Effect of Soil Conditioners, Seaweed Extracts and Chemical Fertilizers: on Growth, Flowering and Bulbs Production of *Narcissus tazetta* L. subsp. "Italicus" Plant.

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**ABSTRACT**

*Narcissus tazetta* L. subsp. "Italicus" belongs to the family "Amaryllidaceae", which is one of the most important ornamental bulbs plant, landscape, and cut flowers plant. So, it needs a balanced fertilization program to produce flowers of good marketing characteristics, healthy bundle growth and new developing bulbs of size and ideal weight suitable for flowering in the new season.

Because most Egyptian lands suffer from high alkalinity, so the time has come to use safe alternative fertilizers. Those are able to make the element in a suitable form to absorption by plants without any toxicity to the soil. Green compost fertilization contains organic acids, which can chelate metallic elements, enhance the ability of them to absorption via plant and improve the properties of soil. Also, the chelate fertilizers have the same role, those can make inorganic nutrients are easier and faster to pass into the plant tissue directly via foliar spray or soil drench, also even in alkaline and calcareous soil conditions. While, seaweed extracts have many nutrients, vitamins, growth hormones and/or regulators, carbohydrates and amino acids, all of which stimulate plant growth.

This experiment aimed to study the effect of soil conditioners "El-Zhra compo*st (ZC), the chelating chemical fertilizer "Nutricomplex 20-20-20" (N20) and seaweed extracts "Algifert" (Alg) as a foliar spray and soil drench application on growth, flowering, bulb production and chemical constituents of *Narcissus tazetta* L. subsp. "Italicus" plants. This study was conducted during two cropping years 2015/16 and 2016/17 at El-Harry village, El Montaza, The East of Alexandria, Egypt. The eight transactions were executed as follow : 1- Control media "without any fertilizers", 2- (ZC) ["El-Zhra compo*st 10% from pot volume], 3- AlgS + AlgD ["Algifert" 1g/l foliar spray + 1g/l soil drench], 4- N20S+N20D ["Nutricomplex 20-20-20" 1g/l foliar spray + 1g/l soil drench], 5- ZC + AlgS+D [10% compo*st + "Algifert" (1g/l foliar spray + 1g/l soil drench)], 6- ZC+N20S+D [10% compo*st + "Nutricomplex 20-20-20" (1g/l foliar spray + 1g/l soil drench), 7- AlgS + N20D ["Algifert" 1g/l foliar spray + "Nutricomplex 20-20-20" 1g/l soil drench] and the last 8 - AlgD + N20S ["Algifert" 1g/l soil drench + "Nutricomplex 20-20-20" 1g/l foliar spray]. All the transactions had significant values compared to control. But the highly significant values resulted from the treatment of ZC+ AlgS+D in most growth characteristics followed by ZC+ N20S+D or AlgS+AlgD in some cases. Thus, when obtaining the highest quantity and quality of the vegetative growth, flowering characteristics, bulb production and chemical composition of *Narcissus tazetta* L. subsp. "Italicus" plant, it is preferable to add leaves compost to the growing soil with the addition of foliar spray and soil drench with either elements chelators or seaweed extracts.

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INTRODUCTION

Narcissus species is one of the important varieties of family "Amaryllidaceae". Subspecies *Narcissus tazetta* L. subsp. "Italicus" is widely spread in the Mediterranean from southern France to Greece. It is cultivated under Egyptian environmental conditions with vegetative organs "bulbs" not by seeds. It is distinguished from other varieties by a slender scape with distinctly two-edged, holds about 6-10 flowers/spike. The perianth diameter of flowers is extended from 1.5 to 2 inches across. The crown color is sulfur-yellow deep (William, 1875). The narcissi has an important historical and artistic since the ancient Egyptian civilization and the Greco-Roman period based on mythology and continued until the modern era. It has an important coordinating value as ornamental bulbs plant in landscape design, botanical gardens and flowering pot plants in/outdoor. Also, it is suitable for picking, growing wild in green meadows and rocky gardens. In addition, it has medical and pharmaceutical importance that cannot be overlooked (Michael and Lerner, 2001). Because it is a bulbous plant, it needs a balanced fertilization program to produce flowers of good characteristics, healthy vegetative growth and new developing bulbs of size and ideal weight suitable for flowering in the new season and/or commercial production and export (Gabra, 2017). Achieve to good qualities of plants including growth, flowering, and bulbs productivity are dependent on the nutritional balance of plant through the suitability of macro and micronutrients for absorption (Sidhu *et al.*, 2019). So, fertilization with microelements contributed to significantly improving the characteristics, qualities and productivity of many crops as well as macro elements (Aske *et al.*, 2017 and Yadav *et al.*, 2018). Major components like N, P and K are involved in the representation of carbohydrates, proteins, fats, oils, enzymes, hormones and few plant pigments. But, the excessive use of agrochemicals may cause toxicity to plants, soil erosion and exposes it with both humans and animals to risk (Sahibin *et al.*, 2002 and Gabra, 2004).

