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The Influence of Decreasing Npk Mineral Fertilizers on Valencia Orange Plants on Vegetative Growth and Nutritional Condition

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Abstract

This study was conducted on fruit trees of the Valencia orange trees variety grafted on Volkamariana rootstock growing: conditions of desert lands and ground water during two successive (2021/2022 and 2022/2023)- on a private farm (Wadi El Natroun),in Beheira Governorate, Egypt. The experiment was studied the effectiveness of reducing mineral fertilizer NPK using organic compost fertilizer and effective microorganisms in improving growth and nutritional status of summer orange trees at a rate of (7.5, 15, 22.5 and 30 kg compost / tree), and Bio vit fertilizer (36 ml/tree). Among the results obtained is a significant improvement effects biofertilization and organic fertilization methods on the nutritional status and growth of trees. Analysis of the data collected during the study showed that there was a statistical significance in increasing vegetative growth and leaf chemical composition with different doses of organic and biological fertilization treatments. The compination between 15kg of compost, biofertilizer and 50% NPK chemical fertilizer had the best results in vegetative growth and nutritional status. As well as the results obtained can be recommended.

Keywords: Valencia orange trees – Bio-Fertilizer – Organic fertilizer as compost –vegetative growth – canopy volume nutritional -status.

Introduction

The importance of citrus fruits is due to their high nutritional value and their superiority over other fruits in vitamins and salts necessary for humans, as well as their ease of marketing and storage total cultivated area is of the Valencia orange trees 140,194 Fadden the productive area is 126,907 Fadden, and productivity is 1,299,685 tons, with an average productivity of 10.24 tons/ Fadden. According to statistics from the Ministry of Agriculture 2021 The cost of mineral fertilizers has been rising dramatically as a result of the overuse of chemical fertilizers, which have a detrimental effect on both the soil and plants. This has made it imperative to look for alternatives that would provide more affordable fertilizer supplies for the poor soil (**Wardowski et al., 1985).** The primary sources of biofertilizers include cyanobacteria, fungus, and bacteria. Biofertilizers are organisms that improve the nutrient content of soil and plants. (blue-green algae). Given the soil conditions in Egypt, using biofertilizers is thought to be a promising substitute for chemical fertilizers. **(El-Haddad et al., 1993).** Organic and biological fertilizers are used, which will maximize the benefit from chemical fertilizer from small quantities of it and thus improve productivity as well as the quality of fruits. **Hegazi et al., (2007) , Eman et al., (2008a) ,Shaban and Mohsen (2009) , Osman et al., (2010) , El-Sisy et al. (2011), Abd El-Razek et al. (2012), Grzyb et al. (2012) , Mustafa et al. (2014), Khamis et al. (2017)** Bio-fertilizers i.e. phosphorein proved to be favorable in enhancing the growth and flowering of the trees. The role of organic fertilizers in citrus crops Adding organic fertilizers to the soil in citrus crops leads to achieving • Providing the soil with macro- and micro-elements: Organic matter contains nitrogen, phosphorus, and potassium in their easy-to-decompose and slow-to-decompose form, and they remain continuous throughout the life of the plant, and their effect may extend to the next crop **Moustafa (2002), Abd Ella (2006), Osman et al. (2010),** Organic matter also contains microelements such as iron, manganese, copper, zinc, and others. Elements are released from organic fertilizers in quantities that suit the plant's needs as a result of microbial activity in the soil, decomposition of organic matter, and the synthesis of biological nitrogen, which is considered the best type of nitrogen for plants. It was found that adding biofertilizers has a very important role in producing organic and inorganic acids that dissolve the elements present in natural rocks and make them easy for absorption **Kurer et al. (2017), According to Sau et al. (2017), Abd El-Migeed et al. (2006).**

