



EFFICIENCY IMPACT OF CHICKEN MANURE AND ITS TEA UNDER CHEMICAL NPK FERTILIZERS REGIME ON YIELD AND QUALITY OF MOLOKHIA (JEW'S MELLOW)

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Amal K. Abou El-Goud*

Botany Dept. (Organic Agriculture), Fac. of Agric., Damietta Univ., Damietta, Egypt

*Corresponding author: amalgoud08@gmail.com

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ABSTRACT

Two field experiments were conducted to assess chicken manure (Ch.M.) and its tea on quantity and quality yield of Molokhia (Jew's mellow) plant during two summer seasons of 2017 and 2018 in Fac. of Agric. El-Shatby, Alexandria University. This investigate aimed to compare between chicken manure (Ch.M.R 100% and R50%), chicken manure tea (R100% and R50%) and the mixture of them (R50% of Ch.M. + R50% of its tea) under four levels (NPK₀ %, NPK₃₀%, NPK₆₀% and NPK₁₀₀%) of chemical fertilizers. Every experiment was carried out with 13 treatments in a randomized complete block design (RCBD) with three replicates (total plot area= 2&1=2m²). The results indicated that, chicken manure tea 100% + 30% NPK(T6) gave the highest mean values of vegetative growth i.e. plant height (92.0cm), number of leaves/plant (29.5), leaf length (13.87 cm), increases in vitamin C. (110.77 mg/g F.W.) and dry weight of leaves (10.25 g) as an average of both seasons. While the mixture of "chicken manure 50% and chicken manure tea 50 %" + 30 % NPK (T10) lead to significant increases in fresh leave weight (49.84 g/plant) and total yield of fresh leaves (4.7 kg/ plot) as an average of both seasons. Highest increases in P uptake (1.37mg/g) and K uptake (20.27 mg/g) either chicken manure 100% (T1) or the mixture of "chicken manure 50% and chicken manure tea 50 %" T9, respectively. The maximum N uptake (2.79 mg/g), total chlorophyll in leaves (47.44 SPAD) and leaf width (6.82 cm) as an average of both seasons by the mixture of "chicken manure 50 % and chicken manure tea 50 %" + 100 % NPK (T12) compared with the control once. Organic plants "safe food" produced with organic fertilizers and their teas really supply more nutrients and vitamins

"chemical free" and health protective so used sustainably in food and environmental friendly.

Keywords: Chicken manure, its tea, Molokhia, Yield and quality

INTRODUCTION

Molokhia (Jew's mellow) belongs to the family *Tiliacea* (Khan et al 2015). It is a popular tropical leafy vegetable crop in Africa, Asia, some parts of the Middle East, Sudan, Kenya, Zimbabwe, Nigeria and Latin America (Odojin et al 2011; Naim et al 2015 and Garjila et al 2017). Jew's mellow is known as the golden fiber and used as mucilaginous vegetable. Fresh leaves and powder drying are used to prepare a smiling sticky sauce, which is the main economic product of vegetable. Leaves are rich in beta carotene, niacin, riboflavin, iron, calcium, phosphorous and vitamins C and E, antioxidant activity, & tecopherol, protein and high dry matter (Garjila et al 2017). Jew's mellow is cultivated in range between 2.5 -3.2 million tons; about 30-60% of world is grown them in India and Bangladesh respectively (FAO, 2018). Fresh vegetables are important components of a healthy and balanced diet. Consumer's interest in the quality of vegetable products has increased worldwide (FAO, 2017 and 2018).

Chicken manure tea is rapidly growing and the concerns over the pesticides residues in food and can provide nutrients instantly to the plant much like the chemical fertilizers (Jigme et al 2015 and Cayci et al 2017). It is highly concentrated microbial solution produced by extracting beneficial microbes from chicken manure to increase microbial population densities during production

(Izunobi, 2002; Javanmardi and Ghorbani, 2012 and Biratu et al 2018). It contains chelated micro-nutrients for easy plant absorption and the nutrients are in biologically available forms for both plants and microbial uptake (Adediran et al 2015; Law-Ogbomo and Osaigbovo, 2016).