Because most Egyptian lands suffer from high alkalinity, so the time has come to use the safe alternative fertilizers that make the element in a suitable form to absorption by plants, also even in alkaline and calcareous soil conditions. Green compost or leaves compost is a product from agricultural waste or plant debris from gardens. It is one of the many compost techniques in the world, which are used to fertilize ornamental plants and improve the properties of soil (Popescu and Popescu, 2015). It also contains organic acids, especially humic acid which have the ability to chelate mineral elements and release them for uptake via plants such as Fe, Zn, Cu and Mn (Chen *et al.*, 1999 and Ahmad *et al.*, 2013).

In addition, the major, minors and micro/trace nutrients found in chelate fertilizers can make the metallic nutrients are easier and faster to pass into the plant tissue directly via foliar spray or soil drench. Because most physiological diseases of plants are due to the lack of trace elements like iron so, iron chelates became commonly used fertilizers for plant nutrition. One of the characteristics of these chelating complexes' "chelated ligands" is that they form lined bonds with a metal cation. Those bonds give it solubility and more stability. In this way, the element remains available to plant uptake and does not hold onto the soil particles depends on the kind of chelate ligands such EDTA, DTPA, HEEDTA (Schmidt and Steinbach, 2000).

While, the seaweed extracts have many nutrients and full of many vitamins, growth hormones and/or regulators, carbohydrates and amino acids, all of which stimulate plant growth. The use of seaweed extracts eliminates the use of any chemical fertilizers NPK or reduces their dosages (Gabra, 2010). She recorded that when "Promex" [the commercial product of seaweed extracts] was added to 12.5% compost at the rate of 1g/l as foliar spray application on *Gladiolus hybrida*, L. cv "Rose Supreme", the chemical fertilization was
dispensed with or decreased NPK dose to three quarter when it was added to them at the same rate and it decreased NPK dose to half when added both of them to 7.5% compost. But the dosage of 3/4 NPK with "Promex", on Narcissus tazetta L. cv. "Polyanthus Narcissus" gave the highly significant growth parameters, flowering characters, and bulbs productivity and chemical compositions. While, Babarabie et al., 2018 explained that the addition of conditioners such as vermicompost to garden soil could improve the important traits of Narcissus flower, including flower life, sprouting rate and scape diameter, thus reducing the use of chemicals. Also, the addition of leaf mold to growing media increased the flower longevity to 7 days.