Azotobacter bacteria fix atmospheric nitrogen, and basil bacteria help facilitate the elements phosphate and potassium, transforming them from the form that is not easy for absorption to the dissolved form that is easy for absorption by the plant in the area of the spread of the root system **Mostafa (2008), Osman et al. (2010),.** The application of bio-fertilizers achieved the following merits **(according to Kannaiyan, 2002). El-Kinany et al. (2018) Ahmed and Mohamed (2018) El-Gioushy and Eissa (2019),** Reducing plant requirements of N by 25%. 30% of mineral nitrogen sources and makes the absorption of mineral elements in plants easier. Moreover, it gives the best results in terms of growth, yield, and the natural and chemical characteristics of the fruits. availability of various nutrients. Stimulating root growth. Enhancing the resistance of plants to root diseases. Justifications for the study: Excessive use of chemical fertilizer rates negatively affects both the soil and plants. Increased use of high-priced chemical fertilizers leads to increased production costs. Low growth of Valencia orange trees growing in sandy lands is evident. Sandy soil is poor in nutrients and organic matter. Study objectives: Expanding the cultivation of Valencia orange trees in newly reclaimed lands. Reducing and rationalizing the use of chemical fertilizers due to their detrimental impacts on plants and soil.. Improving growth, treating symptoms of malnutrition by maximizing the benefit from added organic fertilizers.

Materials and methods

The selected trees were

1. Orchard site and experimental design

The present study was conducted during two successive experimental seasons (2021–2022) and (2022–2023) on Valencia orange trees (Citrus sinensis L.), trees. grown in a private orchad, which was located at Wady Elntron, El Behera Governorate, Egypt. 10 years old trees of Valencia orange trees (Citrus sinensis L.), "cv. budded on Volkameriana lemon rootstock (citrus volkameriana) 54 Valencia trees were chosen as test plants because they were healthy, almost consistent in size and shape, productive, and subjected to the same horticultural techniques. The chosen trees were planted five meters apart on sandy soil, and were watered by a drip irrigation system from a well. Tables 1 and 2 list the soil's chemical characteristics as well as the irrigation water used in this investigation.

treatments were applied to trees that were healthy, almost uniform in size, shape, and productivity, and that were given the same horticultural techniques.: (T_1) control 100% NPK mineral, (T_2) 75% NPK mineral + 25% organic compost (7.5Kg)/tree, (T_3) 50 % NPK mineral + 50% organic compost (15Kg)/tree, (T_4) 25% NPK mineral + 75% organic compost (22.5Kg)/tree, (T_5) 100 % organic compost (30Kg)/tree, (T_6) 75% NPK mineral + 25% organic compost (7.5Kg)/ + bio 36ml /tree, (T_7) 50 % NPK mineral + 50% organic compost (15Kg)/+ bio 36ml /tree, (T_8) 50 % NPK mineral + 50% organic compost (15Kg)/+ bio 36ml /tree and , (T_9) 100 % organic compost(30Kg) + bio 36 cm/tree.

Table 1. chemical analysis of irrigation water:

pH	EC ds/m	Soluble Cations, meq/L				Soluble Anions, meq/L			
		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO_3^{--}	HCO_3^{-}	SO_4^{--}	Cl^{-}
6.76	1.70	7.5	4.3	4.4	0.8	0	4.4	0.4	12.2

Table 2. Some chemical properties of the experimental soil.

Soil depth cm)	pH	EC ds/m	Soluble Cations, meq/L				Soluble Anions, meq/L			
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO_3^{--}	HCO_3^{-}	SO_4^{--}	Cl^{-}
0 – 30	7.09	2.7	1.93	3.86	20.33	.9	0	3.5	2.00	**21.5**
30 – 90	6.83	2.82	2	4.1	21.3	0.8	0	3.7	2.2	**22.5**

Three repetitions of each treatment were used in the randomized complete block design experiment, and two trees were used to represent each replication.

According to Ministry of Agriculture Recommendation (Control or recommended doses RD), NPK mineral (as fertilization program adopted at 4, 3, and 1 kg/tree from (NH4)2SO4, superphosphate, and K2SO4, respectively). The nitrogen source was ammonium sulfate (20.5% N), the P source was calcium superphosphate (15 % P2O5), and the K source was potassium sulphate (48% K2O). In early December of both seasons, the soil received a single application of organic compost treatments.Table (B) presents the analysis of used composted materials.