Chicken manure is an important resource for soil amendment with the benefits of being environment-friendly and has been attributed to enhance the beneficial microbial communities in soil an improvement of mineral absorption conditions for plants and stimulation of defense compounds, growth regulators or phytohormones in plants (Javanmardi and Ghorbani, 2012). It helps to modify physical, chemical, and biological properties of the soil, provides slow release of nutrients and increases crop yield (Agbede et al 2008; Moral et al 2009). Composted organic manure especially from poultry wastes have been reported to improve mineral composition in tissues of vegetables such as Jew's mellow (Mazen et al 2010; Jonathan et al 2012). In contrast to the beneficial roles of compost, it could also be a potential source of contaminants depending on its origin. However, inorganic fertilizers have several limitations including high purchase costs, scarcity, pollution of ground water and deterioration of soil physical properties by depleting the soil organic matter on account of continuous usage over time (Ghoneim and El-Araby, 2003 and Adediran et al 2015 and Law-Ogbomo and Osaigbovo, 2016). Aim of this investigate to use the regime level of chemical NPK fertilizers with recommended doses of chicken manure and its tea to increase the quantity and quality of Molokhia (Jew's mellow).

MATERIALS AND METHODS

Two field experiments were carried out at the farm of Agricultural Faculty, El-Shattby, Alexandria University, at 20th and 24th, July 2017 and 2018, respectively to investigate the comparison effect response between chicken manure R_{100%}, its tea R_{100%} or Ch.M. R_{50%} + Ch.M. Tea R_{50%} under four levels (0, 30, 60 and 100%) of chemical NPK fertilizers on vegetative growth and yield quality of Molokhia (Jew's mellow) species c.v. Balady.

Soil texture was sandy (39.12%) clay (30.88%) silt (30%); a surface soil sample (0-30cm) was collected before planting and analyzed the physico-chemical characteristics during both seasons (pH= 8.4, O.M. %= 2.73%, O.C.%= 1.58%, C/N ratio= 148:1, available of N= 106.9 mg/kg, P= 48.3

mg/kg and K= 1050 mg/kg, E.C. (1:1 water extract) = 0.64 ds/m and CaCO₃ %= 4.2%).

Chicken manure tea was produced by soaked in tap water with volume (1:10) for two days and it sieved through a 2 mm sieve to produce its tea (Sundararasu and Jeyasankar, 2014 and Chaulain et al 2017).

Chick manure and chicken manure tea samples were taken before adding to the soil to determine (total organic matter%= 12.5 and 14.3% , organic carbon%= 7.25 and 7.34% , C/N ratio= 3.4:1 , pH (1:10)=7.6 and 7.9 , E.C.(1:10, water extract)= 5.0 and 4.4 dS/m , total amount of macro elements ;N= 2.14 and 2.17% ,P= 1.41 and 1.42% and K= 1.40 and 1.43% , respectively) according to Chapman and Pratt, 1978; Evenhuis, 1978; Jackson, 1973; Page et al 1982 and Klute 1986.

The experiment was laid out in a randomized complete block design (RCBD) with three replicates, each replicate contained 13 treatments. Total plot area was (2.0m length and 1.0m width = 2m²) as experimental unit. Thirteen treatments can be illustrated as follows; T1=Chicken manure R_{100%} (3.5 t/fed.), T2= Chicken manure R_{100%} + NPK_{30%} , T3= Chicken manure R_{100%} + NPK_{60%} , T4= Chicken manure R_{100%} + NPK_{100%} , T5= Chicken manure tea R_{100%} (200 ml/ 1 m²) , T6= Chicken manure tea R_{100%} + NPK_{30%} , T7= Chicken manure tea R_{100%} + NPK_{60%} , T8= Chicken manure tea R_{100%} + NPK_{100%}, T9= Chicken manure R_{50%}+ chicken manure tea R_{50%}, T10= Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{30%}, T11= Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{60%} , T12= Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{100%} and T13= Control= R_{100%} of N (Ammonium Nitrate 33.5%) = 300 kg/fed. + P (Super Phosphate 15.5%) = 150 kg/fed. + K (Potassium Sulphate 48%) = 75 kg/fed.