Also, Shafee et al., 2015 indicated that foliar application of yeast extract, seaweeds extract and licorice extract together on, due to the highest stimulation effect on bundle growth characters of Allium cepa L. plants, total bulb yield and its components like N, protein and dry matter as a percentage of bulb tissues. While, El-Afif et al., 2009 recorded that, most plant growth parameters were significantly increased by foliar spraying with seaweed extracts "Algifert" of summer squash such early and total yield. Moreover, an increase in NPK content in the leaves as compared with control during two growing seasons. The interaction between seaweed extracts and organic nitrogen fertilizer sources and rates gave the highest values of vegetative characters. They concluded that the maximum net return was obtained with foliar spraying by seaweed extracts [1g/l] in combination with 200% of FYM, followed by rice straw compost at 200% of recommended rate/bed., respectively, comparing with control. Moreover, the application of organic manure affects the properties, texture and fertility of the soil. Also, Nour et al., 2010 studied the effect of foliar spray with seaweed extracts ("Algifert" 1g/1 and 2g/1), four tomato hybrids and their interaction on growth, dry weight, flowering, yield and chemical constituents of tomato plants (Lycopersicon esculentum Mill.) under sandy soil conditions. They elucidated that spraying tomato hybrids with seaweed extracts at a rate of 1g/l gave maximum values of plant growth characters, leaves number and dry weight. And the interaction treatment between the hybrid K615 and foliar spray with seaweed extracts at 2g/l gave the highest values of leaves and shoots number/plant, leaf area, dry weight, N% and protein % concentrations. Sivasankari et al., 2006 soaked the seeds of Vigna sinensis with seaweed liquid fertilizers. They founded the low concentration of 20% of solution extracts soaked improved seedling growth parameters, root length and increased the concentration of pigments, protein, amino acid in shoot and root. Saeedi et al., 2015 studied the effects of calcium amino acid chelates and calcium chloride (CaCl2) on flower production, quality, and vase life of "Cinderella Lime" lisianthus flowers. They recorded that, the highly significant concentrations of calcium in flowering stems were found in plants treated with calcium amino acid chelates than others treated with amino acids only or control treatment. Treatment with calcium methionine chelate led to significantly higher flower numbers, calcium amino acid chelates increased the fresh and dry weight of the flowering stems. Kashif et al., 2014 explained that foliar fertilizer treatment with NPK (17:17:17) gave the highly significant flowers number plant⁻¹, number of leaves plant⁻¹, buds diameter, flowers diameter, flowers fresh and dry weight of Dahlia hybrida cv. Fresco. Also, treated plants with NPK (15:32:7) + micropower increased the leaf area, branches number/plant, emergence date for the first flower, blooming period and number of tubers/plant. While the treatment of NPK (15:32:7) + chelated mix micro-nutrients improved the plant height and also the length of the branches. So, the mixture of macro and micro-nutrients as the foliar application had a positive impact on the growth and yield. Chohura et al., 2012 investigate the effect of four chelates, differing in the percentage of Fe content and the kind of Fe bonding ligand: Fe 8 Forte (EDTA+HEEDTA), Fe 9 Premium (DTPA), Fe 13 Top (EDTA) and Liberal Fe DP7 (DTPA) applied in 3 doses 50, 75,100 mg Fe/l dm⁻³ of growing media, on the yield and fruit quality of the tomato cultivar...
grown in peat substrate. Each fertilization treatment with different iron sources had the same effect in early yield. Plant Fertilization with Fe 9 Premium (DTPA) was the best marketable yield of tomato fruits, while the lowest has resulted from the treatment with Fe 13 Top (EDTA) chelate. The optimal dose of these nutrients for marketing quality and early yield was 50 mg Fe/l dm³.

Gerics et al., 2016 studied the application of foliar spray with salicylic acid with/without some micronutrients (Fe, Zn and Mn) on the growth, bulbs yield and storage ability of onion bulbs variety Giza Red. They founded that combination with salicylic acid (at the rate of 200 ppm) and mixture micronutrients (Fe + Zn + Mn) at the rate of 2 ml/l gave the longest bundle, highest leaf area, heaviest bulb weight and increased the marketable quality of bulbs and total bulbs yield. Also, it gave the lowest value in weight loss as a percentage after 180 days of storage. But the foliar spray with mixture micronutrients only gave the highly significant value of nutrition in bulb tissues.

MATERIALS AND METHODS

This study was conducted during two consecutive cropping years, from fall 2015 to spring 2016 and the same at the second 2016 till spring 2017, at El-Harrery village, El Montaza the second district, The East of Alexandria, Egypt. The aim of the study was to make a comparison between organic soil conditioners from leaves compost "El-Zahra" (ZC), the chelating chemical fertilizer "Nutricomplex 20-20-20" (N20) and seaweed extracts "Algifert" (Alg) as a foliar spray and soil drench application. All of these impacts on growth, flowering, bulb production and chemical constituents of Narcissus tazetta L. subsp. "Italicus" plants.

Plant Materials and Cultivation Methods:

The bulbs of [Narcissus tazetta L. subsp. "Italicus"] were imported from the Netherlands and obtained from the nursery of Faculty of Agriculture, Kafr El-Sheikh University, Egypt. The mean of mother bulbs circumference was 10-11.5 cm and weights were 30.5-32 g for each season. These were planted on 3rd and 7th October 2015 and 2016 in 10 cm depth from soil surface of plastic pots of 20 cm diameter, which filled with 5 kg of sand-clay mixture soil at rate of 2:1 by volume. The mean analysis of soil mixture before planting during both seasons 2015/16 and 2016/17 is shown in table (1).

