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Organic Cowpea "*Vigna unguiculatea*" Production by Smart Agritechnique of Organic Fertilizers Mixture "OFM" and Vermitea Levels and Beneficial Microbes "BM"

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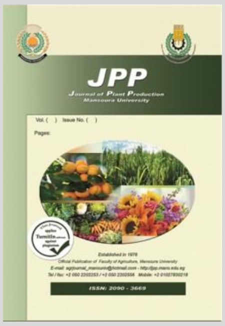
Amal K. Abou El-Goud*

Department of Botany Department "Organic Agriculture", Agricultural Faculty, Damietta University , Egypt,



ABSTRACT

Positive response of cowpea to three levels (4, 6 and 8 t/fed.) of MOF "the mixture of 25% vermicompost+ 25% chicken manure+25% cow dump+25% plant composted" alone and in combination with beneficial microbes B.M. (the mixture of *Azotobacter*, *Bacillus megatherium* and *Bacillus circulance*) and three times of vermitea (VTS3) were adding (3 times on soil drench) were studied. Two field experiments were carried out at a private farm El Amryia, Egypt in two different sites. Experimental field was laid out with 13 treatments in RCBD with three replicates. On results, T13=MOF (8T/fed.)+B.M.+VTS3 gave the highest mean values of plant height (281.5cm), No. of branches (12.7), No. of pods/plant (37.6), total chlorophyll (60.25 SPAD) in leaves, pod weight (141.0 g/plant) and total pod yield (2924.704 kg/fed) as an average of both sites. The lowest means values at T1 "the control" were (81.6 cm, 2.8, 10.6, 16.8 SPAD, 39.3 g/plant and 815.555 kg/fed as an average of both sites, respectively). As well as; T13 lead to significant increases in grain quality of (N, P and K % and proteins %) were (4.7,0.5,0.9 % and 29.8%, respectively) compared to T1 (1.0, 0.11, 0.21and 6.7%, respectively). While T13 was caused significantly increases in mean values by the mixture of bio-organic fertilizers and bio-pesticides provided best results in vegetative growth, total pod yield and grain quality more than T1 in poor nutrients soil. Organic cowpea was produced by bio-organic fertilizers "MOF+B.M." and vermitea "VTS" really "chemicals free", health protection, cost lowest and environmental friendly.

Keywords: MOF, VTS3, B.M., yield, quality, cowpea

INTRODUCTION

Cowpea (*Vigna unguiculatea*, L.) as a summer crop and it is a major grain legume grown in Africa; it is a high nutritive value and major source of protein but a cheap source of quality protein for both rural and urban dwellers in Africa (Fatahi *et al.*, 2014 and Joshi *et al.*, 2016). Cowpea leaves and green pods are consumed as organic wastes, animal feeding and the dried grain is used in food preparations. Cowpea leaves protein ranged from 27 to 43% and protein% of dry grain ranged from 21 to 33%. It is estimated that cowpea able to fix nitrogen up to 200 kg/ha and leave a positive soil N balance of up to 92 kg/ha (Yoganathan *et al.*, 2013; Ragab *et al.*, 2016 and Umadevi *et al.*, 2019). Cowpea (*Vigna unguiculata* L.) has been promising double purpose as plant proteins for humans and animals forage for animals introduced to the Egyptian agriculture (Lyngdoh *et al.*, 2017). Ezeaku *et al.*, 2015 pointed out that, a cup of cooked dry beans/day should lower in the low-density cholesterol, regulate blood sugars and insulin, prevent gastrointestinal troubles, lower blood pressure and regulate the bowels even for hemorrhoids and cancer. Cowpea supplies about 40% of the daily proteins requirement to the most of people in Africa. It improves soil fertility fixing the atmospheric nitrogen "fix 46 to 103 kg N/h" annually. They can reduce the need of N chemical fertilizer reflects on the environmental cleaning, because of biological N fixation for environmentally friendly and is a good idea for sustainable agriculture (Ezeaku *et al.*, 2015; Lyngdoh *et al.*, 2017 and Htwe *et al.*, 2019)