First cutting harvest of Molokhia "c.v. Balady" after 18 days from sowing and the end of both growing seasons, 2017 and 2018; randomized plants were taken from each experimental unit (plot) to determine growth parameters i.e. plant height (cm), number of leaves/ plant, leave length (cm), leave width (cm), leave dry weight (g/plant) were recorded at the end of the growing season and the total chlorophyll in leaves (SPAD) at a green stage (Roods and Blood-Worth,1964). The ascorbic acid "Vitamin C." (mg/100g fresh leaves weight) was determined by titration with 2, 6 dichloro phenol-indo-phenol and calculated as (mg/100 ml fresh juice). Samples of Molokhia leaves were washed by tap water then by distilled water and oven dried at 75°C for fixing dry weights (72h.) to

determine some chemical components (NPK uptakes in leaves) after dryness leaves samples were milled and stored for analysis. Dried samples of leaves were finely ground, then wet digested by using concentrate of H_2SO_4 / H_2O_2 according to **Lowther, 1980** to determine the percentage of phosphorus (vanaomoly-bdophosphoric method), potassium (flam photometer) according to **Jackson, 1973**. Total nitrogen was determined by Nessler's method (**Chapman and Pratt, 1978**) in leaves. Fresh leaves yield (g/plant) and total yield of fresh leaves (kg/plot/season) were determined at the end of seasons, 2017 and 2018.

All data were statistically analyzed using the SAS program (**SAS, 2001**) and means of seven treatments were compared using Duncan's Multiple Range test at 5% level of probability in this investigation.

RESULTS AND DISCUSSIONS

A) Vegetative growth and yield characters

Molokhia species "c.v. Balady"; the first harvesting stage 18 days after sowing and the second harvest was after two weeks. The means in **Table 1 and 2**, the different treatments showed significant response on growth characters during both the seasons (2017 and 2018). Data showed that the recommended dose of chicken manure tea and NPK $R_{30\%}$ of chemical fertilizers (T6) lead to significant increases in plant height (92.0cm), number of leaves /plant (26.67 and 32.33), leaf length (12.8 and 14.93 cm) and leave dry weight (9.93 and 10.57 g) for both seasons as compared to control NPK $R_{100\%}$ treatment (**Table 1 and 2**). The highest significant increases in leaf width (6.5 and 7.13 cm) and total chlorophyll in leaves (45.77 and 49.10 SPAD) at T12= Chicken manure $R_{50\%}$ + chicken manure tea $R_{50\%}$ + NPK $_{100\%}$ more than controlled plant. There are not significant differences between T6 and T12 and between T12, T10 and T9 in leaf length cm and total chlorophyll in leaves, respectively in first season (**Table 1**). Total yield of fresh leaves were highly significant increases (4.67 and 4.69 kg/plot) and fresh leave yield (46.67 and 53.0 g/plant) at T10= Chicken manure $R_{50\%}$ + chicken manure tea $R_{50\%}$ + NPK $_{30\%}$ in both seasons, **Table (1)**. This investigation revealed T6= Chicken manure tea $R_{100\%}$ + NPK $_{30\%}$ or T10= Chicken manure $R_{50\%}$ + chicken manure tea $R_{50\%}$ + NPK $_{30\%}$, lead to high significantly increases in the vegetative growth and total yield characters in both seasons in **Table (1 and 2)**. **Singh and Hussain, 2015**, prepared and reported

that, chicken manure contains highly significant quantities of nutrients, beneficial microbes biologically active metabolites, cytokines, auxins, gibberellins and group B vitamins, so as to get better healthy food and quality of diverse plants. The combined application of poultry and inorganic fertilizers has been shown to integrate the attributes of organic and inorganic fertilizers. **Jonathan et al (2012)** observed that the Jews planted on 100% compost manure had the best growth followed by 50%, 30% and 0% compost manure respectively (in terms of plant height, leaf number, stem girth, and leaf area). Significantly higher growth parameters obtained in plants treated with NPK fertilizer in comparison to those treated with sole poultry manure during the initial stage of study could be attributed to the ready availability of nutrients in contrary to the slow release of nutrients through the decomposition of poultry manure as reported by **Khan et al 2015**. Significantly higher growth parameters obtained in poultry manure treatments when compared to NPK 15:15:15 at 56 days after planting could be due to the fact that the nitrogen present in poultry manure is released slowly and consistently to meet the growth requirements of plant growth stages unlike inorganic nitrogen source that is easily lost soon after application (**Kareem and Douglas, 2014 and Adediran et al 2015**). The plants that received 20 t/ha of chicken manure had the highest height while plants in the control which were grown without chicken manure had the lowest plant height at all growth occasions. The result is in tandem with **Adediran et al 2015 and Cayci et al 2017** in a study on the effect of organic and inorganic fertilizer on the growth and yield of *Corchorus olitorius*. Similar results were obtained by **Khan et al (2015)** in a study on the effect of chicken manure and commercial fertilizer on performance of *Corchorus olitorius*. This is in harmony with the findings and reports of many researchers. **Ndlovu and Afolayan (2008)** who reported increased plant height resulting from application of high rate of chicken manure and the lowest number of leaves was obtained from Jew's mallow plants which did not receive chicken manure fertilizer. This could be attributed to the fact that 20 t/ha was compatible with the requirements and growing characteristics and yield enhancement. **Ndlovu and Afolayan, 2008**; who recommended that manure was applied at rates that are compatible with the nutrient requirements and increase yield with high plant biomass because of highly photosynthetic rate.

