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Integrated Nutrient Management by used Vermicompost, Chicken Manure and Bokashi EM1 with Vermitea or Seaweed on Green Onion Growth and Yield

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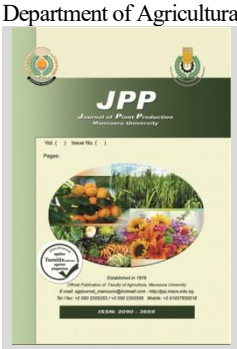

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ABSTRACT

The investigation on green onion (*Allium fistulosum*) were commenced on two winter growing seasons during 2023 and 2024; respectively in the private farm of Basin Six (El-Malawany), Dafsho Village, Kafr El-Dawwar Center, Beheira Governorate. This study aims to exam the effect of Integrated Nutrients Management (INM) using vermicompost (V) or the mixture of vermicompost 33.3%, chicken manure 33.3% and bokashi EM133.3% (VCB) at the rate of 6 tons/fed. with vermitea or seaweed as foliar spraying (two times/season) on vegetative, production & its quality of green onion plant. This study is seven treatments, used the local green onion cultivar "Crystal", it was arranged on Randomized Complete Block Design (RCBD) by 3 replications. The results cleared that, best significantly measurements of growth traits, yield and quality were came at (VCB+ Vermitea 2 times/season) T_4. But, the lowest significantly values of them at T_1 (inorganic fertilizers) control. Results showed that, the mixture of organic fertilizers (VCB) with vermitea as a biofertilizer lead to significantly outer formed on quantity & quality for Sustainable Agriculture enhancing.

***Keywords*:** Vermicompost, Chicken manure, Bokashi EM1, Vermitea, Seaweed, Green Onion

INTRODUCTION

Genus of green onion belongs to *Allium*. It is almost (*Allium fistulosum*) and is classified into 4 taxonomic groups. It is on same family (*Alliaceae*), as vegetables, including Garlic, shallots & Onion. Its testes to be milder tasting more than bulb onions. It is used in salad or in soup or sauces, which were eaten more for enhancing flavor of other foods. Non cooked green onion is good nutritionally compared to others cooked. In Egypt, green onion is important crop, was used for local consumption and as exportation commodity. Green onion is riched source in sulfur, flavonoids, vitamins from B, A and C, Minerals, Phenolic components "Ferulic acid" which is antioxidant compound and protection cells from oxidation damage. A pound of green onion is contains carbohydrate 45 g, protein 7.2 g, Calcium 139.4 mg, Phosphorous 187.6 mg, Iron 2.4 mg, Fats 0.7 g; Niacin 0.7 mg; Thiamine 0.15 mg; Riboflavin 0.1mg and Vitamin C 38 mg. All elements are essentials in survival functioning in diver living organisms. Components like Vitamins & Minerals, lead to use in building block & catalysts of physiology mechanisms in human. Green onion has sources of elements, riched on Vitamins, Fibers, Carbohydrates, Proteins & Phyto-chemicals; which they were represented as sources for human energy & in metabolisms. Elements & Vitamins were play roles in human cells and serve as an antioxidant, enzymatic reaction to maintain bodily processes & prevent nutritional deficiency and health human building. Green onion contains Vitamins, which are essentials in diver's metabolisms in human. It is importance for more biologicals activities of instance; used as anti-oxidants & anti-cancers & anti-microbes & anti-obesity. Major vitamins on green onions such as vitamins A in forms pro-vitamins "A-beta carotene", ranged from Vitamins B " Thiamine (B1), Riboflavin (B2), Niacin (B3), Pyridoxine (B6) & Folate (B9) & Vitamin C (Indira and Singh, 2014; Poberežny and Ochmian, 2017; Ahmed *et al*., 2018; Yoldas *et al*., 2019; Cantrell *et al*., 2020; Dollen *et al*., 2021; Hossin *et al*., 2022; Abd Allah and Abd Allah, 2022; Hassan *et al*., 2024; AL-Zubaidy, 2024 and Sitapara *et al*., 2024). These Vitamins are vital to energy metabolisms, DNA synthesis, neurvous systems functions & human well-beings (Figures 1 & 2).

Vermicompost is an economical and environmental friendly by Red wiggler worms. It is producted by reactions in earthworm (Eisenia- foetida), for utilizing their capacities to produce organic matters such as; manures, eggs shell, coffe husks & plants residues into vermicasts by digestive worm systems. Consequently, this technology led to increase the bio-availability of essential nutrients, vitamins, plant hormones, regulators and stimulation to convert plant's & animal's raws; that served as Bio & Organic Fertilizers. Intensive usage from Inorganic Fertilizers on plants cultivation lead to derogate in soil aggregates; which led to bad impacts on environmental conditions, microbial communities in soil & healthy. Organic fertilizers like chicken manure and bokashi EM1 application for both maintaining soil organic matter, nutrients availability, enhance beneficial soil microorganismis and sustain crop production. They are important for maintaining soil health & enhancing elements effectively on nutritional plants (Brown, 1995; Xu *et al*., 1999; Abd El-Ati & El-Hadidy, 2013; Indira and Singh, 2014; Abd El-Ati 2017; El-Hadidy, 2018; Dhaker *et al*., 2018; Yoldas *et al*., 2019; Mohammed *et al*., 2019; Patidar *et al*., 2019; Mårtensson *et al*., 2020; Soraya *et al*., 2020; Chamberlain *et al*., 2020; Oliveira *et al*., 2021; El-

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Mogy *et al*., 2021; Hossin *et al*., 2022; Oyege and Bhaskar, 2023; Darwesh *et al*.,2023; Luu *et -al*., 2024; Hatungimana *et- al*., 2024 and Hassan *et- al*., 2024). Organic fertilizers, including chicken manure, bokashi EM1 and vermicompost; which they act as sources of Minerals, Vitamins & Hormones for stimulation in plant vegetative (Abd El-Ati & El-Hadidy, 2013; Indira & Singh, 2014 and Mohammed *et- al*., 2019). Organic Fertilizers able to enhance soil qualities for maintaining soil structures, increasing soil water holding capacity, supplying more beneficial microorganisms and increasing microfloura density, also improving the soil pH, earthworms stabilities in community (Mohammed *et- al*., 2019; and Luu *et- al*., 2024).