Table 1: The physical and chemical analysis of initial soil mixture:

| The physical analysis  | The chemical analysis |
|------------------------|----------------------|
| Sandy-loam soil        | Organic Matter       |
| Sand                   | %                    |
| Clay                   | %                    |
| Silt                   | %                    |
| Total N                | %                    |
| Total P                | %                    |
| K                      | %                    |
| Fe                     | mg/kg                |
| Zn                     |                      |
| Cu                     |                      |
| pH                     |                      |
| Ec                     | dS/m                 |

Fertilizer Materials and Adding Methods:

1- The chelating chemical fertilizer is represented by the "Nutricomplex 20-20-20" (N20) component from tradecorp© A ROVENDA Company. It is containing from 20% N, 20% P2O5 and 20% K2O with many chelating micronutrients. The doses were foliar spray and soil drench at the rate of 1g/l at 3 times in three phases. The first stage was added after bulbs sprouting [when the length of the vegetative bundle was reached at 10cm], the second dose after emergence bloom and the last one after picking flowers. Irrigation "soil drench" doses were given simultaneously with spray doses at the same concentrations, according to
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Field capacity/pot without drainage loss. The analysis of "Nutricomplex 20-20-20" is shown in Table (2).

**Table 2: Chemical analysis of "Nutricomplex 20-20-20"**

| Component                  | Analysis (%) | % w/w |
|----------------------------|--------------|-------|
| Total N                    | 20           | Fe    | 0.06 |
| P2O5                       | 20           | Mn    | 0.04 |
| K2O                        | 20           | Zn    | 0.02 |
| Stable interval of pH for chelated fraction EDTA | 4 - 10 | Cu   | 0.01 |
|                            |              | B     | 0.02 |
|                            |              | Mo    | 0.003 |

*The analysis of "Nutricomplex 20-20-20" is on the product bottle and the company brochures.

2- The seaweeds extract "Algifert" (Alg) is the commercial product for "SIDASA-Egypt Company for Fertilizers, Pesticides and Chemicals". This synthetical product is prepared as an aqueous extract of *Ascophyllum nodosum* algae granules. It contains many nutrients and chelated minerals, many simple and complex carbohydrates, amino acids, phytohormones, alginic acid and mannitol. The analysis of "Algifert" is shown in Table (3). The doses, adding methods and times number were like the same of "Nutricomplex 20-20-20".

**Table 3: Chemical analysis of seaweed extracts "Algifert"**

| Dry matter % | Prot. & 7±1 | Macronutrients | Micronutrients |
|--------------|-------------|----------------|---------------|
| Moisture %   | 7±0.5       | Total N %      | Ca% 0.2±0.05  | Fe ppm 125±2 0 |
| Organic matter % | 50±5        | P % 2±0.5      | Zn ppm 55±5   |
| Ash (minerals) % | 50±5        | K % 10±2       | Cu ppm 3,5±0, 5 |
| pH for 250g extract/l | 5.5±0.5 | Mg % 0.5-0.9   | Bo ppm 100±1 0 |
| Color        | Brown       | K % 10±2       | Mn ppm 8.5±2  |
| Vitamins (ppm): | V. B1 6.8   | Growth hormones| Mo ppm 1-5    |
|              | V. B2 6.0   |                |               |
|              | V. B12 0.04 |                |               |

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3- The compost "El-Zahra" (ZC) is a product from "Bany-Swafe Company for Organic Fertilizers". This compost is a botanical product 100% from the medicinal and aromatic plant wastes for a period of up to 4-5 months. It contains macro and micronutrients without any artificial additives. Also, it is free from weed seeds, nematodes and pathogens. It works to improve the physical, chemical and biological properties of poor soils. The compost was added while preparing the pots with cultivation media at the rate of 10% per pot volume. The analysis of the compost "El-Zahra" is shown in Table (4).

**Table 4: Chemical analysis of the compost "El-Zahra"**

| Component          | Analysis (%) | % w/w |
|--------------------|--------------|-------|
| Moisture %         | 25±5         | C/N   | 1:18 |
| pH                 | 7.5±0.5      | Ec ds/m | 1.7±0.3 |
| Organic matter %   | 40±5         | Weight of m3 (kg) | 570±50 |
| Ash %              | 32±3         | Organic C % | 38.5±2 |
|                     |              | N%   | 1.6±0.2 |
|                     |              | P%   | 0.81 |
|                     |              | K%   | 1.09 |
The Statistical Analysis and Transactions:

The statistical analysis of the experiment was CRD (Complete Randomized Design), and means of the different treatments were compared using Duncan’s Multiple Range Test according to (Snedecor and Cochran, 1974) as 3 replicates and 3 pots for both of them inter 8 transactions as a follow:

