a few coarse minerals has been found useful in improving drainage. Sand improves soil aeration and moisture retention. As a soil conditioner, sand can enhance the aeration and water-retaining characteristics of "sticky" soils, lessening complicated watering and chance of compaction, cracking and crusting of the soil (Anderson 2019). All those media are beneficial in this regard.

Biofertilizers are fertilizers composed of selected living cells of microbes which provide the plants with certain nutrients, growth promoters and other important biologically compounds (Leoni et al 2019). These microbes use extraordinary mechanisms to offer nutrients to the plants. Among them, some are atmospheric-nitrogen fixers, phosphate solubilizers and phosphate mobilizing (Bhat et al 2010), Addition of nitrogen-fixing bacteria to cultivation medium supports plants with free nitrogen, and other growth promoters (Brar et al 2012). They are renewable asset that may be utilized to replace portion of the chemical fertilizers. Use of biofertilizers is getting to be prevalent in view that of their nutritious esteem and comparatively lower natural impacts (Hari et al 2010). A study conducted on *Gerbera jamesonii* cv. Stanz plant, showed that inoculating

the plant with a mix of mycorrhiza, *Azotobacter chroococcum* and *Bacillus subtilis* significantly increased vegetative growth characteristics, including leaf chlorophyll intensity, leaf area, concentration of mineral elements in gerbera leaves and flowering characters, including length of flower stalk, diameter of flower stalk, capitulum diameter, percentage of flower dry matter and number of flowers and vase life (Abdul-Latif and Mustafa 2019).

Soilless culture is an artificial means of providing plants with support and a reservoir for nutrients and water. Often called solution culture or water culture, the method was originally termed hydroponics (i.e., "water working") by W.F. Gericke in the 1930s. Recently, it has been widely in research facilities as a technique for studying plant nutrition. Various modifications of pure-solution culture have occurred. Gravel or sand is sometimes used in soilless systems to provide plant support and retain some nutrients and water. Soilless culture has been applied in horticulture and floricultural crops, has been used for several years in the Mediterranean and international locations (Maloupa et al 1992, Brun et al 2001). The Interaction between different growing media combinations and biofertilizers showed to have significant influence on growth parameters and root parameters of gerbera cv. Natasha under protected conditions (Swarupa et al 2019).

The use of farmyard manure as organic fertilizer is growing in Egypt due having great features such as being a quick-performing fertilizer, consequences on physical, chemical and biological residences of the soil, having impact as a supply of critical elements, capability to growth the availability of positive nutrients in addition to its impact in decreasing the leaching out of minerals (Suthar 2009). These authors showed the maximum values of some plant parameters, i.e., root length, shoot length, leaf length, bulb weight, number of cloves and number of leaves per plant were recorded in the (15 t/ha vermi compost + 50% NPK) treatment-plant. (Yassen and Khalid 2009) confirmed that mixture of farmyard manure and hen manure treatment enhanced vegetative characters, crop yield and NPK content of onion plants.

Therefore, the aim of this study was to investigate the impact of slow- and quick-release fertilizers, cultivation medium and biofertilizers on the production and quality of potted gerbera flower.

2 Materials and Methods

2.1 Location and duration

The experiments of this research study were conducted in the experimental field of the Aird lands Agriculture Research Institute (ALARI), Shobra Elkheima area, Qalyobia governorate, Egypt (30°07'01.6"N 31°14'37.6"E) in two successive seasons of 2016/2017 and 2017/2018.

2.2 Growing media types and treatments

Three types of substrate were used in this experiment, in combination with biofertilizers and chemical fertilizers, making up 10 treatments, as follows:

No.	Growing medium combination	Chemical fertilizer	Biofertilizer
T1	Peatmoss + Sand	Fast-release	without
T2	Peatmoss + Sand	Fast-release	added

T3	Peatmoss + Sand + Vermicompost	Fast-release	without
T4	Peatmoss + Sand + Vermicompost	Fast-release	added
T5	Peatmoss + Sand + Vermicompost	Slow-release	without
T6	Peatmoss + Sand + Vermicompost	Slow-release	added
T7	Peatmoss + Sand + Compost	Fast-release	without
T8	Peatmoss + Sand + Compost	Fast-release	added
T9	Peatmoss + Sand + Compost	Slow-release	without
T10	Peatmoss + Sand + Compost	Slow-release	added

Tables 1 & 2 show the chemical and physical characteristics of the cultivation media used in the study. Table 1 illustrates the content of major elements, ions and cations of the growing media and Table 2 shows the physical analysis of the growing media.