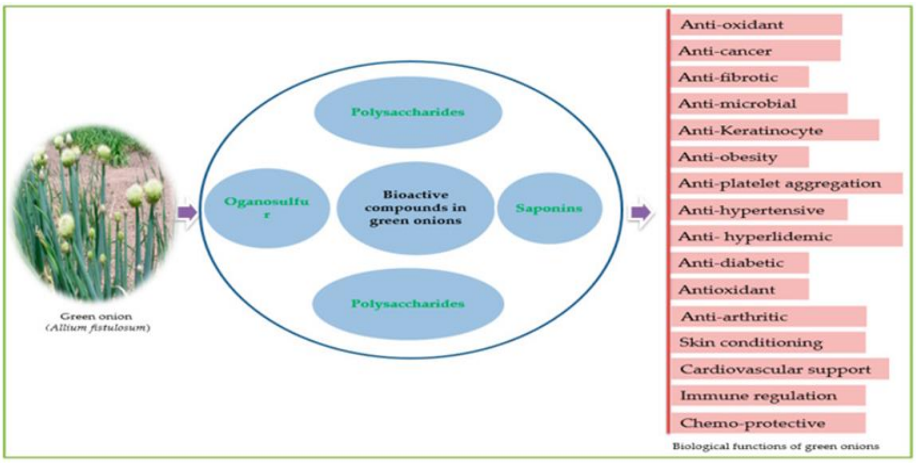

Figure 1. Biologically functions from Minerals & Vitamins on Green Onion plant (*Allium fistulosum*)

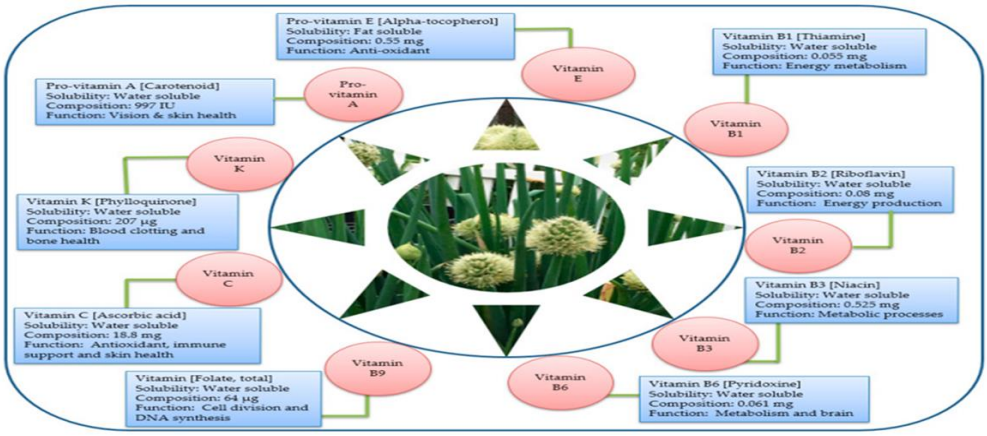

Figure 2. Chemical compositions & biologically functions in Vitamins of Green Onions (*Allium fistulosum*).

Agricultural Practices by different organic fertilizers lead to improve plant vegetative, their productions & qualities (Patidar *et- al*., 2019;Abou El-Goud, 2020 a & b; Mårtensson *et- al*., 2020; Soraya *et- al*., 2020; Chamberlain *et -al*., 2020; Oliveira *et -al*., 2021; El-Mogy *et al*., 2021 & Luu *et- al*., 2024). Bokashi EM1 and vermicompost as biofertilizers have significantly effects on the yield and their components, such as weights and fruit diameter. There were also significantly differences in the vegetative growth and yield; as well as increase the availability of nutrients to enhance leaves surface area, which they caused improve the photo-synthetic capability & significantly increases in crop yield more than the control (inorganic fertilizers). Well-acknowledged that, vermicompost, chicken manure and bokashi EM1 are Bio & Organic Fertilizers thank for their slows-releasing property; which allows crops for absorption all elements required more efficiency, alongside their capacities to enhance soil Physical, Chemical & Microbiological properties. As well as, beside benefits for improving plant vegetative & increasing crops production (Hossin *et al*., 2022; Oyege & Bhaskar, 2023; Darwesh and Elshahawy, 2023; Hatungimana *et- al*., 2024 & Luu *et- al*.; 2024). They have shown their potentials for suppression diseases & pests in crops. Their suppressions related to diver mechanisms such as; highest density of beneficial microbes or increase total microbial activities, which able to inhibit pathogens & pests, or induced systemic resistances on plants against pests/diseases, or in soil qualities & essential elements for pests control & increase competitions of beneficial microbes for food - air & space - water more than harmfully Microbes (Indira & Singh, 2014; El-Hadidy, 2018; Yoldas *et- al.*, 2019; Patidar *et- al*., 2019; Mårtensson *et- al*., 2020; Chamberlain *et- al*., 2020; Oliveira *et- al*., 2021; El-Mogy *et- al*., 2021; Hossin *et- al*., 2022; Oyege and Bhaskar, 2023; Darwesh and Elshahawy, 2023 and Hatungimana *et -al*., 2024) all this lead to enhance the immunity system of plant. Seaweed and vermiteas contain useful amounts of Macro and Micro nutrients (N- P- K- Ca- Mg- Fe- Zn- S & Cu). Vermitea has others usefull component, like beneficial soil micro-organisms such as, Nitrogen-Fixing Bacteria, Actinomycetes, *Bacillus subtillus*, *Bacillus megatherium*, *Pseudomonas flourescences* & mycorrhizal fungi (Xu *et- al*., 1999; Indira & Singh, 2014; El-Hadidy, 2018; Dhaker *et- al*., 2018; Abou El-Goud, 2020 a & b; Darwesh and Elshahawy, 2023; Hatungimana *et- al*., 2024 & Hassan *et- al*., 2024). Which they able to enhance the microbial communities in rhizosphere to prevent the soil