Table 1. Effect of chicken manure treatments under four different levels of chemical NPK fertilizers on vegetative growth and yield parameters of molokhia species c.v. Balady during two seasons; 2017 and 2018

Treat.	Plant Height (cm)		No. of Leaves/Plant		Leaf Length (cm)		Leaf Width (cm)		Total Chlorophyll (SPAD) in Leaves		Fresh Leaves Yield (g/plant)	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
T1	75.0 ^{de}	52.43 ⁱ	16.00 ^{cd}	22.40 h	10.33c	7.40 k	4.87cde	4.87e	32.83e	40.17 f	21.33 g	45.50 d
T2	66.67 ^f	46.0 ^L	12.33 ^e	18.20 L	10.83bc	9.63 f	4.70cde	3.47i	38.00d	35.53 i	27.33 ef	32.2 m
T3	79.67 ^{cd}	59.9 ^g	14.33 ^{de}	19.20 k	11.07bc	12.17 c	5.27bc	6.33c	40.43cd	33.60 j	23.33 fg	35.63 j
T4	89.33 ^{ab}	81.30 ^c	18.33 ^{bc}	24.77 f	10.77bc	9.13 g	5.27bc	5.83d	40.43cd	32.13 k	44.67 ab	50.30 b
T5	85.33 ^{bc}	74.73 ^d	21.0 ^b	28.80 c	11.00 bc	11.07 d	5.0cd	4.97e	42.37abc	41.87 e	28.33 e	43.20 e
T6	92.0 ^a	88.2 ^b	26.67 ^a	32.33 a	12.80 a	14.93 a	5.83b	6.67b	41.10bcd	39.83 f	41.33 b	41.07 f
T7	93.0 ^a	97.93 ^a	21.33 ^b	31.73 b	10.97 bc	10.17 e	5.17cd	5.73d	43.40abc	43.7 d	31.00 de	34.50 k
T8	70.0 ^{ef}	49.30 ⁱ	20.67 ^b	27.53 d	10.50c	8.73 h	4.77cde	4.07h	40.93cd	37.5 h	36.33 c	38.87 g
T9	70.0 ^{ef}	48.20 ^k	15.0 ^{cde}	20.20 j	10.50 c	8.23 i	4.60de	3.03j	44.03ab	47.07 b	28.67 e	33.53 L
T10	76.00 ^{de}	55.77 ^h	20.33 ^b	26.20 e	10.47 c	7.90 j	4.9 cde	4.37g	44.03abc	45.27 c	46.67 a	53.0 a
T11	85.0 ^{bc}	68.47 ^e	17.67 ^{bcd}	23.47 g	10.23 c	7.13 k	4.33e	4.57i	41.00bcd	38.63 g	35.33 c	37.73 h
T12	81.33 ^{bc}	63.60 ^f	16.0 ^{cd}	21.20 i	11.87 ab	13.47 b	6.5a	7.13a	45.77a	49.10 a	34.67 cd	36.70 i
T13	60.0 ^g	45.80 ^m	9.0 ^f	16.2 m	10.07 c	6.50 L	4.73cde	3.10j	40.30cd	30.40 L	44.67 ab	47.70 c