Table 1. Major elements content of the cultivation media.

Growing medium	Properties %						ppm		
	N	P	K	Ca	Mg	Fe	Mn	Zn	Cu
P. + S.	0.053	0.036	0.02	0.012	0.093	0.12	44.24	14.4	8.64
P. + S. + V.	0.53	0.038	0.28	0.38	0.36	0.34	184.28	83.4	20.51
P. + S. + C.	0.41	0.108	0.27	0.42	0.16	0.19	60.63	16.05	10.17
Milliequivalent/ liter									
Cations					anions				
	Ca ⁺⁺	Mg ⁺⁺	Na ⁺	K ⁺	Cl ⁻	CO ₃	HCO ₃	pH	E.C. (ds/m)
P. + S.	2.2	9.3	3.00	3.69	3.60	0	3.00	7.19	2.2
P. + S. + V.	5.6	6.8	11.30	13.86	10.1	0	13.40	7.27	5.6
P. + S. + C.	11.7	12.0	9.00	58	91.5	0	14.8	7.38	11.7

*P=Peatmoss, S=Sand, V=Vermicompost, C=Compost.

Table 2. Physical analysis of the cultivation media used in the study experiments

Physical analysis			
	O.M %	O.C %	Bulk density
P. + S.	22.4	11.2	1084
P. + S. + V.	13.60	6.80	909.2
P. + S. + C.	13.60	12.40	858.3

*P=Peatmoss, S=Sand, V=Vermicompost, C=Compost, O.M% = Organic matter, O.C% = Organic carbon

2.3 Plant material and growing conditions

Freshly extracted seedlings of *Gerbera jamesonii* (cv. Jaguar Yellow) were planted on the 25th of December in black polyethene pots (30 cm width x 25 length) filled with different media mixture. Seedlings were placed in open nursery and watered using drip irrigation system at 2 L/hour.

Pots were placed in a 200-micron thickness black & white polyethylene sheets sheet to form the gullies to collect the drained water returned to the

catchment tank. Water was circulated by submersible pump, where a submerged pump was used to pump water up through a small floppy tube. Plants were irrigated 3 or 4 times per day in all applications depending on the calculated drainage percentage in the previous watering applications (Maloupa and Gerasopoulos 1999, Özzambak and Zeybekoğlu 2004). Biostimulants (biofertilizers) and chemical fertilizers were added as described below.

Biofertilizers. Biofertilizer (250ml of *Azotobacter chroococcum* and *Azospirillum* sp. mixture) was added one time, 15 days after planting, (Soil Application). Biofertilizer contained 10^3 cfu/ml of *Azotobacter chroococcum* and 10^3 cfu/ml of *Azospirillum* sp.

2.4 Chemical Fertilizers

Slow Release Fertilizers. Controlled-release Basacote® Plus NPK complex fertilizer (at 15:8:12 ratio plus traces elements, purchased from Shora company), with an optimal set of trace elements, was used as recommended fertilization for potting soil, substrate mixtures or top dress and plant hole fertilization. The fertilizer was added to the mixture of growing media (peat moss + sand), (peat moss + sand + vermicompost) and (peat moss + sand + compost), at a rate of 4.2 g/plant, 3 times: 30 days, 60 days after planting, and 90 days after planting.

Fast Release Fertilizers. Mineral fertilizer Kristalon®, containing NPK 19:19:19 in addition to traces elements, was used as nutrient supply for the experimental plants. The fertilizer was added to the mixture of growing medium, at the rate of 2.5 g/plant 3 times 30 days after planting, 60 days and 90 days after planting.