borne pathogens, also can produce organic acids to decrease the soil PH and dissolve the minerals, to improve availability of Macro & Micro elements and enhance the plant nutrition's, vegetative rate and yield. Vermitea offers a natural solution; which is enrich with Macro & Micro-nutrients, humic acids, enzymes, plant vegetative-regulating Hormones & Vitamins to positive influences of plant nutritions, photo-synthesis & nutrients content of differ parts in plants. Moreover, they have been shown to increase crop tolerance against diseases and pests. Chemical Fertilizers in crop productions caused increase soil degradations & environmental problems. Farmers able to achieve sustainable agriculture practices by organic and bio fertilizers, while reducing environmental impacts. Vermitea is unique organic amendments, which offer numeorus benefits to pest's managements on plants. It has high microbial-activities & nutrients-rich (essential elements of N- K- P- Ca- Mn- Mg- Fe- Cu & Zn). These elements are readily absorbed by plant to increase enzymes activities, beneficial microbe's populations & plants-growth-promoting. Furthermore, Vermitea exhibits as bio-control properties because its abilities to harbors antagonistic and can effectively suppressed the most of soil borne pathogens. They have the dual functions as an organic amendment and a bio-control agent for pest management in plant and sustainable agriculture practices. Seaweed liquid also contains plant vegetative regulating, hormones (auxins, cytokinine, gibberellins & indol acetic acid), vitamins & enzymes (amylase, lipase, cellulase and chitinase). They were balanced supply of nutrients, vitamins and hormones are crucial to increase production and nutritional value in plants. Seaweed is enrich with various enzymes (Cellulose, Chitinase & Amylase), Vitamins, Proteins, Vegetative Hormones. The benefits play vital roles for enhancing the crop production, soil microorganisms and soil structure. Seaweed is rich sources of biological diversity (Abbas *et al*., 2020; Abd Allah and Abd Allah, 2022; Oyege and Bhaskar, 2023; Darwesh and Elshahawy, 2023; AL-Zubaidy, 2024; Hatungimana *et-al*., 2024 & Hassan *et-al*., 2024) as environmentally friendly, because; it is rich in nutrients, vitamins, phytohormones, antioxidants, natural omega-3, lipids, amino acids, proteins, carbohydrates and antimicrobial compounds for potential yield and quality of plants. Seaweed plays increasing important roles in agriculture; it is used as a biofertilizer (Ismail and Abo-Hamad, 2017; Osman *et al*., 2020 and Hatungimana *et al*., 2024) increase the crop productivity, also for maintaining the soil fertility and stability. In addition, seaweed provides comprehensive of global productions of alga & estimated costs of the trans-forming algae biomasses into bio-fertilizers (Singh and Hussain, 2015; Poberežny & Ochmian, 2017; Gupta *et- al*., 2021; Darwesh and Elshahawy, 2023; AL-Zubaidy, 2024; Luu *et- al*., 2024; Hatungimana *et- al*., 2024 & Hassan *et- al*., 2024). Vermitea & Seaweed liquid with organic fertilizers, including chicken manure, bokashi EM1 & vermicompost have been recommended to achieve the address of elements deficiency & mitigate soil qualities deteriorations caused by intensive crops cultivation practices. Farmers can enhance Soil Fertility, elements availability & promote sustainable long-term productivities on crops by combination between organic & bio-fertilizers. They were caused to better challenges in global public health & substantial portion in populations. Aims of these work for studying influence Integrated Nutrients Management (INM) using vermicompost (V) or the mixture of vermicompost 33.3%, chicken manure 33.3% and bokashi EM1 33.3% (VCB) with vermitea or seaweed as foliar spraying (2 times/season) as biofertilizer on the growth, yield and quality of green onion to prevent chemical fertilizers used and stimulate the sustainable agriculture.