1- Cont. [Control media "without any fertilizers"].
2- ZC ["El-Zahra compost" 10%].
3- AlgS + AlgD ["Algifest" 1g/l foliar spray + 1g/l soil drench].
4- N20S+N20D ["Nutricomplex 20-20-20" 1g/l foliar spray + 1g/l soil drench].
5- ZC + AlgS+D [10% compost + Algifest (1g/l foliar spray + 1g/l soil drench)].
6- ZC+N20S+D [10% compost+"Nutricomplex 20-20-20"(1g/l foliar spray+1g/l soil drench).
7- AlgS+ N20D ["Algifest" 1g/l foliar spray + ["Nutricomplex 20-20-20" 1g/l soil drench].
8- AlgD + N20S ["Algifest" 1g/l soil drench + "Nutricomplex 20-20-20" 1g/l foliar spray].

The Estimated View Data As Follow:

1- The vegetative [bundle] growth and flowering characteristics were measured at the flowering stage. The bundle growth data were [leaf length (cm), number of leaves, leaf diameter (cm), leaf area (m²), leaves fresh and dry weight (g)]. And the flowering data were [emergence date (day), showing color date (day), flowering date (day) and inflorescence length (cm), scape circumference (cm), number of florets/scape, florets diameter (cm) and inflorescence fresh and dry weight (g)].
2- The bulbs productivity was recorded after the end of season at pre-yellowish of leaves in June 2016 and 2017. The data were [number of bulbs, bulb circumference (cm) and total bulbs fresh and dry weight (g)].
3- The chemical composition such astotal chlorophyll [mg/g fresh weight of leaves] was determined during the flowering stage for each season due to Moran (1982) using aspectrophotometer. And N, P and K% were determined in dry leaves, by acolorimetric method according to Evenhuis and Deward (1980), Trough and Meyer (1939) and Brown and Lilliland (1946), respectively. All of the chemical analyses of plants were carried out by the Hort. Res. Inst. ARC. Giza, Egypt.

RESULTS AND DISCUSSION

Effect of soil conditioners "El Zahra compost", seaweed extracts "Algifest" and chelate chemical fertilizer "Nutricomplex 20-20-20" on bundle growth parameters, flowering characteristics and bulbs productivity of Narcissus tazetta L. subsp. "Italica" plant.

The Bundle Growth Parameters:

The variable parameters that were taken on the bundle growth of Narcissi plants are shown in Table (5) for both cropping years 2015/16 and 2016/17, influenced by fertilization transactions. And the latter all indicated a significant increase in vegetative growth rates, such as leaf length (cm), leaf diameter (cm), leaf area (m²) and leaves number/bundle, leaves fresh and dry weight (g) compared with the lowest values of control treatment. The highly significant increase in leaf length, leaf area, leaves dry weight in both years resulted from the treatment of ZC+AlgS+D. But the treatment of ZC+N20S+D gave the highly significant value of leaf diameter in both years, number of leaves in 2nd year and leaves fresh weight in 1st year. While the results were equal in significance between the two previous treatments in data of leaves number/bundle and leaf diameter in 1st year. Also, the results did not show any significant difference values between the treatments of ZC+AlgS+D and AlgS+AlgD in dry weight of leaves in 2nd year. The results indicate that the addition of chelated micro and macro mineral nutrients or seaweed extract forms improved the efficiency of plants to absorb
the elements, which reflected on the health and quality of vegetative growth. Also, the presence of compost in growing media provided the soil fertility and texture and increased the organic or inorganic nutrients which improved the spread and efficiency of roots uptake. These results were consistent with the findings of Schmidt and Steinbach, 2000; Gabra, 2010; Kashif et al., 2014; Babarabie et al., 2018.

Table 5: Effect of fertilization transactions on bundle growth measurements of Narcissus tazetta L. subsp. “Italicus” for both cropping years 2015/16 and 2016/17.

| Fertilization transactions | Leaf length (cm) | No. of leaves/bundle | Leaf diameter (cm) | Leaf area (m²) | Leaves F.W. (g) | Leaves D.W. (g) |
|---------------------------|------------------|----------------------|-------------------|---------------|----------------|----------------|
| Cont.                     | 45.15f           | 19.40f               | 18.82e            | 5.36f         | 6.97e          | 4.26f          |
| ZD                        | 49.23e           | 21.83e               | 20.00de           | 6.13e         | 7.53de         | 4.09e          |
| AlgS+AlgD                 | 51.93d           | 23.25d               | 17.78d            | 6.83d         | 8.69d          | 4.95d          |
| N20S+N20D                 | 50.68de          | 21.91de              | 1.68ed            | 7.44e         | 8.04ed         | 4.94d          |
| ZC+AlgS+D                 | 60.81s           | 26.68s               | 1.77ab            | 10.87s        | 10.95s         | 5.12s          |
| ZC+N20S+D                 | 57.43s           | 24.50sb              | 1.80a             | 8.66s         | 10.10s         | 5.79s          |
| AlgS+N20D                 | 54.70s           | 22.75sc              | 1.60cd            | 7.12cd        | 8.59c          | 4.621c         |
| AlgD+N20S                 | 51.69d           | 24.35bc              | 20.88cd           | 7.00cd        | 9.47b          | 4.54cd         |