2.5 Plant parameters measurements

Periodic Measurements were taken for each parameter such as height of seedling using (meter scale from ground level to growing tip), number of leaves per pot (counted every month up to 150 days), diameter of stem (measured every month up to 150 days by using digital Vernier caliper), fresh and dry weight of seedling (measured at the end of the season by electronic balance), length of longest tap root (measured at the end of the season from the point of initiation of roots to the tip of the root by using meter scale). Leaf greenness was determined, at the end of the season, using SPAD.

2.6 Measured parameters

A-Vegetative growth characteristics

- 1- Number of leaves/plant.
- 2- Number of plants/pot.
- 3- Leaf greenness (using SPAD).

B- Flower characteristics

- 1- Number of flower/ plants.
- 2- Flower stalk diameter/ plant (cm) using a digital caliber.
- 3- Flower head diameter/ plant (cm) using a graduated ruler.

2.7 Statistical analysis

The experiment of each season was arranged in a completely randomized design with 3 replications. Result were subjected to statistical analyses using analysis of variance (ANOVA) method. Data had been statistically analyzed using Duncan multiple range test (Duncan 1955).

3 Results and Discussion

3.1 Influence of growing medium treatments, mineral fertilization and biostimulant on vegetative characters

Peat is the most widely used substrate for potted plant production in the nurseries and accounts for a significant portion of the materials used to grow potted plants (Marfa et al 2002, Ribeiro et al 2007). However, sustainable horticultural production cannot rely on expensive, non-renewable natural resources such as peat (Marianthi 2006). Therefore, other materials, namely sand, compost and vermicompost, were added to the peatmoss to provide organic matter content, better aeration and more available soluble nutrients.

Table 3 shows the effect of growing medium, type of chemical fertilizer and bio-stimulants on the number of leaves, number of daughter plants and Leaf greenness of Gerbera flower plant. Results exhibited significant increases in these parameters in plants cultured in (T4) treatment, recorded the highest values in numbers of leaves (16.52 and 24.76) and values of leaf greenness (39.62 and 59) in the 1st and 2nd season, respectively.

Table 3. Effect of Growing medium treatments, mineral fertilization, compost and Biostimulant on number of leaves, number of daughter plants and leaf greenness (SPAD) of Gerbera (*Gerbera jamesonii* cv. "Jaguar Yellow"

Treatments	Number of leaves/plant		Number of daughter plants/pot		Leaf greenness (SPAD)	
	1 st season	2 nd season	1 st season	2 nd season	1 st season	2 nd season
T1	9.12c	6.52e	0b	0b	26.30bcd	34.62bcd
T2	9.52c	8.6d	0.4b	0.5b	34.8ab	23.59def
T3	8.12d	16.16c	1b	1b	30.88abc	27.41cde
T4	16.52a	24.76a	3.8a	4a	39.62a	59a
T5	11.56b	17.36c	3.8a	3.9a	17.89cd	47.86ab
T6	11.96b	21.04b	5a	5.3a	37.25ab	37.17bc
T7	9.4c	9.68d	3.6a	3.6a	3.93e	6.032g
T8	6.52e	8.68d	0.8b	0.6b	12.57de	7.68fg
T9	6.6e	8.96d	0.8b	0.5b	3.93e	10.41g
T10	9.32c	3.72f	0.8b	0.3b	3.83e	6.03g

Means followed by the same letter in the column do not differ at the 5% probability by the Duncan test. T1: Peat moss + Sand "NPK fast-release fertilizer", T2: Peat moss + Sand "NPK fast-release fertilizer + biofertilizer", T3: Peat moss + Sand + Vermicompost "NPK fast-release fertilizer", T4: Peat moss + Sand + Vermicompost "NPK fast-release fertilizer + Biostimulant", T5: Peat moss + Sand + Vermicompost "NPK slow release", T6: Peat moss + Sand + Vermicompost "NPK slow release + Biostimulant", T7: Peat moss + Sand + Compost "NPK fast-release fertilizer", T8: Peat moss + Sand + Compost "NPK fast-release fertilizer + Biostimulant", T9: Peat moss + Sand + Compost "NPK slow release", T10: Peat moss + Sand + Compost "NPK slow release + Biostimulant".