Organic farming for boost agricultural production to important multi features e.g., it is rich in nutrients, vitamins, plant hormones, growth regulators and free from pathogens. Different sources of organic fertilizers provide all nutrients, hormones and vitamins in readily available forms and enhance uptake them by plants and play a major role for developing plant growth and yield and raising the soil quality. Significantly affected on the quality and mineral content of NPK in seeds of pea plants (Htwe *et al.*, 2019) and increased its content of zinc and other minerals under application of farmyard manure compost and biofertilizers. Organic manures stimulate the beneficial microorganisms activities, which makes the plants to get the macro and micro-nutrients by enhancing biological, chemical and physical properties, increasing nutrient solubility, alter soil salinity (Rajiv *et al*,. 2009; Yoganathan *et al.*, 2013; Lyngdoh *et al.*, 2017; Piya *et al.*, 2018 and Htwe *et al.*, 2019). Chicken manure, vermicompost can be a good substitute for chemical fertilizers and remove the pesticides and adverse the chemical pollution in newly sandy soil. Friendly-environment is like the mixture of organic fertilizers with biofertilizers to enhance the aeration, water-holding capacity, microbial activity and drainage. Interaction between red wiggler worm and microbes in chicken manure, cow dump and plant composted to increase the biodegradation of red wiggler intestine for producing the

* **Corresponding author.**
E-mail address: amalgoud08@gmail.com
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bio-organic fertilizer. They contain macro and micro nutrients in plant available, vitamins, plant regulators and hormone for initial healthy plant growth (Yadavi *et al.*, 2014; Ramnarin *et al.*, 2018 and Abou El Goud, 2020). As well as, MOF have large surface areas lead to provide many sites for beneficial microbial activity and for strong retention of nutrients (Ye *et al.*, 2019). Due to their different productions of plant composted, cow and chicken manures and vermicast might exhibit different physicochemical and microbial features, reflected that on the excellent growth and crop yield (Arancon *et al.*, 2003; Arancon *et al.*, 2008; Moraditochaee *et al.*, 2011; Moradi *et al.*, 2014; Mahmud *et al.*, 2018; Abou El Goud and Yousry, 2019 and Soraya *et al.*, 2020). Organic fertilizers have high nutritional values of especially N, P, K, Ca , S, Zn, Fe and Mg, while the contamination with heavy metals and other toxicity are bio-chelating and not apsorbion from roots (Moradi *et al.*, 2014; Agyenim *et al.*, 2015; Amoah *et al.*, 2018 and Gao *et al.*, 2020).

Vermitea extraction from vermicompost (Sundararasu and Jeyasankar, 2014) has positive effects in growth, flowering, fruiting and soil quality. So that, it has the Integrated Plant Nutrition System (IPNS) and plays the important roles for rooting initiation system, nutritional plant, promoting growth regulators and improve plant production (Abou El Goud, 2020 and Soraya *et al.*, 2020). It is as liquid fertilizer for excellent plant feeding, enhances enzymatic activity, plant growth regulators, antibiotics and hormons (Brown, 1995; Musa *et al.*, 2017; Birla *et al.*, 2018 and Soraya *et al.*, 2020). As well as, it contains antibiotics, different kinds of beneficial microbes like "*Azotobacter, Azosperillium, Rhizobium, B.magatherium, B. circulance, B.subtilus, Psedomonaus fluorescence, Trichoderma spp.* "for using as a biological control for soil borne pathogens and different insects (Edwards *et al.*, 2006 and Soraya *et al.*, 2020). Chemical fertilizer causes environmental hazards; surface water pollution by nitrate leaching (Yadavi *et al.*, 2014 and Ye *et al.*, 2019; Gao *et al.*, 2020 and Abou El Goud, 2020). Usage of chemicals "fertilizers and pesticides" should be prevent by the recycling of different organic wastes by composting or vermicomposting processes (Ramnarin *et al.*, 2018 and Gao *et al.*, 2020).