The Flowering Characteristics:

Data in Tables (6 & 7) was shown the flowering characteristics of Narcissus plants for both cropping years. All fertilization treatments had significantly increased flowering characteristics [emergence date, showing color date, flowering date, inflorescence length, scape circumference, number of florets/scape, florets diameter, inflorescence fresh and dry weight], compared with control. But the significant values of the treatment were equal to the addition of chemical chelators or/ seaweed extracts with compost at the treatments of ZC+AlgS+D and ZC+N20S+D in most characteristics, followed by treatments of AlgS+N20D and/or AlgS+AlgD in earlier flowering data such as emergence date, showing color date in both years and [flowering date, inflorescence dry weight in 2nd year] and inflorescence fresh weight 1st y. While the transaction of ZC+AlgS+D was the only one with the highest significant value of inflorescence length data, [scape circumference and inflorescence fresh weight at 2nd y], the number of florets/ scape, [florets diameter and inflorescence dry weight 1st y]. These results confirm that seaweed extracts either spraying or soil drench each then added for compost has the strongest effect because it contains many growth stimulants, plant hormones, regulators, and vitamins in addition to inorganic nutrients. These evidences are consistent with concluded of El-Afif et al., 2009; Gabra, 2010; Nour et al., 2010 and Shafeek et al., 2015.

Table 6: Effect of fertilization transactions on flowering characteristics of Narcissus tazetta L. subsp. “Italicus” for both cropping years 2015/16 and 2016/17.

| Fertilization transactions | Emergence date (day) | Showing color date (day) | Flowering date (day) | Inflorescence length (cm) |
|---------------------------|----------------------|--------------------------|----------------------|---------------------------|
| Cont.                     | 126.5a               | 152.0a                   | 156.0a               | 40.80g                    |
| ZD                        | 124.5ab              | 147.0b                   | 150.3b               | 42.70f                    |
| AlgS+AlgD                 | 121.5bc              | 139.0cd                  | 142.0e               | 44.64e                    |
| N20S+N20D                 | 119.5de              | 138.5cd                  | 146.57d              | 46.62ef                   |
| ZC+AlgS+D                 | 109.0e               | 128.3fs                  | 131.33e              | 58.70a                    |
| ZC+N20S+D                 | 111.0e               | 129.3ef                  | 131.33e              | 52.44b                    |
| AlgS+N20D                 | 113.0de              | 132.67ef                 | 135.33de             | 50.26c                    |
| AlgD+N20S                 | 117.0cd              | 135.33de                 | 143.33c              | 48.39cd                   |
Table 7: Effect of fertilization transactions on flowering characteristics of *Narcissus tazetta*L. subsp."Italicus" for both cropping years 2015/16 and 2016/17.

| Fertilization transactions | Scape circumference (cm) | No. of florets/scape | Florets diameter | Inflorescence F. w.(g) | Inflorescence D. w.(g) |
|----------------------------|--------------------------|----------------------|------------------|-------------------------|------------------------|
|                            | 1st Y | 2nd Y | 1st Y | 2nd Y | 1st Y | 2nd Y | 1st Y | 2nd Y | 1st Y | 2nd Y |
| Cont.                      | 1.80e  | 1.74e  | 5.67e  | 6.33e  | 4.55e  | 4.55e  | 7.42e  | 7.86e  | 0.584e  | 0.590e |
| ZD                         | 1.98bc | 1.85e  | 6.30e  | 6.83e  | 4.60e  | 4.65e  | 8.18e  | 8.43e  | 0.567e  | 0.627de |
| AlgS+AlgD                  | 2.03bc | 2.08b  | 6.50de | 7.07cd | 4.67de | 5.05bc | 9.10ab | 9.07bc | 0.693b  | 0.700abc |
| N2O5+N2O5D                 | 2.00bc | 1.95cd | 6.67cde| 7.20bc | 4.77cd | 4.90cd | 8.73bc | 8.86c  | 0.596de | 0.677bocd |
| ZC+AlgS+D                  | 2.07ab | 2.25a  | 6.33a  | 8.00a  | 5.10a  | 5.12ab | 9.36a  | 9.94a  | 0.867a  | 0.763a |
| ZC+N2O5S+D                 | 2.20ab | 2.10b  | 7.44b  | 7.65b  | 4.95b  | 5.25a  | 8.99abc| 9.26b  | 0.661c  | 0.733ab |
| AlgS+N2O5D                 | 1.90cd | 1.89de | 7.00bcd| 7.33bc | 4.83bc | 4.95cd | 8.82bcd| 8.89c  | 0.624d  | 0.633cde |
| AlgD+N2O5S                 | 2.00bc | 1.98c  | 7.11bc | 7.55b  | 4.88bc | 4.97bcd| 8.62d  | 8.93c  | 0.617d  | 0.690bcd |