T1=Chicken manure R_{100%} (3.5 t/fed.) , T2= Chicken manure R_{100%} + NPK_{30%} , T3= Chicken manure R_{100%} + NPK_{60%} , T4= Chicken manure R_{100%} + NPK_{100%} , T5= Chicken manure tea R_{100%} , T6= Chicken manure tea R_{100%} + NPK_{30%} , T7= Chicken manure tea R_{100%} + NPK_{60%} , T8= Chicken manure tea R_{100%} + NPK_{100%} , T9= Chicken manure R_{50%} + chicken manure tea R_{50%} , T10= Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{30%} , T11= Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{60%} , T12= Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{100%} and T13= Control= R_{100%} of N (Ammonium Nitrate 33.5%) = 300 kg/fed. + P (Super Phosphate 15.5%) = 150 kg/fed. + K (Potassium Sulphate 48%) = 75 kg/fed

Table 2. Effect of chicken manure treatments under four different levels of chemical NPK fertilizers on chemical components and yield parameters of molokhia species c.v. Balady during two seasons; 2017 and 2018

Treat.	Total Yield of Fresh Leaves (kg/plot)		Leaves Dry Weight (g)		N Uptake in Leaves (mg/g)		P Uptake in Leaves (mg/g)		K Uptake in Leaves (mg/g)		V.C. (mg / 100 F.W.)	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
T1	2.13 ^j	4.24 ^c	4.67 d	8.17 f	0.53 ^{cde}	2.30 ^f	0.57 ^a	2.17 ^a	9.60 ^{de}	13.80 ^L	90.67 ^b	113.57 ^b
T2	2.60 ^{gh}	4.02 ^d	4.40 de	7.77 g	0.20 ^{ef}	2.77 ^c	0.20 ^c	1.07 ^f	10.57 ^{cde}	17.0 ^g	49.00 ^f	66.03 ^m
T3	2.33 ^{hi}	2.96 ^j	3.60 fg	6.37 k	0.27 ^{def}	1.87 ⁱ	0.47 ^{ab}	1.67 ^c	11.17 ^{dc}	18.50 ^e	83.00 ^{bc}	106.40 ^c
T4	4.47 ^{ab}	4.47 ^b	3.27 g	6.03 L	0.30 ^{def}	1.80 ^j	0.10 ^c	0.47 ⁱ	9.30 ^{de}	20.13 ^c	45.33 ^f	89.63 ^f
T5	2.83 ^g	2.44 ^m	6.00 c	8.57 e	0.80 ^c	2.67 ^d	0.40 ^b	1.27 ^e	14.33 ^b	20.87 ^b	68.33 ^{de}	77.77 ⁱ
T6	4.13 ^{bc}	3.83 ^e	9.93 a	10.57a	0.60 ^{cd}	2.47 ^e	0.10 ^c	0.40 ^j	10.80 ^{cde}	17.77 ^f	100.67 ^a	120.87 ^a
T7	3.13 ^{ef}	2.70 ^k	7.67 b	9.57 c	0.47 ^{cdef}	2.17 ^g	0.04 ^c	1.47 ^d	11.57 ^c	19.33 ^d	69.67 ^{de}	85.33 ^g
T8	3.63 ^d	3.46 ^g	7.93 b	10.07b	0.37 ^{def}	2.07 ^h	0.20 ^c	0.87 ^g	9.10 ^{ef}	15.73 ⁱ	76.33 ^{cd}	100.57 ^d
T9	2.87 ^g	2.59 ^L	3.93 ef	6.70j	0.17 ^f	1.50 ^k	0.17 ^c	0.77 ^h	18.50 ^a	21.73 ^a	63.33 ^e	71.73 ^k
T10	4.67 ^a	4.69 ^a	6.50 c	9.1d	0.27 ^{def}	1.67 ⁱ	0.10 ^c	0.30 ^j	9.50 ^{de}	13.40 ^m	68.67 ^{de}	80.80 ^h
T11	3.53 ^{de}	3.28 ^h	4.30 ^{de}	7.43h	0.20 ^{ef}	2.37 ⁱ	0.57 ^a	1.87 ^b	10.50 ^{cde}	16.40 ^h	45.33 ^f	74.73 ^j
T12	3.47 ^{de}	3.12 ⁱ	3.87 ^{efg}	7.03i	2.60 ^a	2.97 ^a	0.10 ^c	0.30 ^j	9.77 ^{cde}	14.50 ^k	61.67 ^e	68.77 ^L
T13	3.73 ^{cd}	3.64 ^f	2.37 h	5.67m	1.43 ^b	2.87 ^b	0.20 ^c	0.70 ^h	7.20 ^f	15.13 ^j	75.67 ^{cd}	94.50 ^e