Beneficial microbes are commonly used as inoculants for improving the growth and yield to replace chemical fertilizers, pesticides and supplements biological nitrogen fixing bacteria like "*Azotobacter*" to fix 180 & 10 6 metric tons/ year; *Bacillus megatherium* and *B. circulans* able to phosphate and potassium solubilizing, respectively; to stimulate plant growth, nutrition increasing the uptake of N,P K and Fe ; which they are rapidly colonize the rhizosphere, suppress soil borne pathogens at the root surface to control plant pests, produce metabolites e.g. antibiotics, phytohormones, volatile compounds, have efficient systems for uptake and catabolism of organic compounds in root exudate (Abou El Goud, 2006; Ban *et al.*, 2011; Singh *et al.*, 2012 and Soraya *et al.*, 2020;). They able to act with soil beneficial microbes caused enhancable of microbial communities within rhizosphere, decrease the rates of chemical fertilizers (Abou El Goud, 2006) and increase the grain yield of *Trigonella foenum* and *Nigella sativa.* Therefore, this trial is to use many different varieties sources of organic fertilizers (the mixture of 25% vermicompost + 25% plant composted + 25% cow dump + 25% chicken manure), benefits microbes (*Azotobacter+ B.magatherium + B. circulance*) and vermitea on total cowpea pods yield and grain quality in sandy soil.

MATERIALS AND METHODS

Two field trials were conducted in the summer season at 5th April, 2019 at a private farm El Amryia, El King-Mariout, Egypt, in a newly soil, to investigate efficiency response of mixed organic fertilizers MOF (25%vermicompost + 25% plant composted + 25% cow dump + 25% chicken manure) at three levels (4,6 and 8t/fed.), benefits microbes "BM" (*Azotobacter+ B.magatherium + B. circulance*) and vermitea "VTS3" was added three times as a soil drench on total pods yield and grain quality in sandy soil. The field experiment was conducted in a randomized complete block design (RCBD) with three replications, it consists of 13 treatments: T1= control (recommended doses of ammonium nitrate 33.5% = 250 kg/fed. + super phosphate 15.5%=150 kg/fed. + potassium sulphate 48% = 75 kg/fed.), T2= MOF (4 t/fed.), T3 = MOF (4 t/fed.) + VTS3, T4 = MOF (4 t/fed.) + B.M., T5 = MOF (4 t/fed.) + B.M. +VTS3, T6= MOF (6 t/fed.), T7= MOF (6 t/fed.) + VTS3, T8= MOF (6 t/fed.) + B.M., T9= MOF (6 t/fed.) + B.M. +VTS3, T10= MOF (8 t/fed.), T11= MOF (8 t/fed.) + VTS3, T12= MOF (8 t/fed.) + B.M., T13=MOF (8T/fed.) +B.M. + VTS3. Soil sample (0-30cm) was taken before sowing to determine the physical and chemical properties , details: soil texture was sandy (90.74%), silt (4.31%) and clay (4.95%), (pH= 8.0, O.M. %= 1.86%, O.C. %= 1.08%, available of N= 19.53 mg/kg, P= 14.5 mg/kg and K= 475 mg/kg and E.C. (1:1 water extract) = 1.51 ds/m and $CaCO_3$ %= 4.2%) according to Evenhuis,1976; Chapman and Pratt, 1978; Page *et al.*, 1982 and Klute 1986. Mixed organic fertilizer**s** "MOF" contain of the mixture of (25%vermicompost + 25% plant composted + 25% cow dump + 25% chicken manure, w: w) as equal weight quantity by composting and vermicomposting processes of them for 25 days and two months, respectively. Then sample was taken from them (MOF) before adding to the soil to estimate (organic carbon%= 17.3%, total organic matter% = 30.3% , C/N ratio= 3.4:1, pH (1:10)= 7.6, E.C.(1:10, water extract) = 4.3 dS/m, total amount of macro elements; N= 3.24% ,P= 2.42% and K= 6.4%) according to Jackson, 1973; Everhuis, 1976; Chapman and Pratt, 1978; Page *et al.*, 1982 and Klute 1986. It was added at 7th. March, 2019. Beneficial microbes "B.M." were the mixture of *Azotobacter + B.magatherium + B. circulance* from Cairo MERCEN, Fac. of Agriculture, Ain Shams Univ., at Shoubra El- Khima. They were added at the rate of (7ml/ hill) from each species with sowing. Vermitea was produced by mixed of vermicompost (250g), yeast, salicylic acid (5 g), humic acid (100g), rabbit urine (200 ml), coffee (100 g) and molasses soaked in 2 liters of tap water for 72 hr. and then it sieved through net and diluted by concentration (1:10) to produce vermitea (VT) according to (Sundararasu and Jeyasankar, 2014 and Chaulagain *et al.*, 2017). It was applied as a soil drench (200 ml/ plant) three times per 10 days were beginning after 30 days from sowing. Total plot area was (3.4 m length and 0.8 m width = 2.7 m^2) as an experimental unit and total number of plant was 14 plant and the distance between two hills was 17 cm. Cutting harvest of cowpea pods after 85 days from sowing at 1st. July, 2019 as the end growing season. From each plot randomized, two plants were taken to determine plant height (cm), No. of branches/plant, No. of pods/plant, pod weight g/plant, total pod yield kg/fed were recorded. At a green/vegetative stage, total chlorophyll in leaves (SPAD) according to Roods and Blood-Worth, 1964, which is a light weight hand held to measure the chlorophyll content of leaves without causing damage to plant by at a green stage, total chlorophyll in leaves (SPAD); Signal Passed At Danger. Samples of cowpea grains were washed by distilled water and oven dried at 75°C for fixing dry weights (72h.) to measure grain contents of N, P and K after dryness samples. Dried samples of grain was finely ground, then wet digested by using concentrate of H_2SO_4 /H_2O_2 according to Lowther, 1980 to determine the percentage of potassium (flam photometer) according to Jackson, 1973; phosphorus (vanaomoly-bdophosphoric method).Total nitrogen was estimated by Nessler's method (Chapman and Pratt, 1978) in grains. Proteins % were calculated by the equipment =N% & 6.25 in grains. Statistical analyzed for all data by using the SAS program (SAS, 2001) and means of 13 treatments were compared by using Duncan's Multiple Range test at 5% level of probability in this investigation.