T6, containing vermicompost, slow-release NPK fertilizer and biofertilizer, recorded the highest number of daughter plants/pot, being 5 and 5.3, in 1st and 2nd season, respectively. The least number of daughter plants/pot (zero) was in (T1) in both seasons.

Leaf greenness recorded the highest values in plants were cultured in (T4) in 1st season (39.62) and in the 2nd season (59), whereas, the least Leaf greenness values were obtained when plants were cultured in T10 Treatment in both of seasons (3.83 and 6.03, respectively).

This study made a good comparison between different NPK mineral fertilization systems and bio-fertilizer used in gerbera cultivation. Research on production of gerbera generally involves applying biofertilizer and analyzing the mineral fertilizer used for the study. NPK mineral fertilizer has specific and essential functions in plant metabolism. The content of the different types of fertilization used in this research played a crucial role in flower yield and quality of gerbera plants.

Nitrogen is an essential element that has profound effects on plant growth. The form of supplied nitrogen affects plant growth and yield in both soil-based and soilless grown crops (Forde and Clarkson 1999). Nitrate and ammonium are the major sources of inorganic nitrogen for fertilization of

plants. As a source of N, a kind of chemical fertilizer which consists of NH⁴⁺ and NO³⁻ was used. But, under such conditions; N is mainly taken up as NH⁴⁺ rather than as NO³⁻ (Forde and Clarkson, 1999). In our study, N is supplied from the fertilizers which consist of mainly NH⁴⁺.

A similar study conducted on *Gerbera jamesonii* cv. Stanz plant, showed that bio-inoculant with combined inoculum of mycorrhiza, *Azotobacter chroococcum*, and *Bacillus subtilis* significantly increased vegetative growth characteristics; includes leaf chlorophyll intensity, leaf area, concentration of mineral elements (N, P, K, Fe and Zn) in gerbera leaves (Abdul-Latif and Mustafa 2019).

As a result of that, number of leaves significantly differed according to the type of growing medium and fertilization. The highest number of leaves/plant was obtained from the 4th treatment, **Table 3**, which could be attributed to the addition of biofertilizer and vermicompost. The minimum number of leaves and lowest number of daughter plants per plant were observed in the 8th and 9th treatments, and this result may be related to the negative effect of compost and without biofertilizer.

A similar study done on gerbera cv. Natasha (Swarupa et al 2019) showed that Interaction between different growing media combinations and bi-

ofertilizers had significant influence on growth parameters and root parameters of the studies gerbera under protected conditions. Results of that study showed that the media composed of Red soil + Coco peat + Vermicompost (1:1:1) plus biofertilizer and Vesicular Arbuscular mycorrhiza (VAM) recorded significantly maximum plant height at first flower appearance, plant height at flower harvesting stage, wider plant spread at first flower appearance and higher plant spread at flower harvesting stage and other growth parameters values.

In addition, the number of daughter plants was the highest in the 6th treatment (5.3 /plant), which maybe due to the application of quick-release fertilizer and biofertilizer. This could be further supported when noticing that the lowest number of daughter plants/pot is in the 1st treatment (0/plant) which is void of biofertilizer and fast-release fertilizer **Table 3**.

In terms of leaf greenness measurement (SPAD), the 4th treatment gave the highest SPAD values, which is attributed to the interaction between biofertilizers, NPK fast-release fertilizer and vermicompost, while the lowest readings (SPAD) was in 10th treatment was obtained to the negative effect of compost as shown in **Table 3**. Chlorophyll contents are one of the most important criteria to determine the health of the plant, because it is directly related to physiological activities of the plant (Richardson and Simpson 2011).

3.2 Influence of growing medium Treatments, mineral fertilization, compost and Biostimulant on Flower characters

Data presented in **Table 4** show the effect of growing medium, type of chemical fertilizer and biostimulants on number of flowers, flower head diameter and flower stalk diameter of Gerbera flower plant.