The Bulb Productivity:

Table 8: Effect of fertilization transactions on bulbs productivity of *Narcissus tazetta*L. subsp."Italicus" for both cropping years 2015/16 and 2016/17.

| Chemical Components | No. of bulbs | Bulb circumference (cm) | Total bulbs fresh weight (g) | Total bulbs dry weight (g) |
|---------------------|--------------|--------------------------|-----------------------------|---------------------------|
|                     | 1st Y | 2nd Y | 1st Y | 2nd Y | 1st Y | 2nd Y | 1st Y | 2nd Y |
| Cont.               | 4.00f  | 3.25f | 11.43d | 11.01e | 34.28e | 33.43d | 10.06f | 10.09e |
| ZD                  | 4.67e  | 4.00e | 12.50bc| 12.04d | 40.39cd| 41.02c | 11.89e | 12.03d |
| AlgS+AlgD           | 5.41bc | 8.75a | 13.42ab| 13.86b | 40.57cd| 45.00b | 14.49b | 14.89b |
| N2O5+N2O5D          | 4.72de | 4.25de| 12.28cd| 12.87c | 42.26c | 39.76c | 12.28de| 12.22d |
| ZC+AlgS+D           | 6.50a  | 6.87a | 13.08abc| 13.3bc | 51.70a | 50.68a | 15.39a | 16.27a |
| ZC+N2O5S+D          | 5.60b  | 6.00b | 13.55a | 15.19a | 49.30b | 49.74a | 14.13b | 14.23bc |
| AlgS+N2O5D          | 5.6bcd | 4.75cd| 12.80abc| 13.44bc| 40.52cd| 41.39c | 13.36c | 13.97c |
| AlgD+N2O5S          | 4.77cd | 5.20c | 12.72abc| 12.99bc| 39.88d | 40.80c | 13.87bc| 12.87d |

Chemical Components:

Results of the effect of fertilization transactions on chemical components of *Narcissus tazetta*L. subsp."Italicus" are presented in Table (9). All data noticed that the treatments of ZC+AlgS+D and ZC+N2O5S+D were unique in achieving the highest values of total chlorophyll content and N, P and K percentage. The reason for this due to the high amount of nutrients available for plant uptake derived from the application of foliar spraying and soil drench in the presence of compost. Also, the ease of transporting these elements like
Fe and Mg pass plant tissues, which led to the balanced proportions of its components. All of these consistent with what Sivasankari et al., 2006; Gabra, 2010; Chohura et al., 2012; Babarabie et al., 2018 mentioned.

**Table 9:** Effect of fertilization transactions on chemical components of *Narcissus tazetta* L. subsp."Italicus" for both cropping years 2015/16 and 2016/17.

| Fertilization transactions | Total Chlorophyll mg/g | N%         | P%          | K%          |
|----------------------------|-------------------------|------------|-------------|-------------|
|                            | 1st Y | 2nd Y | 1st Y | 2nd Y | 1st Y | 2nd Y | 1st Y | 2nd Y |
| Cont.                      | 1.74g  | 1.89e | 1.65  | 1.59  | 0.203 | 0.211 | 2.24  | 2.16  |
| ZD                        | 2.01f  | 2.28cd| 1.89  | 1.92  | 0.219 | 0.237 | 3.06  | 3.02  |
| AlgS+AlgD                  | 2.80b  | 2.74b | 1.99  | 2.01  | 0.280 | 0.305 | 3.12  | 3.15  |
| N20S+N20D                  | 2.00f  | 2.43c | 1.95  | 2.05  | 0.269 | 0.297 | 3.06  | 3.11  |
| ZC+AlgS+D                 | 3.03a  | 3.07a | 2.17  | 2.19  | 0.312 | 0.317 | 3.15  | 3.20  |
| ZC+N20S+D                  | 2.50c  | 2.80b | 2.12  | 2.20  | 0.305 | 0.299 | 3.28  | 3.23  |
| AlgS+N20D                  | 2.25d  | 2.09de| 2.06  | 2.14  | 0.288 | 0.312 | 3.09  | 3.17  |
| AlgD+N20S                  | 2.12e  | 2.11de| 2.04  | 2.07  | 0.269 | 0.301 | 3.02  | 3.05  |