T1=Chicken manure R_{100%} (3.5 t/fed.), T2= Chicken manure R_{100%} + NPK_{30%}, T3= Chicken manure R_{100%} + NPK_{60%}, T4= Chicken manure R_{100%} + NPK_{100%}, T5= Chicken manure tea R_{100%}, T6= Chicken manure tea R_{100%} + NPK_{30%}, T7= Chicken manure tea R_{100%} + NPK_{60%}, T8= Chicken manure tea R_{100%} + NPK_{100%}, T9= Chicken manure R_{50%}+ chicken manure tea R_{50%}, T10= Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{30%}, T11= Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{60%}, T12= Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{100%} and T13= Control= R_{100%} of N (Ammonium Nitrate 33.5%) = 300 kg/fed. + P (Super Phosphate 15.5%) = 150 kg/fed. + K (Potassium Sulphate 48%) = 75 kg/fed.

Marketable yield of Jew's mallow was significantly increased with the increment levels of chicken manure. This might be attributed to the stimulating effect of chicken manure that supplies plant with nutrients required for better yield. For application of chicken manure at different levels, the highest rates of chicken manure (10 and 20 t/ha) gave a significantly substantial high yield, yield fresh and dry weight than other rates. These results are in good agreement with the findings of several researchers who revealed that organic manure increases the vegetative growth and biomass production effectively **Rashwan, 2012; Nwagburuka et al 2012 and Law-Ogbomo and Osaigbovo, 2016**. The contribution of compost amendment to higher growth and yield of *Corchorus* compared to control soil without amendment was a reflection of the beneficial roles played by the compost amendment in enhancing crop yield (**Agbede et al 2008**).

B) Total yield and chemical components of Molokhia leaves

According to the results (**Table 2**) of variance analysis, in order to determine impact the high rate of chicken manure and chicken manure tea under the lowest level of mineral NPK fertilizers on the healthy growth and quality molokhia plant. Data presented in **Table 2**, showed that the highest significant means of N, P and K uptake in leaves were (2.9, 2.17 and 21.73 mg/kg) at T1 "Chicken manure R_{100%}" and T9 "Chicken manure R_{50%} + chicken manure tea R_{50%}", respectively in both seasons more than other treatments. Results in **Table 2**, were reported that the highly significant increases in V.C. (100.67 and 120.87 mg/g) in fresh leaves and leaves dry weight (9.93 and 10.57 g) at the treatment T6="Chicken manure tea R_{100%}+NPK_{30%}". But T10 = "Chicken manure R_{50%} + chicken manure tea R_{50%} + NPK_{30%}" lead to a significant increase in total yield of fresh leaves (4.69 and 4.67 kg/plot) of both seasons (**Table 2**). These results can be explained that chicken manure and its tea are rich in macro (N, P and K) and micronutrients, enhance soil microflora and healthy plant growth, which lead to increase contain essential elements, vitamins and quality food (**Chaulagain et al 2017 and Al Ali et al 2019**). Data in **Table 2 and 1** cleared that, there are significant differences between thirteen treatments in vegetation growth, yield components parameters and total fresh yield. In the same trend

Garjila et al 2017, gave that organic manure of poultry manure, which having superior growth, improved all parameters of Jew's mallow. So that the highest yield at organic fertilizers and the lowest total yield at chemical fertilizers. In the same trend, (**Tovihoudji et al 1997; Javanmardi and Ghorbani, 2012; Adediran et al 2015 and Jigme et al 2015**) fined that, use of chicken manure improves macro and micronutrients, the soil aggregates, water holding capacity, bulk density, microbial properties (enzymes and microbial population) and organic matter, which reflected on enhancement in early and latter stages of plant growth and applied them must be got for optimum yield and quality products.

CONCLUSION

Effective response on vegetation parameters, total yield of fresh leaves and quality of molokhia "C.V. Balady" improved with addition of T1"chicken manure R_{100%}", T6 "chicken manure tea R_{100%} + NPK_{30%}", T9 "the mixture of chicken manure R_{50%} and chicken manure tea R_{50%}", or T10 "the mixture of chicken manure R_{50%} and chicken manure tea R_{50%} + NPK_{30%}" as compared to the huge chemical fertilizers & pesticides.