Number of Flowers was the highest in plants cultured in T4 treatment, composed to peatmoss + sand + vermicompost with fast-released fertilizer and biofertilizer, and that was in both the 1st season (1.24) and in the 2nd season (1.28), compared to other treatments. The effect of adding biofertilizer on flower yield can be observed when comparing treatments containing biofertilizer (T4, T6 and T8)

having higher flower yield than their counter-treatments (T3, T5 and T7, respectively) which have the same formula except biofertilizer.

Moreover, Fast-release NPK fertilizer had better effect of flower yield when the growing medium contained vermicompost than same treatments but with slow-release NPK fertilizer, i.e. T3 was better than T5 and T4 was better than T6.

Flower yield of gerbera was significantly influenced by addition of compost, compared to vermicompost. Treatment which contained compost (T7, 8, 9 and 10) had less flower yield than those counter treatments containing the same combination but with vermicompost instead (T3, 4, 5 and 6), regardless of the type of chemical NPK fertilizer or the presence of biofertilizer. This could be due to the composted having less nitrogen content than vermicompost **Table 1**. The least number of flowers was obtained when plants were cultured in T7 treatment, in both seasons (0.2 and 0.16, respectively), which contained compost but no biofertilizer.

Flower head diameter (FHD) significantly increased in plants cultured in T6 in the 1st season (8.61) and in the 2nd season (8.3), compared to other treatments. The lowest values of FHD were obtained in plants cultured in the T10 in the 1st season and T10 in the 2nd season (1.53 cm and 1.08 cm, respectively).

Compost had the same impact on FHD, as on the flower yield. Treatments T7, 8, 9 and 10 (containing compost) had smaller flower head diameter than those counter treatments (T3, 4, 5 and 6) containing vermicompost instead, regardless of the type of chemical fertilizer or the presence of biofertilizer. This could be due to the composted having less nitrogen content than vermicompost **Table 1**.

As for Flower stalk diameter, results showed that plant in T6 treatment had the highest flower stalk diameter of (3.46) in the 1st season and (2.72) in the 2nd season. Whereas, the lowest vase life values were obtained in T10 plants (0.45 and 0.41) in the 1st and second seasons, respectively.

The weakest flower stalk (the thickness of flower stalks) was observed in the 10th treatment, considering the P content in the growing medium, while the strongest flower stalk was observed in the 4th treatment in terms of quality characteristics of flower.

Table 4. Effect of Growing medium treatments, mineral fertilization, compost and Biostimulant on number of flowers, flower head diameter and flower stalk diameter of Gerbera (*Gerbera jamesonii*).cv “Jaguar Yellow”

Treat.	Number of Flower		Flower head diameter (cm)		Flower stalk diameter (cm)	
	1 st season	2 nd season	1 st season	2 nd season	1 st season	2 nd season
T1	0.48bc	0.84abc	4.68abc	5.49b	1.73bc	2.37a
T2	0.32bc	0.68bcd	3.2bc	5.89ab	1.69bc	2.09ab
T3	0.52bc	1abc	5.2abc	4.11bcd	2.27ab	1.58abc
T4	1.24a	1.28a	4.84abc	4.98bc	2.36ab	2.44a
T5	0.36bc	1.08ab	4.92abc	5.47b	2.38ab	2.40a
T6	1.08a	1.04ab	8.61a	8.3a	3.46a	2.72a
T7	0.2c	0.16e	2.90bc	2.44cde	1.17bc	0.93cd
T8	0.24c	0.2e	2.04bc	1.38de	1.07bc	0.59cd
T9	0.28bc	0.28de	6.6ab	2.46cde	0.95c	1.03bcd
T10	0.28bc	0.28de	1.53c	1.08e	0.45c	0.41d

Means followed by the same letter in the column do not differ at the 5% probability by the Duncan test. T1: Peat moss + Sand “NPK fast-release fertilizer”, T2: Peat moss + Sand “ NPK fast-release fertilizer + biofertilizer”, T3: Peat moss + Sand + Vermicompost “NPK fast-release fertilizer”, T4: Peat moss + Sand + Vermicompost “NPK fast-release fertilizer + Biostimulant”, T5: Peat moss + Sand + Vermicompost “NPK slow release”, T6: Peat moss + Sand + Vermicompost “NPK slow release + Biostimulant”, T7: Peat moss + Sand + Compost “NPK fast-release fertilizer”, T8: Peat moss + Sand + Compost “NPK fast-release fertilizer + Biostimulant”, T9: Peat moss + Sand + Compost “NPK slow release”, T10: Peat moss + Sand + Compost “NPK slow release + Biostimulant”.