Organic fertilization (compost):

Table 3. An examination of the utilized composting substance**:**

Analysis	Value	Analysis	Value	Analysis	Value
m3 weight	790 kg	**C:N ratio**	17.6	**T. Ca%**	1.93
Moisture %	30	**Organic carbon %**	26.4	**T.Mg%**	0.90

PH (1:10)	9.3	**Total N%**	1.5	**T.l Fe (ppm)**	1012
EC (dS/m)	3.4	**T. P%**	0.6	**T.Mn (ppm)**	116
Organic matter	35.6	**T.K%**	1.32	**T. Zn (ppm)**	28

Effective Microorganisms (Bio vit) Phosphorene**:** A commercial phosphor bio-fertilizer, which contains some active fungi strains (*Arbuscalar mycorrhiza*). Nitrobein: A commercial nitrogen bio-fertilizer contains special bacteria (*Azotobacter chorococcum*) Potassein: A commercial potassium bio-fertilizer contains special bacteria (*Bacillus pasteurii).* preparation, which was provided by the Department of Microbiology, Agric. Res. Inst., Giza, was utilized in this study as biological activators. It was applied as a soil drench once, at a rate of 36 ml per tree (6 liters/feddan), in December early of both seasons.

2.2. Vegetative Growth Measurements:

The impact of the different investigated anti substances on some vegetative growth measurements has to be evaluated, thus four main branches well distributed around the periphery of each replicate (tree) were labeled. On each selected branch ten newly emerging shoots were tagged and the aforementioned growth parameters were estimated in late of October during both seasons, as follow:

2.2.1. Length of spring shoots and leaf number:

The final week of May saw the selection of sixteen fresh shoots from the spring growth cycle on four labeled branches in the four primary orientations for measuring shoot length (cm) and number of leaves per shoot. Shoot diameter (cm) at the base of shoot.

2.2.2. Leaf area (cm2):

Ahmed and Morsy (1999) reported that in order to calculate the leaf area, twenty mature leaves from the spring development cycle were removed from the center sections of the shoot (at September). Here is how the leaf area was determined.: Leaf area (cm2) = 0.46 (maximum length of leaf x maximum width of leaf) + 1.81.

2.2.3.Tree canopy volume (m^3)

Tree size, expressed as canopy volume, was calculated by the formula: 0.5238 x tree height x diameter square, According to **Morse and Robertson (1987).**

2.3. Leaf nutritional status

2.3.1. Total chlorophyll(mg/100g F.W.)

Total chlorophyll content was determined in the basal sixth and seventh leaf from the shoot base (10 fresh leaves/replicate) **The Minolta SPAD-502** nondestructive chlorophyll meter measures the relative amount of leaf in two wave bands (600–700 and 400–500 nm) and provides readings in arbitrary units that correspond to the amount of chlorophyll content.

2.3.2. Leaf mineral content

In October, ten mature and healthy leaves were taken from the base of the fourth and fifth non-fruiting spring shoots, which had already been tagged in April.

The leaves were then repeatedly cleaned with tap and distilled water, dried in an oven at 70 degrees Celsius until their weight remained consistent, then wiped clean with a moist cloth to remove any remaining dust. Following that, 0.5g of each dried and crushed leaf sample was broken down using hydrogen peroxide and sulfuric acid.. The digested solution was used for the determination of N, P, K, Na, , Fe, Zn, Mg , Ca ,and Mn nutrients as follows:

- The micro-Kjeldahl method, as outlined by **Pregl (1945),** was used to calculate the total nitrogen content of the leaves.
- Leaf Phosphorus content was determined by using Spectrophotometer at 882 U.V. according to the method described by **Murphy and Riely (1962)**
- Leaf Potassium and Sodium were determined using flame – photometer according to **Brown and Lilleland (1946).**
- Leaf, Manganese, Zinc and Iron contents were determined by using Atomic Absorption Spectrophotometer (3300) according to **Chapman and Pratt (1961).**

Statistical analysis

According to **Snedecor and Cochran (1980),** analysis of variance was used to all data collected over both seasons for the two trials that were part of this study. Additionally, significant differences between means were distinguished using the Duncan multiple test range **(Duncan, 1955),** in which the means of several treatments for each attribute under investigation were distinguished using a letter orletters.