Future prospective

Further this investigation intends to clean environment from differ chemicals pollution hazard. Decrease able of chemical fertilizers for the lowest rate and increase amounts of differ organic fertilizers and their teas were acted as an environmental friend, quality soil, safety food and human health.

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تأثير كفاءة سبلة الكتكوت وشاي السبلة تحت مستويات منخفضة من التسميد الكيماوي على إنتاج وجودة الملوخية

[8]

آمال كرم أبو الجود*

قسم النبات الزراعي (الزراعة العضوية) - كلية الزراعة - جامعة دمياط - دمياط - مصر

*Corresponding author: amalgoud08@gmail.com

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الموجز

+ 50% من شاي السبلة + 30% من مخلوط الاسمدة الكيماوية NPK (T10) أدى للزيادة المعنوية في متوسط الوزن الرطب للاوراق (49.84 جم / النبات) وإنتاج المحصول الكلي من الاوراق الرطبة (4.7 كجم/ الحوض) كمتوسط للموسمين. وعلي التوالي T1 (100% من الجرعة الموصي بها من سبلة الكتكوت) و T10 (المخلوط من 50% من الجرعة الموصي بها من سبلة الكتكوت + 50% من شاي السبلة) يؤدي لزيادة إمتصاص الفسفور (1.35 ملجم/جم) وزيادة إمتصاص البوتاسيوم (20.27 ملجم/جم) بالورقة. كما أن T12 (المخلوط من 50% من الجرعة الموصي بها من سبلة الكتكوت + 50% من شاي السبلة + 100% من NPK) أدى لزيادة إمتصاص النيتروجين بالورقة (2.79 ملجم/جم) وإرتفاع محتوى صبغة الكلوروفيل بالورقة (SPAD 47.33) وعرض الورقة (6.82 سم) كمتوسط للموسمين مقارنة بإستخدام الأسمدة الكيماوية بالجرعات عالية (الكنترول).

وأخيراً فإن إنتاج الغذاء الأيمن من النباتات العضوية بإستخدام الأسمدة العضوية ومستخلص الشاي منها لإمداد النباتات بالعديد من العناصر الغذائية والفيتامينات بدون إستخدام الكيماويات لحماية الصحة وهو الإستهلاك الأمثل لإنتاج الغذاء الأيمن والصديق للمناسبات للبيئة.

الكلمات المفتاحية: الملوخية، سبلة الكتكوت، شاي السبلة

تم عمل تجربتين حقليتين بكلية الزراعة - قسم خضر (الشاطبي) - جامعة الأسكندرية لدراسة تأثير سبلة الكتكوت وشاي السبلة علي إنتاج وجودة نبات الملوخية أثناء الموسمين الصيفيين المتتاليين لعام 2017 و 2018. بهدف المقارنة بين الجرعة الموصي بها (100%) و 50% من الجرعة الموصي بها من سبلة الكتكوت؛ وشاي السبلة والمخلوط منهم 50% من سبلة الكتكوت + 50% من شاي السبلة بإستخدام أربع مستويات من مخلوط الأسمدة الكيماوية NPK (0, 30, 60, 100%) من الجرعة الموصي بها لتقليل الكميات المستخدمة منها في ظل وجود التسميد العضوي. تحتوي كل تجربة على 13 معاملة و 3 مكررات للمعاملة وتطل إحصائياً بنظام القطاعات العشوائية المتكاملة ومساحة الحوض (الوحدة التجريبية) = 2 متر مربع.

أوضحت النتائج ما يأتي: إستخدام 100% من الجرعة الموصي بها من شاي السبلة + 30% من مخلوط الاسمدة الكيماوية NPK (T6) حققت أعلى النتائج في الإنتاج والجودة (متوسط طول النبات 92 سم؛ متوسط عدد الاوراق بالنبات 29.5؛ متوسط طول الورقة 13.37 سم؛ نسبة فيتامين C 110.77 ملجم/جم ووزن رطب ومتوسط الوزن الجاف للاوراق 10.25 جم) كمتوسط لكلا الموسمين. كما أن المخلوط من 50% من الجرعة الموصي بها من سبلة الكتكوت

تحكيم: ا.د كمال غلاب

ا.د علاء الدين محمد طنطاوي