MATERIALS & METHODS

Field experiment was conducted in two winter seasons, at 2023& 2024; respectively on a private farm entitled Basin Six (El-Malawany), Dafsho Village, Kafr El-Dawwar Center, Beheira Governorate to study influence integrated nutrients management (INM) by using vermicompost (V) or the mixture of vermicompost 33.3%, chicken manure 33.3% and bokashi EM1 33.3% (VCB) at the rate of (6 tons fed^{-1}.) and vermitea or seaweed as foliar spraying (two times/season) on vegetative; quantities & qualities in green onions plants. Chemicho-physically characters in the field experiment of soil surface (zero -25 cm); was taken the soil samples before cultivation in the first winter season, 2023. Soil texture was Sand 48.5, Clay 39 and Silt 12.5% (sandy clay); *E.C.* (1:1, Water Extraction) 00.97 ds. m^{-1}, soil pH 8.7, the percentage of organic matter (1.73%) and organic carbon (46%); C/N ratio (19.5:1), $CaCO_3$ (5.7%) and the availability of nitrogen, phosphorus and potassium were (7.8, 29.3 and 549.6 mg/kg; respectively) according to Jackson; 1973; Chapman & Pratt, 1978; Evenhuis,1978; Page *et- al*., 1982 & Klute 1986. Chemical properties in Organic Fertilizer mixture (VCB) and vermicompost (V) were (pH 8.5 and 8.3, E.C. 7.5 and 6.1 ds/m, OM% 29.2 and 16.8%, OC% 17.3 and 9.7 %, C/N ratio 11.5:1 and 17:1; respectively). Total amounts from Nitrogen, Phosphorous & Potassium were; 2.6, 3.5 and 5.7%; respectively in VCB. Total amounts of macro elements nitrogen, phosphorous and potassium were (2.2, 3.1 and 5.1%; respectively) in vermicompost. Organic fertilizers like V or VCB were obtained from a private farm (El-Malawany), Dafsho Village, Kafr El-Dawwar Center, Beheira Governorate. Vermitea was prepared from vermicompost by adding (200 g/ L water) and air fermentation for three days to obtain vermitea and then sieved through the net (Sundararasu and Jeyasankar, 2014), and contains of 4.3 % N, 1.26% P and 3.8% K. Seaweed powder was obtained from the Soil, Water, and Environment Department in National Research Centre- Egypt and it contains of 3.3% N, 4.6% P, and 17.4 % K. It is diluted with water to the concentration of 25g/L water to obtain seaweed liquid, and was applied at the rate of 150 ml/plant as a foliar spraying. Field Experiment was two arranged on randomized completed blocks designs (RCBD) with 3 replications of seven treatments as follows ; T_1 = Control (recommended doses of Chemicals N, P & K Fertilizer), T_2 = VCB (Mixed from Vermicompost 33.3% + Chicken Manures 33.3%+ Bokashi EM1 33.3%) at (6 tons/fed.), T_3= VCB at (6 tons/fed.) + Seaweed tea (2 times/season) at the rate of 150 ml/plant as a foliar spraying in (growth stage), T_4= VCB at (6 tons/fed.) + Vermitea (2 times/season) at the rate of 150 ml/plant as a foliar spraying in (growth stag), T_5= Vermicompost at (6 tons/fed.), T_6= Vermicompost at (6 tons/fed.) + Seaweed tea (2 times/season) at the rate of 150 ml/plant as a foliar spraying in (growth stage), T_7= Vermicompost at (6 tons/fed.) + Vermitea (2 times /season) at the rate of 150 ml/plant as a foliar spraying in (growth stage). Planting the seedlings of local green onion cultivar "Crystal" was sown. Total plot area is 1.05 m^2 by 1.5 m length x 0.70 cm width, and it contains 15 plants/plot, distance between hills were 10 cm and cultivated in 17th and 20th

October, 2023 and 2024; respectively. Organic fertilizers were vermicompost (V) or mixed of vermicompost, chicken manure and bokashi EM1 (VCB) at 33.3% from every one with vermitea or seaweed liquid as foliar spraying on plants as biofertilizers compared to inorganic fertilizers (T1). Organic fertilizers; such as VCB or V were applied at the rate of 6 ton/fed on the soil surface before planting by 21 days. Chemical Fertilizers treatment (T_1), full doses of Phosphorus & Potassium fertilizers; are applying in soil surface at planting with also half dose of N fertilizer. While, the remaining half dose from Nitrogen fertilizer was added after 20 days from sowing. Recommenders dose of Nitrogen; Phosphorus and Potassium per fed. are 250 kg of Ammonium-Nitrate (33.5 %), 150 kg of Super-Phosphate (15.5 %) and 100 kg of Potassium-Sulfate (48.0 %). The around protection measure of plants from weeds were controlled by twice weekly manual hoeing with a sickle after sowing, with organic pesticides programme used by foliar spraying on whole plants of the Neem oil extract (Ashok) at rate (3 cm/ L) every 10 days after seedlings planting direct. This protection programme was continued for the harvest ending in 16th and 20th , December- 2023 and 2024; respectively to enhance the plant defense against insects and covering the green onion plants under net for protection increased. Irrigation System is Drip-Irrigation, was added twice per week. Five samples of plants were cut randomly per plot (Experimental Unit) to estimate vegetative, yield and quality characters studied. The height of plant cm, number of leaves per plant, shoot fresh weight g/plant, bulb diameter cm was measured at two growing seasons ending, in 2023 and 2024. Measuring of total chlorophyll (SPAD) and leaf area index (cm^2) were done accorded to Roods & Blood-Worth; (1964). Green onion samples were cleaned in distilling water, dried samples in Oven (65°C) for 72h until their weights fixed to measure chemicals components studied. Quality parameters were expressed in green onion, such as (T.S.S. %, essential oils%, percentage of N- P- K- Fe- Zn- Cu- Mn- S ppm; as well as total chlorophyll in green leaves and bulb diameter cm. Dried plant samples were finely ground, wet digestion by using the concentration of H_2SO_4 / H_2O_2 to estimate the percentage of phosphorus (Vanaomolybdophosphoric method) and potassium (Flam Photometer); according to Jackson, 1973 & Lowther, 1980. Nitrogen % is estimated using Nessler's Method Chapman & Pratt, 1978. Juice of green onion sample was taken to measure total soluble solids (T.S.S. %) by Hand Refractometers model (Portable Refractometer ATC) according to Chen & Mellenthin; (1981) and Chen & Ho; (1998). Total yield (kg/m^2.) and (kg/fed.) were calculated at the harvest in 16th and 20th December, 2023 and 2024; respectively. In order to, samples of dry plants were finely ground for chemical contents determination. Samples of dried plants were wet digested using the concentrations of H_2SO_4 /H_2O_2 (Lowther, 1980). Micro-elements of (Cu, Mn, Zn, Fe & S ppm) were measured in dried plant samples, used Atomic Absorption Spectro-photometer "Perkin-Elmer, 3300" according to Chapman & Pratt; (1961); Chapman & Pratt, (1978) and A.O.A.C. (1990). Samples of plant were placed in 500 *mL* bottom flask & steam distilled for 3.5 h until approximately 500 *mL* of Steam distilled onion oils were obtained by Soxhlet Apparatus to determine the percentage of essential oils in green onion (Cantrell *et-al*., 2020). Results were statistical analyzed used SAS program (S.A.S., 2001) and the mean of treatments were compared by using Duncan's Multiple and Range Test at the level of 5% probability Gomez and Gomez; (1984) and Snedecor and Cochran;(1980).