Results and discussion

3.1. Vegetative growth

3.1.1. Shoot length (cm)

According to the results presented in Table 4, there was significant variety in the growth characteristics that were studied, including shoot length, shoot diameter, and the number of leaves per branch. Here, Valencia orange was linked to the noticeably higher values. trees exposed to T1 treatmenet. Moreover, T7 treatmenet showed significantly the same effectiveness in this regard. Moreover, T6 and T9 treatmenets ranked second statistically in terms of its efficiency. Likewise, the lowest values for the aforementioned measurements were usually associated with T5 treatment, which ranked last statistically during the two seasons of the study.

Table (4) The effects of various NPK mineral fertilizers, in conjunction with compost and beneficial microorganism sources, on the number leaves of shoots, shoot length, and shoot diameter of Valencia orange trees during the trial seasons of (2022 and 2023)

Parameters / Treatments	Shoot length (cm)		Shoot diameter (cm)		Number of leaves	
	2022	2023	2022	2023	2022	2023
T1: Control100% NPK mineral	15.66AB	16.13AB	0.368 A	0.373A	6.33AB	6.66AB
T2: 75% NPK mineral + 25% organic.	15.00ABC	15.33BC	0.346BC	0.351AB	5.33CD	5.66CDE
T3: 50 % NPK mineral + 50% organic..	13.76BCD	14.10CD	0.343C	0.346B	4.33E	4.83E
T4: 25% NPK mineral + 75% organic.	13.40CDE	13.86CD	0.310D	0.315C	4.33E	4.93E
T5: 100 % organic. Compost	9.50F	11.10E	0.263F	0.253D	4.76DE	5.10DE
T6: 75% NPK mineral + 25% organic compost + bio	15.60AB	16.33AB	0.352ABC	0.362AB	6.00ABC	6.40ABC
T7: 50 % NPK mineral + 50% organic compost + bio	16.26A	17.10A	0.366AB	0.374A	6.66A	6.90A
T8: 25% NPK mineral + 75% organic compost + bio	12.06DE	12.53DE	0.356ABC	0.360AB	5.50BCD	5.83BCD
T9: 100 % organic compost + bio	11.50E	11.86E	0.286E	0.294C	4.66DE	4.93E

The means in each column that were followed by the same letter or letters did not differ substantially at the 5% level.

3.2.2. Total chlorophyll content, Leaf area (cm^2) and Canopy volume (m^3)

The data given in Table 5 shows that T_1 treatment was the most statistically superior and gave the highest values of total chlorophyll content, and average leaf area (cm^2), and tree canopy volume (m^3) during the two study seasons. In general, the various fertilization treatments studied can be arranged in descending order according to their efficiency after the two aforementioned treatments, as follows: T_6, then T_2 treatment and then T_3 treatment. While T_9 treatment was occupied by ranked penultimate statistically in its efficiency during the two study seasons. Conversely, the lowest values for the aforementioned measurements were usually associated with T_5 treatment, which ranked last statistically during the two study seasons.

Table (5) The effectiveness of different NPK mineral fertilizers, combined with compost and sources of effective microorganisms, on total chlorophyll content, canopy volume (m2), and leaf area (cm3) of Valencia orange trees in the experimental seasons of 2022 and 2023.

Parameters / Treatments	Total chlorphel(mg/100g F.W.)		Leaf area (cm^2)		Canopy volume (m^3)	
	2022	2023	2022	2023	2022	2023
T1: Control100% NPK mineral	76.20A	76.36A	31.83A	32.16A	27.83A	30.33A
T2: 75% NPK mineral + 25% organic.	71.33C	72.06C	30.00AB	30.66AB	25.33B	27.66B
T3: 50 % NPK mineral + 50% organic..	69.73CD	70.53D	28.00C	29.26B	24.66BC	24.00C
T4: 25% NPK mineral + 75% organic.	63.86E	64.36F	24.60D	25.83C	23.66C	23.83D
T5: 100 % organic. Compost	61.00F	63.76F	17.83F	19.00E	19.00E	19.66F
T6: 75% NPK mineral + 25% organic compost + bio	73.83B	74.60B	28.66BC	29.66B	27.33A	29.33A
T7: 50 % NPK mineral + 50% organic compost + bio	76.56A	77.23A	30.73A	31.06AB	27.66A	30.26A
T8: 25% NPK mineral + 75% organic compost + bio	68.80D	69.73D	26.00D	26.95C	22.00D	24.50C
T9: 100 % organic compost + bio	63.50E	65.83E	19.93E	21.26D	20.667CD	20.66E