RESULTS AND DISCUSSION

Vegetation, pod yield and its components

Sandy soil texture is 90.74% sand, poor in macronutrients (N= 19.53 mg/kg, P= 14.5 mg/kg and K= 475 mg/kg), organic carbon (1.08%) and organic matter (1.86%), which they below ranged for a good plant nutritional requirement, yield and fruit quality (Landon, 1991). Mean values of plant height, No. of branches / plant, No. of pods / plant, Total chlorophyll in leaves (SPAD) were (281.5, 12.7, 37.7 and 60.25 SPAD, as an average for two different sites, respectively) at T 13 in table (1). T13 was MOF (8T/fed.) + VTS3. +B.M., which were indicated that, the highly significant increases in vegetation parameters in Table (1), more than T1 by the increasing percentage were (244.9, 370.4, 258.1 and 258.6 %, respectively). Results in Table (2) detected that, T13 lead to the highest significant increases in pod weight (g/plant), total pod weight (g/plot) and total pod weight (kg/fed) were (140.9, 1973.3 and 2923.407 as an average for both sites, respectively) compared to T1 as controlled once. All tested treatments from T13 to T1 lead to significant differences in vegetation parameters and total yield in Table (1 and 2), but T13 cause the highly significant increases of them compared to T1 the control once. The highly significant of treatments at T13 for both different sites, 2019 in grain components is an clear evident about (8 t/fed of mixture of organic fertilizers +B.M. + VTS3) able to enhance the nutritional powerful statues, which reflected on total pod yield and grain component cleared that in Table (1,2 and 3). Means comparison in Table 3 shown that, its components in N%, protein%, P% and K % in grains at T13 were (4.8, 29.8, 0.5 and 0.9 % in grains, as an average for both sites, respectively) compared to T1. The lowest values were (N% =1.1, protein%=6.7, P %= 0.11 and K%= 0.12 %, as an average for both sites) at the controlled once (T1) in Table (3). In general we can say that the treatments of different levels (4, 6 and 8 t/fed) of the mixture of organic fertilizers + VTS3 (three times of vermitea as a soil drench) as a biological controlled with bio-fertilizers "B.M. = the mixture of *Azotobacter* + *B. megatherium* + *B. circulans*" have the best modify in poor nutrients soil; because of B.M. which they lead to fix the atmospheric N, dissolving P and K and adding equipment of them. That reflected on plant strength growth, health yield and pods quality among all treatments from T13 to T 2 where gave an average high significant differences in growth parameters, yield and its components compared to control treatment T1 (R100% of NPK chemical fertilizers) in the both sites, 2019. Organic fertilizers lead to soil fertility and productivity was maintained by the soil organic carbon and matter. Humus acts directly as a source for nutrional plant and indirectly effects on the physico- chemical properties compared to heavy applications of chemical "fertilizers and pesticides" were cause depletion of certain nutrients and pollution in soil, plant, animal, fish and air. Mixture of different organic fertilizers i.e. vermicompost, chicken, cow manures and plant composted are slow releasing of macro and micro nutrients, huge amounts of vitamins, hormones, plant regulators, enzymes "protease, amylase, unease and phosphatase", antibiotics and organic