RESULTS & DISCUSSIONS

1- Growth Parameters

Two open Field Experiments were applied in two winter seasons at 2023 & 2024; respectively in private farm for evaluation influence integrated nutrients management (INM) by used vermicompost single at $R_{100\%}$ or the mixture of vermicompost 33.3%, chicken manure 33.3% and bokashi EM1 33.3% (VCB) with foliar spraying by two times of vermitea or seaweed on characters of vegetative, production & qualities of green onions on Tables (1, 2, 3 & 4). Data on Table, 1; showed that, plant length cm, number Of leaves/plant, total chlorophyll in leaves SPAD, total fresh weight g/plant and blub diameter cm were the highest significantly values (65.5 cm, 13.7 leaves/plant, 64.3 SPAD, 117 g/plant and 7 cm; Respectively) averages from two Seasons; at 2023 & 2024 in VCB + vermitea 2 times (T_4). While, the lowest significantly values were (34 cm, 7 leaves/plant, 35.1 SPAD, 62 g/plant and 3.4 cm; Respectively) averages from two Seasons; at 2023 & 2024 in chemicals fertilizers (T_1) in Table, 1.

Table 1. Influence Vermicompost (V) or the mixture of Vermicompost 33.3%, Chicken manure 33.3% and Bokashi EM1 33.3% (VCB) with seaweed or vermitea as a foliar spraying on vegetative parameters in green onions (Allium fistulosum) plant in both winters seasons, during 2023 & 2024; respectively

	Plant Height cm		Numbers Of leaf plant^{-1}		Total Chlorophyll in leaf SPAD		Total Fresh Weightg plant^{-1}		Bulb diameter cm	
T	First season	Second season	First season	Second season	First season	Second season	First season	Second season	First season	Second season
T1	32.7 g	35.8 g	6.8 g	7.6 g	32.8 g	36.4 e	57.9 g	63.7 g	3.2 g	3.6 g
T2	49.9 c	54.9 c	10.8 C	11.9 C	49.7 C	55.2 C	89.6 c	98.6 c	5.3 c	5.8 c
T3	55.3 b	60.8 b	11.8 B	13.1 B	55.1 B	61.1 B	99.5 b	109.5 b	5.9 b	6.5 b
T4	61.9 a	68.1 a	13.0 a	14.4 a	60.7 a	67.4 a	110.2 a	121.2 a	6.7 a	7.4 a
T5	44.6 d	49.1 d	9.7 d	10.8 d	44.9 d	49.9 d	80.6 d	88.7 d	4.7 d	5.2 d
T6	36.2 f	39.8 f	7.9 f	8.7 f	36.5 f	40.5 f	65.1 f	71.7 f	3.7 f	4.1 f
T7	40.3 e	44.3 e	8.8 e	9.8 e	39.9 e	44.4 e	72.7 e	79.9 e	4.2 e	4.6 e
L.S.D.0.05	0.49	0.54	0.36	0.39	0.47	0.52	0.46	0.50	0.16	0.18

T1= Control (Recommended doses from Chemicals N, P & K Fertilizers), T2= (Vermicompost 33.3% + Chickens manure 33.3%+ Bokashi EM1 33.3% mixed) VCB at R100% (6 tons/fed.), T3= VCB + Seaweed tea (2 times) as a foliar spraying, T4= VCB + Vermitea (2 times) as a foliar spraying, T5= Vermicompost at R100% (6 tons/fed.), T6= Vermicompost at R100% (6 tons/fed.) + Seaweed tea (2 times) as a foliar spraying, T7= Vermicompost at R100% (6 tons/fed.) + Vermitea (2 times) as a foliar spraying. Means followed by the same latter in the same coloum are not statistical differences

This may be due to better the moisture holding capacity, supply more availability of macro and micro nutrients, increase the percentage of organic matter, organic carbon and C/N ratio due to favorable soil fertility by applying the different organic sources. Results corroborated by findings in (Dhaker *et- al*., 2017; AL-Zubaidy, 2024 & Sitapara *et- al*., 2024) in green onions. The higher values of plants height Cm, numbers of leaf plant^{-1}, Total Chlorophylls

on leaf, total fresh weight and diameter of bulb were significant increases at organic treatments from T_2 to T_7 more than T_1 (inorganic fertilizers) were recorded in Table (1). Minimum significantly data from vegetative characters were noticed at controlled T1. Improving of growth parameters lead to increase productions of plants hormones, vegetative regulators, vitamins and minerals to enhance the plant nutrition and improve the vegetative growth. This is lead to enhance in cell elongation, cell multiplication and increase the number of leaves /plant; which lead to increase bulb diameter cm and cause better the growth. Same data were reported in (Brown, 1995; Abd El-Ati & El-Hadidy, 2013; Indira & Singh, 2014; Abd El-Ati 2017; El-Hadidy, 2018; Yoldas et -al., 2019; Patidar et- al., 2019; Mårtensson et -al., 2020; Soraya et -al., 2020; Abou El- Goud, 2011; Abou El- Goud, 2020 a and b; Chamberlain et- al., 2020; Oliveira et- al., 2021; El-Mogy et -al., 2021; Dollen et- al., 2021; Hossin et- al., 2022; Hassan et- al., 2024; AL-Zubaidy, 2024; Sitapara et -al., 2024; & Hatungimana et -al.; 2024) on crops.