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تأثير محسنات التربة ومستخلصات الأعشاب البحرية والتسميد الكيماوي علي نمو وإنتاج أبصال نبات النرجس الإيطالي Narcissus tazetta L. subsp. "Italicus".

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نبات النرجس تازيتا الإيطالي (Narcissus tazetta L. subsp. "Italicus") ينتمي لعائلة "Amaryllidaceae" و هو أحد أهم نباتات أبصال الزينة وتنسيق الحدائق و زهور القطف. ولذلك فهي تحتاج لبرامج تسميد متوازنة لانتاج ازهار ذات مواصفات تسويقية جيدة ونمو صحي للحزمة الخضرية وأبصال جديدة ذات حجم ووزن مثالي مناسب للإزهار في الموسم التالي.

ولأن معظم الأراضي المصرية تعاني من ارتفاع نسبة القلوية، لذلك فقد حان الوقت لأستخدام الاسمدة البديلة الآمنة والتي تساعد في صورة صالحة للامتصاص بواسطة النبات دون حدوث أي سمية للتربة. حيث يحتوي سماد الكمبوست النباتي علي أحماض عضوية يمكنها أن تخلب العناصر المعدنية وتعزز قابليتها للأمتصاص بواسطة النباتات وتحسين من خصائص التربة. أيضًا الاستمدة المخلبية والتي تجعل العناصر الغذائية غير العضوية أسهل وأسرع لامتصاصها مباشرة عن طريق الرش الورقي أو من خلال الري في حالة التربة القلوية أو الجيرية.

تهدف هذه التجربة لدراسة تأثير محسنات التربة "كمبوست الزهرة " (ZC) ومستخلصات الأعشاب البحرية "الجيفيرت (Alg)" على النمو والازهار وانتاج الأبصال النرجس الإيطالي. أجريت هذه الدراسة خلال عامي 2015/2016 و 2016/2017 في قرية الحريدي بالمنتزه - شرق الإسكندرية. حيث تم تنفيذ ثماني معاملات على النحو التالي:

1- معالمة الكنترول ( دون إضافة أي تسميد)
2- ZC كمبوست الزهرة 10 % من حجم إصيص الزراعة
3- AlgS + AlgD (الجيفيرت بمعدل 1 جم/لتر رش ورقي + الري بمعدل 1 جم/لتر)
4- N20S+N20D (نيوتريكومبلекс 20-20-20 بمعنى 1 جم/لتر رش ورقي + الري بمعدل 1 جم/لتر أو 1 جم/لتر رش ورقي + الري بمعدل 1 جم/لتر)
5- ZC+ AlgS+D (كمبوست الزهرة مع الرش والري بالجيفيرت بمعدل 1 جم/لتر)
6- ZC+ N20S+D (كمبوست الزهرة + الرش والري بالنيوتريكومبلекс 20-20-20 بمعنى 1 جم/لتر أو 1 جم/لتر رش ورقي + الري بالمعدن)
7- AlgS + N20D (الجيفيرت + الرش والري بالمعدن 20-20-20 بمعنى 1 جم/لتر أو 1 جم/لتر رش ورقي + الري بالمعدن)
8- AlgD + N20S (النيوتريكومبلекс 20-20-20 بمعنى 1 جم/لتر أو 1 جم/لتر رش ورقي + الري بالمعدن)

في جميع الحالات، و تم فحص النباتات والنتائج في بعض الحالات، و تم استنتاج قيود إنتاجية للنوع النرجس الإيطالي من أفضل انتاجية لوالكبسات النباتية من الورقة القلوية أو الورقة الجيرية.

كلمات المفتاحية: نرجس تازيتا، الأدبية المزهرة، التسميد المخلبي، مستخلصات الأعشاب البحرية، مختلفة