The means in each column that were followed by the same letter or letters did not differ substantially at the 5% level.

By adding biofertilizer to organic compost, the nutrients break down and become more readily available for plants to consume, which further explains the outcomes. Additionally, In order to deliver nitrogen and phosphorus, which are necessary for a number of biological processes in the trees, microbine was used as a biofertilizer. This prompted the trees to exploit the elements' availability, as seen by their healthy vegetative development, average shoot length and diameter, and leaf count, as opposed to the control, which had the lowest value. Additionally, **Ahmed et al. (2013**) On Balady Mandarin, it was discovered that using chemical, organic, and biofertilizers together significantly increased the diameter of the shoots and the number of leaves per shoot. Additionally, the findings of our investigation demonstrated the definite improvement in vegetative growth that organic fertilizers had. **El-Kobbia (1999)** on Washington navel orange, but the results of biofertilizers were enhanced by S**ingh et al. (2000)**and **Abd El-Naby (2000), Obreza and Hampton (2000), Prince et al. (2000). Abd El-Aziz (2002), Moustafa (2002), Abou El-Khashab et al. (2005) , Abd-Rabou's (2006) on El-Khawaga and Maklad (2013)** on Valencia orange and Mosambi sweet orange. However, irradiating organic fertilizers significantly enhanced dissolved organic matter and N and P availability while having little effect on the overall amount of organic C, N, and P. (**Zhou, et al., 2002).** Also, greater leaf area was linked to higher nitrogen levels. **(Abdo, 2008).** According to Shaban and Mohsen (2009), the greatest results for seedling height, thickness, and leaf count were obtained when phosphorene, microbein, or nitrobein were applied singly or in combination at 5, 10, or 20 g per seedling of sour orange and Volkamerina lemon rootstocks **Osman et al. . (2010) According to Sau et al. (2017), Fatma K. Ahmed et al. (2020), Thoraua S. Abo El-Wafa a, Hanaa A. Abo-Koura b, the results obtained were in line with El-Kosary et al. (2013), Nidhika and Thakur (2014), EL-Gioushy and Baiea (2015), Khamis et al. (2017), and Maged M. Saad d,e(2023)and Abo-Gabien, M. G. (2021). .**

3.2. Nutritional status

The effectiveness of different NPK mineral fertilizers, combined with compost and sources of effective microorganisms, on Valencia orange trees' levels of nitrogen, phosphorus, potassium, calcium, magnesium, iron, zinc, and manganese throughout the 2022 and 2023 study seasons. presented in table (6,7 and 8)

The results showed that T_1 100% chemical fertilization caused the elements (nitrogen, phosphorus, potassium, calcium, magnesium, iron, zinc, and manganese) in the leaves of Valencia orange trees to significantly increase in comparison to the other treatments that were being studied.While T_7 treatment led to the same result as the chemical fertilization at a rate of 100%. On the other hand, only organic fertilizer at different rates without biofertilizers did not affect the mineral content. For papers during the 2022 and 2023 trial seasons. Therefore, The remaining therapies don't differ significantly from one another., and the ninth to last treatment T_9 came in, while the fifth treatment T_5 ranked last in the mineral content of leaves during the experimental seasons 2022 and 2023.

Table 6. The effectiveness of different NPK mineral fertilizers, combined with compost and sources of effective microorganisms, on N%, P% and K% of Valencia orange trees during 2022 and 2023 experimental seasons.