2-Yield And Quality Parameters

Results demonstrated by using vermicompost single $R_{100\%}$ or the mixture of vermicompost 33.3%, chicken manure 33.3% and bokashi EM1 33.3% (VCB) with foliar spraying by two times of vermitea or seaweed on characters of green onion quality and yield in Tables (2, 3 and 4; respectively).

Table 2 cleared that, the results of the percentage of T.S.S., essential oils, proteins, phosphorus and potassium of green onion plant were significantly increased by applying the mixture of organic fertilizers (VCB) or vermicompost $R_{100\%}$ single with foliar spraying by vermitea or seaweed (from T_2 to T_7), also its quality and yield parameters in (Tables 2, 3 and 4) more than inorganic fertilizers (T_1). Table 2 shows that, the highest significantly values were (13.2, 5.1, 12.7, 0.95 and 1.9; Respectively) averages from two Seasons, 2023 & 2024 in VCB + Vermitea 2 times as foliars spray (T_4). Lowest significantly data are (7.1, 2.2, 6.9, 0.49 and 0.97; Respectively) averages from two Seasons, 2023 & 2024 in T_1 (Controlled). The findings revealed that, foliar spraying treatments with seaweed or vermitea in yield and quality studied traits were comparison between treatments in (Table 2). Best measurements were obtained by treatments from T_2 to T_7 involved (the percentage of T.S.S., essential oils, proteins, phosphorus and potassium) more than T_1 (control) inorganic fertilizers in Table (2). These increases are due to organic fertilizer's positive effects, the improving of plant growth, yield and quality by encouraging division and development of plant cells. Their influence on biological processes in plant cells like (photosynthesis, respiration and synthesizing proteins, carbohydrates and plant hormones (Xu *et- al*., 1999; Abd El-Ati & El-Hadidy, 2013; Indira & Singh, 2014; Singh and Hussain, 2015; Abd El-Ati 2017; El-Hadidy, 2018; Mohammed *et- al*., 2019; Patidar *et- al*., 2019; Mårtensson *et -al*., 2020; Soraya *et- al*., 2020; Chamberlain et- al., 2020; Abou El-Goud, 2020 a & b; Oliveira *et- al*., 2021; El-Mogy *et- al*., 2021; Hossin *et- al*., 2022; Oyege & Bhaskar, 2023; Darwesh *et- al*.,2023; Hatungimana *et- al*., 2024 & Hassan *et- al*., 2024). Additionally, they able to enhance the assimilation of nutrients; stimulate enzymes activities within the plant cell and improve their functions as organic compounds to enhance the cell membrane permeability (El-Mogy *et al*., 2021; Hossin *et al*., 2022 and Hatungimana *et al*., 2024).

Table 2. Influence Vermicompost (V) or Vermicompost 33.3%, Chicken manures 33.3% and Bokashi EM1 33.3% mixed (VCB) with seaweed or vermitea as a foliar spraying on quality parameters of green onion (*Allium fistulosum*) plant at two winter growing seasons, 2023 and 2024; respectively

T	T.S.S.%		Essential Oil%		Proteins%		Phosphorus%		Potassium%	
	First season	Second season	First season	Second season	First season	Second season	First season	Second season	First season	Second season
T1	6.7 g	7.4 g	2.1 g	2.35 g	6.6 g	7.2 g	00.47 G	00.51 G	0.93 g	1.03 g
T2	10.7 c	11.9 C	3.7 C	4.07 c	10.3 c	11.3 c	00.73 C	00.79 C	1.47 C	1.64 C
T3	11.9 b	13.1 b	4.1 b	4.59 b	11.6 b	12.7 b	00.82 B	00.89 B	1.63 b	1.81 b
T4	12.9 a	14.2 a	4.7 a	5.30 a	12.1 a	13.3 a	00.91 a	00.99 a	1.80 a	2.0 a
T5	9.7 d	10.7 d	3.2 d	3.58 d	9.2 d	10.1 d	00.66 D	00.72 D	1.33 D	1.47 D
T6	7.9 f	8.7 f	2.6 f	2.88 f	7.4 f	8.1 f	00.54 F	00.59 F	1.08 f	1.20 f
T7	8.7 E	9.7 E	2.8 e	3.25 e	8.2 E	9.2 E	00.60 e	00.65 e	1.19 E	1.32 E
L.S.D.00.05	00.39	00.42	00.17	00.19	00.44	00.49	00.02	00.03	00.04	00.04

T1= Control (Recommended doses of Chemicals N, P & K Fertilizers), T2= (Vermicompost 33.3% + Chicken manures 33.3%+ Bokashi EM1 33.3% mixed) VCB at R100% (6 tons/fed.), T3= VCB + Seaweed tea (2 times) as a foliar spraying, T4= VCB + Vermitea (2 times) as a foliar spraying, T5= Vermicompost at R100% (6 tons/fed.), T6= Vermicompost at R100% (6 tons/fed.) + Seaweed tea (2 times) as a foliar spraying, T7= Vermicompost at R100% (6 tons/fed.) + Vermitea (2 times) as a foliar spraying. Means followed by the same latter in the same coloum are not statistical differences

Table 3. Influence Vermicompost (V) or Vermicompost 33.3%, Chicken manures 33.3% and Bokashi EM1 33.3% mixed (VCB) with seaweed or vermitea as a foliar spraying on quality parameters of green onion (*Allium fistulosum*) plant at two winter seasons, 2023 and 2024; respectively