In a similar study, (Abdul-Latif and Mustafa 2019), bio-inoculation of *Gerbera jamesonii* cv. Stanz with combined inoculum of mycorrhiza, *Azotobacter chroococcum* and *Bacillus subtilis* significantly increased flowering characters, including length of flower stalk, diameter of flower, capitulum diameter, flower dry matter %, number of flowers and vase life (28.52 days).

4 Conclusions

The use of vermicompost and biostimulants in the potting media for gerbera flower plant showed a significant increase in plant characteristics and flower quality. Fast-release NPK fertilizers showed to have better impact on growth and flower parameters, in the presence of vermicompost, compared to Fast-release NPK fertilizers treatment with compost.

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تأثير معاملات التسميد والمحفزات الحيوية على نمو وإزهار نبات الجرييرا "Jaguar Yellow" cv. (*Gerbera jamesonii*) المنزرعة في إصص

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الموجز

أصص الجرييرا. أشارت النتائج إلى أن بيئة النمو المكونة من البيتموس + الرمل + الفيرميكمبوست (1:1:1) مع المحفزات الحيوية أعطت أفضل قياسات بالنسبة للنمو الخضري وجودة الأزهار، وأن بيئة النمو المكونة من البيتموس + الرمل + الفيرميكمبوست (1:1:1) المضاف إليها المحفزات الحيوية مع السماد المركب سريع الذوبان أعطت أزهار ذات صفات جيدة، بينما السماد المركب بطيء الذوبان في بيئة النمو المكونة من الرمل + البيتموس + الفيرميكمبوست مع المحفزات الحيوية أعطت صفات خضرية جيدة متمثلة في متوسط طول النبات (28.24 سم / النبات) ومتوسط عدد الأوراق (24.76 / النبات) ومتوسط قطر الساق (3.75 مم / النبات) وكان متوسط الوزن الطازج للنبات (47.87 جم / النبات) ومتوسط الوزن الجاف للنبات (12.55 جم / النبات) ، بالإضافة إلى أعلى متوسط طول الجذر (19.76 سم / النبات) ، أعلى متوسط قطر الجذر (2.95 مم / النبات) ، وأعلى نسبة عدد الشعيرات الجذرية (1.43 سم² / النبات) ، نسبة الإخضرار في الأوراق (57.2) وأعلى عدد الخلفات (5 / النبات).

هدفت هذه الدراسة إلى تقييم تأثير أنواع التربة ومعاملات الأسمدة المختلفة والمحفزات الحيوية على نمو وإزهار نبات الجرييرا (*Gerbera jamesonii* cv. Jaguar Yellow). تم إجراء هذه الدراسة خلال موسمي 2017/2016 و 2018/2017 بمزرعة معهد الدراسات العليا والبحوث للزراعة في المناطق القاحلة ، شبرا الخيمة ، محافظة القليوبية، مصر. تم تنفيذ التجربة بتصميم تام العشوائية (CRD) في ثلاث مكررات، والنتائج النهائية خضعت لتحليل التباين (ANOVA). تم زرع شتلات الجرييرا في إصص مملوءة بالبيتموس+الرمل (1:1)، أو البيتموس+الرمل + الفيرميكمبوست (1:1:1)، أو البيتموس + الرمل + الكمبوست (1:1:1) مع أو بدون المحفزات الحيوية بمعدل (250 مل/ النبات) مع أسمدة NPK مركبة بطيئة الذوبان بمعدل (4.2 جم / النبات) أو أسمدة سريعة الذوبان بمعدل (2.5 جم / النبات) لتحديد تأثير الأسمدة المختلفة والمحفزات الحيوية على نمو وإزهار