Parameters / Treatments	N%		P%		K%	
	2022	2023	2022	2023	2022	2023
T1: Control100% NPK mineral	2.41A	2.39A	0.133 A	0.133A	1.274A	1.278A
T2: 75% NPK mineral + 25% organic.	2.29BC	2.30AB	0.121C	0.123C	1.254D	1.259AB
T3: 50 % NPK mineral + 50% organic..	2.22C	2.23AB	0.114D	0.115DE	1.234E	1.236C
T4: 25% NPK mineral + 75% organic.	2.11D	1.80C	0.111 E	0.113E	1.220G	1.242BC
T5: 100 % organic. Compost	1.96E	1.98BC	0.104G	0.105F	1.196I	1.203 E
T6: 75% NPK mineral + 25% organic compost + bio	2.32ABC	2.35A	0.124B	0.127B	1.264C	1.269A
T7: 50 % NPK mineral + 50% organic compost + bio	2.39AB	2.40A	0.133A	0.135A	1.269B	1.273A
T8: 25% NPK mineral + 75% organic compost + bio	2.30BC	2.32AB	0.115D	0.116D	1.226F	1.231CD
T9: 100 % organic compost + bio	2.02DE	2.08ABC	0.109F	0.114DE	1.202H	1.211DE

The means in each column that were followed by the same letter or letters did not differ substantially at the 5% level.

Table 7. The effects of various NPK mineral fertilizers on the Na%, Mg%, and Ca% of Valencia orange trees over the trial seasons of 2022 and 2023 when mixed with compost and sources of beneficial bacteria.

Parameters / **Treatments**	**Na %**		**Ca%**		**Mg%**	
	2022	2023	2022	2023	2022	2023
T1: Control100% NPK mineral	0.230G	0.240DE	2.99A	3.07A	0.325A	0.333A
T2: 75% NPK mineral + 25% organic.	0.250DEF	0.260C	2.87C	2.97B	0.302D	0.306D
T3: 50 % NPK mineral + 50% organic..	0.256DE	0.256CD	2.81D	2.91C	0.297E	0.301E
T4: 25% NPK mineral + 75% organic.	0.276C	0.256CD	2.79D	2.81DE	0.287G	0.292F
T5: 100 % organic. Compost	0.320A	0.330A	2.73E	2.74F	0.246I	0.252H
T6: 75% NPK mineral + 25% organic compost + bio	0.240FG	0.230E	2.91B	2.95BC	0.311C	0.317C
T7: 50 % NPK mineral + 50% organic compost + bio	0.243EFG	0.233E	2.98A	3.03A	0.322B	0.328B
T8: 25% NPK mineral + 75% organic compost + bio	0.263CD	0.240DE	2.81D	2.85D	0.289F	0.293F
T9: 100 % organic compost + bio	0.313B	0.303B	2.75E	2.78EF	0.250H	0.264G

The means in each column that were followed by the same letter or letters did not differ substantially at the 5% level.

Table 8. The effectiveness of different NPK mineral fertilizers, combined with compost and sources of effective microorganisms, on Fe, Mn and Zn of Valencia orange trees during 2022 and 2023 experimental seasons.

Parameters / **Treatments**	**Fe (ppm)**		**Mn (ppm)**		**Zn (ppm)**	
	2022	**2023**	**2022**	**2023**	**2022**	**2023**
T1: Control100% NPK mineral	96.00A	95.66 A	27.33A	28.66A	83.00 A	84.00 A
T2: 75% NPK mineral + 25% organic.	92.00C	92.33 B	24.33C	25.66C	76.00C	78.00C
T3: 50 % NPK mineral + 50% organic..	86.00D	86.33C	23.50D	24.33D	72.00 D	73.66 D
T4: 25% NPK mineral + 75% organic.	81.00E	81.66 D	22.83D E	24.16D	68.33E	69.66E
T5: 100 % organic. Compost	56.00G	56.33F	22.26E	23.83D	60.00 G	62.00 G
T6: 75% NPK mineral + 25% organic compost + bio	95.00A B	95.33 A	26.40B	27.33B	79.50B	81.33B
T7: 50 % NPK mineral + 50% organic compost + bio	94.00B	94.33 A	27.50A	28.50A	82.00 A	84.00 A
T8: 25% NPK mineral + 75% organic compost + bio	84.33D	84.66C	24.50C	26.50B C	72.00 D	73.33 D
T9: 100 % organic compost + bio	66.00F	66.33E	23.23D	24.16D	65.66F	67.00F

The means in each column that were followed by the same letter or letters did not differ substantially at the 5% level.