T	Cu ppm		Fe ppm		Zn ppm		Mn ppm		S ppm	
	First season	Second season	First season	Second season	First season	Second season	First season	Second season	First season	Second season
T1	1.02 g	1.11 g	46.93 g	51.63 g	16.87 g	18.89 g	6.37 g	7.07 g	1.02 g	1.11 g
T2	1.63 c	1.81 c	73.13 c	80.45 c	27.53 c	30.84 c	10.73 c	11.91 c	1.73 c	1.88 c
T3	1.87 b	2.08 b	80.50 b	88.55 b	30.40 b	34.05 b	11.87 b	13.17 b	1.89 b	2.06 b
T4	1.96 a	2.17 a	89.52 a	98.48 a	33.91 a	37.98 a	12.85 a	14.27 a	2.18 a	2.37 a
T5	1.48 d	1.64 d	65.67 d	72.23 d	24.47 d	27.40 d	9.73 d	10.80 d	1.53 d	1.66 d
T6	1.20 f	1.33 f	53.10 f	58.41 f	19.73 f	22.10 f	7.87 f	8.73 f	1.24 f	1.36 f
T7	1.33 e	1.48 e	59.73 e	65.71 e	21.87 e	24.49 e	8.73 e	9.69 E	1.37 E	1.49 E
L.S.D.00.05	00.05	00.06	00.80	00.88	00.36	00.41	00.31	00.35	00.06	00.07

T1= Control (Recommended doses of Chemicals N, P & K Fertilizers), T2= (Vermicompost 33.3% + Chicken manures 33.3%+ Bokashi EM1 33.3% mixed) VCB at R100% (6 tons/fed.), T3= VCB + Seaweed tea (2 times) as a foliar spraying, T4= VCB + Vermitea (2 times) as a foliar spraying, T5= Vermicompost at R100% (6 tons/fed.), T6= Vermicompost at R100% (6 tons/fed.) + Seaweed tea (2 times) as a foliar spraying, T7= Vermicompost at R100% (6 tons/fed.) + Vermitea (2 times) as a foliar spraying. Means followed by the same latter in the same coloum are not statistical differences

Table 4. Influence Vermicompost (V) or the mixture of Vermicompost 33.3%, Chicken manure 33.3% and Bokashi EM1 33.3% (VCB) with seaweed or vermitea as a foliar spraying on total yield of green onion (*Allium fistulosum*) plant at two winter seasons, 2023 and 2024; respectively

T	Total Yield (kg/m^2)		Total Yield (Ton/fed.)	
	First season	Second season	First season	Second season
T1	1.217 g	1.338 g	3.042 g	3.346 g
T2	1.882 c	2.070 c	4.704 c	5.174 c
T3	2.090 b	2.299 b	5.224 b	5.746 b
T4	2.314 a	2.545 a	5.784 a	6.362 a
T5	1.693 d	1.862 d	4.232 d	4.655 d
T6	1.368 f	1.505 f	3.420 f	3.762 f
T7	1.526 e	1.679 e	3.815 e	4.197 E
L.S.D.00.05	00.96	01.05	00.024	00.026

T1= Control (Recommended doses of Chemicals N, P & K Fertilizers), T2= (Vermicompost 33.3% + Chicken manures 33.3%+ Bokashi EM1 33.3% mixed) VCB at R100% (6 tons/fed.), T3= VCB + Seaweed tea (2 times) as a foliar spraying, T4= VCB + Vermitea (2 times) as a foliar spraying, T5= Vermicompost at R100% (6 tons/fed.), T6= Vermicompost at R100% (6 tons/fed.) + Seaweed tea (2 times) as a foliar spraying, T7= Vermicompost at R100% (6 tons/fed.) + Vermitea (2 times) as a foliar spraying. Means followed by the same latter in the same coloum are not statistical differences