By adding biofertilizers to compost, the nutrients break down and become more readily available for plants to consume, which further explains the results. Additionally, the inclusion of microbeans as a biofertilizer preserved phosphate and nitrogen, which are essential for a number of biological functions in trees. This encouraged trees to benefit from the availability of these elements. Adding biofertilizer to organic fertilizer increased the mineral content compared to organic fertilizer only (**Iman et al., 2008 and Khamis et al., 2013).** In the same vein, **Awad and Salama (2012**) discovered that, after mineral fertilization, the leaf N, P, and K% of sour orange seedlings were considerably increased by poultry manure exposed to biofertilizers. Biofertilizers' increasing impact on leaf N, P, and K% is in line with findings from **Abdelhak et al. (2012)** and **Al-Khawaja and Muqlad (2013**) on Valencia oranges, who reported that several biofertilizers significantly increased the aforementioned nutrients. Balady mandarin trees grown in sandy soil benefited from the addition of farmyard manure (FYM) and filter mud (FM), as shown by **Ebrahiem and Mohamed (2000).** As stated by **Abd El-Aziz (2002),** banana plants growing Williams cv. were shown to have higher leaf contents of N, P, and K when bio fertilizer and organic manure rates were raised. **Moustafa (2002)** assessed how the Washington navel orange trees leaf mineral content responded to various organic manure sources, including cattle, poultry, and rabbit dung. He demonstrated that the best organic manure source for raising the N, P, K, and Mn content of leaves was poultry manure. The results obtained are consistent with **Abd-Rabou (2006)** assessed how mango and avocado seedlings responded to various biofertilizers, **Abd Ella (2006)** Arabi pomegranate trees with microbial fertilization (Biogein, Nitrobine, and Phosphorein) significantly improved shoot length, leaf area, leaf dry weight, leaf total carbohydrate contents, leaf concentrations of N, P, Ca, Fe, and Zn, and leaf chlorophyll, **Shahain *et al.* (2007),** applying EM (a commercial biostimulant containing, **Abd El-Migeed *et al*. (2006**), **Abd El-Migeed *et al.*, (2007), Osman *et al*. (2010)**, the Koronaki olive cultivar had the richest leaves, **Abd-Ella and El-Sisi (2011),** applying 30 ppm of effective microorganisms (EM) improved the Sultani fig trees' leaf chlorophyll, N, P, and Fe contents, **El-Khawaga (2011)**discovered that applying organic and biofertilizers improved the nutritional condition and growth (leaf area and NPK content), **Saad *et al.* (2011),** Zaghloul date palms, **Abdelaal *et al.* (2013)** compost, potassium (potassium sulphate), sulfur, yeast, Minia Azotein, and EM1 were all very successful in improving all nutrients (N, P, K, Mg, Ca, Zn, Fe, Mn, and Cu) in the leaves of Valencia orange trees, **El-Merghany *et al.* (2014),** in North Sinai circumstances, the Zaghloul date palm's leaf N, P, K, Ca, Mg, Fe, Zn, and Mn content was highest when 50% ammonium sulphate, 25% compost, and 25% bio were combined.. **Sharaf *et al*. (2015),** fertilizing "Canino" apricot trees with NPK at 50% + organic (compost) at 50% + EM + bio-fertilizers (phosphorene, nitrogenbein, and potassein) + humic acid (HA) + compost tea greatly increased the average number of leaves per shoot, average trunk diameter (ITD%), average new shoot length and thickness (cm), leaf area, dry weight, and nutrient contents. of N, P, K, Ca, Mg, Zn, Fe & Mn. **Slama et al. (2019)** the leaf NPK content of Flame Seedless grapevine. **El-Gioushy and Eissa (2019),** the combination of 33.3% chemical NPK + 33.3% NPK bio-fertilization mixture + 33.3% natural alternative NPK fertilization. **Fatima K. Ahmed and others (2020)** the impact on Valencia orange plants with biofertilizers and irradiation fertilizer.

Conclusion

In summary, this study demonstrated that the compination between 15kg of compost, biofertilizer and 50% NPK chemical fertilizer had the best results in vegetative growth and nutritional status . As well as the results obtained can be recommended.

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تأثير تقليل الأسمدة النيتروجينية والفوسفاتية والبوتاسية المعدنية على النمو الخضري والحالة الغذائية لأشجار البرتقال الفالنسيا.

أجريت هذه الدراسة في مزرعة خاصه بوادى النطرون – محافظة البحيرة – مصر خلال موسمين متتاليين 2022 &2023 علي أشجار البرتقال الفالنشيا (الصيفى) عمر 10 سنوات المثمرة والمطعومة علي أصل ليمون الفولكاماريانا وعلي مسافة زراعة 5x5م في أرض رملية تحت نظام الري بالتنقيط. المعاملات تحت الدراسة. كان متوسط عدد الأفرخ النامية علي المتر الطولي للفرع الرئيسي ، طول وسمك الفرخ ، عدد الأوراق لكل فرخ ، المساحة الورقية ،) هي عوامل النمو التي تم قياس مدى إستجابتها للمعاملات السمادية المختلفة . حيث لوحظ أعلى قيم لعوامل النموالسابقة بشكل كبير مع أشجار البرتقال الصيفى والتى عوملت (100% تسميد معدنى). علاوة على ذلك ، أظهرت المعاملة السابعة (50% تسميد معدنى + كمبوست بمعدل 15 كجم /شجرة + سماد حيوى بمعدل 36مل / شجرة). نفس الفعالية من المعاملة الأولى وبشكل ملحوظ في هذا الصدد. بينما إحتلت المعاملة التاسعة (0% تسميد معدنى + كمبوست بمعدل 30 كجم /شجرة + حيوى بمعدل 36 ملل) المرتبة قبل الأخيرة إحصائيًا في كفاءتها وذلك خلال موسمى الدراسة . على العكس من ذلك ، فإن أقل القيم للقياسات السابق ذكرها كانت عادةً مصاحبة للمعاملة الخامسة (0% تسميد معدنى + كمبوست بمعدل 30 كجم /شجرة) والتي احتلت المرتبة الأخيرة إحصائيًا وذلك خلال موسمي الدراسة.

كما أوضحت النتائج تحت الدراسة أن التسميد الكيماوى بنسبة 100% أدى إلى زيادة معنوية فى محتوي الأوراق من العناصر (النيتروجين والفوسفور والبوتاسيوم والكالسيوم والمغنسيوم والحديد والزنك والمنجنيز) لأشجار البرتقال الفالنسيا بالمقارنة مع المعاملات الأخرى تحت الدراسة. فى حين أن المعاملة السابعة (50% تسميد معدنى + كمبوست بمعدل 15 كجم /شجرة + حيوى بيوفيت بمعدل 36مل /شجرة) أدت إلى نفس نتيجة التسميد الكيماوى بنسبة 100% ومن ناحية أخرى لم يؤثر السماد العضوي فقط بالمعدلات المختلفة بدون الأسمدة الحيوية على المحتوى المعدني للأوراق خلال الموسمين التجريبيين 2022 و 2023. من النتائج التي تم الحصول عليها ، يمكن التوصية تحت نفس ظروف التجربة بتقليل 50 ٪ من الأسمدة الكيماوية NPK ذات التأثيرات الضارة على صحة الإنسان والبيئة بمصادر أخرى صديقة للبيئة ورخيصة الثمن وذلك عن طريق السماد العضوى (الكمبوست) بمعدل 15كجم/شجرة كمبوست + مركب بيوفيت بمعدل36مل /شجرة لتحسين نمو الشجرة والحالة الغذائية والإنتاجية وجودة الثمار لأشجار البرتقال الصيفى والتى تعمل أيضاعلى خفض تكلفة الإنتاج وإنتاج ثمار ذات جودة عالية تصلح للتصدير.