Mixtures of Organic Fertilizers (VCB) able to promote biologicals processes of plant, enhance developments in roots branches & Growth Systems. Facilitating macro & micro elements, waters assimilation & improving Photo-synthesis Efficiency. Several data, cleared the different sources of organic fertilizers applied with foliar spraying lead to enhance Vegetative, quantities & qualities characteristics of crops (Xu *et- al*., 1999; Abou El- Goud, 2011; Abd El-Ati and El-Hadidy, 2013; Indira & Singh, 2014; Abd -El-Ati 2017; El-Hadidy, 2018; Mohammed *et- al*., 2019; Patidar *et- al*., 2019; Mårtensson *et- al*., 2020; Soraya *et- al*., 2020; ; Abou El- Goud, 2020a; Chamberlain *et- al*., 2020; Oliveira *et -al*., 2021; El-Mogy *et- al*., 2021; Hossin *et- al*., 2022; Oyege and Bhaskar, 2023; Darwesh *et- al*.,2023; Hatungimana *et- al*., 2024 & Hassan *et- al*., 2024 and AL-Zubaidy, 2024). Adding vermitea or seaweed able to improve photosynthesis and increase crop production. Furthermore, their composition likes (organic compounds, mineral, vitamins and plant regulators and hormones including auxins, gibberellins and cytokinine). It also in table (3) shown that, micronutrients contain including (Cu, Fe, Zn, Mn and S ppm), which are crucial for plant respiration. They able to activate the reduction and the oxidation of enzymes in the electron transfer chain, to help the production of chlorophyll A and B, store Fe in the chloroplast as phyto ferritin, which lead to promote and increase the vegetative growth plant (Mårtensson *et- al*., 2020& Hatungimana *et -al*., 2024). Data in *Table,* 3 cleared this, highest significantly values were (2.03, 94.56, 36.3, 13.55 and 2.32 ppm; respectively) averages from two Seasons, 2023 &2024 in T_4 (VCB + vermitea 2 times as foliars spray). Lowest significantly data are (1.1, 50.53, 18.34, 6.67 and 1.20 ppm; respectively) averages from two Seasons, 2023 & 2024 in T_1 (controlled). These are similar to findings in (Chamberlain *et- al*., 2020; Oliveira *et- al*., 2021; Dollen *et al*., 2021; Darwesh and Elshahawy, 2023 & Luu *et- al*., 2024) of plants. Some authors (Yoldas *et al*., 2019; Mohammed *et al*., 2019; Abou El-Goud, 2020 a & b; Abd Allah *et al*., 2022; Hossin *et al*., 2022; Sitapara *et al*., 2024 &AL-Zubaidy, 2024) reported that, crops tend to increase the quality and yield by applying the commercial organic fertilizers; which they gave a positive net income. Application of Organic Fertilizers mixed (VCB) able to commendable marketable yield and quality increased. The usage of different organic sources were found to be not expensive considering that, they are required to compensate the recommended doses of macro and micro nutrients requirement for powerful nutritional plant to enhance kreb's cycle, photosynthesis, respiration and improve the vegetative growth, their production and quality. As the results in Table (4) were shown that, total yield of green onion were significant increases in organic treatments from T_2 to T_6. In table, 4; shown that, highest significantly values in total yield kg/m^2 and total yield tons/fed. were (2.5 and 6.1; respectively) averages from two Seasons, in 2023 & 2024 at VCB + Vermitea 2 as foliars spray (T_4). But lowest significantly data are (1.3 and 3.2; Respectively) averages from two Seasons, in 2023 & 2024 at T_1 (controlled) chemicals fertilizers. These increases due to Beneficial's components and microbes in organic fertilizers; which they usage as nutrients supplements & bio-stimulants for a good vegetative growth and production increased (Mårtensson et -al., 2020; Oliveira et-al., 2021; Abd -Allah *et- al*., 2022 & Oyege and Bhaskar, 2023). These results in agreement with (Yoldasa *et- al*., 2019; Patidar *et- al*., 2019; Dollen *et- al*., 2021; Abd Allah & Abd Allah, 2022; Hossin *et- al*., 2022; Oyege *et- al*., 2023 & AL-Zubaidy, 2024) stated that on the most of crops. These increases in yield and their qualities due to the application of the mixture of organic fertilizers involved (vermicompost 33.3%, chicken manure 33.3% and Bokashi EM1 33.3%) VCB with vermitea as a biofertilizer by a foliar spraying (2 times) T_4, in comparison with the values in T_1 (inorganic fertilizers) recorded the lowest significantly impact. Recorded data are proving that, Chemicals Fertilization leads to improve in crop. Organic fertilizers variations were recommended to be sufficient to meet the need of crop for powerful vegetative growth and increasable of yield and quality by addition them to the soil surface (Patidar *et -al*., 2019; Hossin *et- al*., 2022 & Sitapara, *et- al*., 2024).

CONCLUSIONS

Modern Integrated Nutrient Management (INM) system; including the utilization of Organic Fertilizers such as Vermicompost, Chicken manures and Bokashi EM1 (VCB) with foliar spraying by vermitea or seaweed. The best significantly values by application VCB + Vermitea as a foliar spraying (T_4) to enhance vegetative rates & increase quantities and qualities in green onions plant more than others. On Contrary, Chemicals Fertilizers (T_1) had dangerous impacts in environment, healthy & decrease crop production and qualities.

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الإدارة المتكاملة للمغذيات باستخدام سماد الفيرميكمبوست وروث الدجاج والبوكاشي EM1 مع الفيرميتي أو الأعشاب البحرية علي نمو وإنتاج البصل الأخضر

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الملخص

بدأت فحوصات البصل الأخضر (*Allium fistulosum*) خلال موسمين شتويين متتاليين ٢٠٢٣ و ٢٠٢٤ بمزرعة خاصة بالحوض السادس (الملوانى) الخاصة بقرية دفشو- مركز كفر الدوار- محافظة البحيرة. حيث تم دراسة تأثير الإدارة المتكاملة للمغذيات (INM) باستخدام سماد الفيرميكمبوست (V) أو خليط من سماد الفيرميكمبوست ٣٣,٣٪ وروث الدجاج ٣٣,٣٪ والبوكاشيEM1 33.3% (VCB) مع الرش الورقي علي النبات مرتين إما بالفيرميتي أو مستخلص الأعشاب البحرية خلال الموسم أثناء مرحلة النمو و دراسة تأثيرذلك على نمو وإنتاج و جودة محصول البصل الأخضر. و أجريت هذه الدراسة بسبع معاملات، استخدم فيها صنف البصل الأخضر المحلي "Crystal"، وزرعت في تصميم القطاعات الكاملة العشوائية (RCBD) بثلاث مكررات. وكانت أفضل القياسات المعنوية لصفات النمو والإنتاج والجودة عند المعاملة (2مرات رش ورقي في الموسم +vermitea(VCB T4 و أقل القيم المعنوية لها عند المعاملة الكنترول T1 (المستخدم فيها الأسمدة غير العضوية). أظهرت استجابات صنف البصل الأخضر للتسميد العضوي بخليط من سماد الفيرميكمبوست ٣٣,٣٪ وروث الدجاج ٣٣,٣٪ والبوكاشي EM1 33.3% (VCB) بمعدل ٦ طن للفدان مع Vermitea كرش ورقي مرتين بالفيرميتي علي النبات اثناء مرحلة النمو و لقد تفوق بشكل كبير لإعطاء أعلى النتائج في النمو والإنتاج والجودة للبصل الاخضر، وبالتالي فإن الأسمدة العضوية و الحيوية و التي تؤدي إلى الزراعة المستدامة وزيادة النمو والمحصول وجودة إنتاج البصل الأخضر.

الكلمات الدالة: الفيرميكمبوست – روث الدجاج – البوكاشي EM1- الفيرميتي – الطحالب البحرية – البصل الاخضر