acids, which they caused dissolving the minerals, humus chelating them and transporting into the root cells for a powerful nutritional plant, safety crop production (Fatahi *et al.,* 2014; Amoah *et al.,* 2018; Al Ali *et al.,* 2019 and Abou El Goud, 2020). Physicochemical and microbial properties of soil, by bio-fertilizers ""B.M. = the mixture of *Azotobacter* + *B. megatherium* + *B. circulans*" for enhancing the microbial activity, increasing the availability of N, P and K uptakes for positively reflection on health growth, yield and quality characters (Joshi *et al.,* 2016; Lyngdoh *et al.,* 2017; Amoah *et al.,* 2018 and Abou El Goud and Yousry, 2019). Improving cowpea growth by adding 100% of the mixture of organic fertilizers + B.M. combined were attributed to the positive effects of microbial communities in rhizosphere zone; which they contains huge amounts of humic acids, hormones, folvice acid, amino acids, macro and micro nutrients, vitamins, plant regulators and antibiotics. They able to increase the growth, yield and its quality, this finding were agreement with (Rajiv *et al.,* 2009; Ezeaku *et al.,* 2015; Dalorima *et al.,* 2018; Umadevi *et al.,* 2019 and Abou El Goud, 2020). Organic fertilization lead to enhance the cations exchange, water holding capacity, soil pH, and total amounts of C, O.M., N, P and K ultimately resulted in the accumulation of plant biomass. As well as, B.M. were caused not only dissolving P and K, fix the atmospheric N, but also stimulate the growth regulators and hormones "auxins, cytokinins and gibberellins" production to enhance the beneficial microbes "microbial communities" to inhibit the soil borne pathogens (Birla *et al.,* 2018; Bellitürk, 2018; Al Ali *et al.,* 2019 and Soraya *et al.,* 2020) and increase plant defense, healthy growth and quality food. These are agreement with (Ragab *et al.,* 2016; Lyngdoh *et al.,* 2017; Piya *et al.,* 2018; Htwe *et al.,* 2019 and Umadevi *et al.,* 2019). Positive effects of different sources of organic fertilizers combination with B.M. and vermitea as a soil drench on cowpea grown in poor nutrients soil in this study. They had significant differences between all treatments from T13 to T1, because of (MOF+ B.M.) as bio-organic fertilizers for plant establishment was a well-improved root rhizosphere to tap nutrients by B.M. and beneficial microbes of MOF, this argument in this investigated. Vermitea contains antibiotics, vitamins and minerals to be the best organic fertility and biological control to increase yield and its quality of cowpea plant. The same trend by (Abou El Goud, 2010; Kyei- Boahen *et al.,* 2017; Birla *et al.,* 2018; Dalorima *et al.,* 2018 and Abou El Goud, 2020) were found that, organic fertilizers improve growth and yield of plant, it has promising nutrients value more than traditional manures or chemicals. Due to increase the mineralization rate by microbial action, biological agents and humidity cation degree. This was influenced as a perfect result of vermicompost produces "biodegradation of Red wiggler intestine" to increase the activity of beneficial microbes lead to positive effects of the mixture of chicken, cow manures and plant composted on potential plant growth and subsequently yield and products enhancement (Agyenim *et al.,* 2015; Kyei- Boahen *et al.,* 2017; Mainga *et al.,* 2018 and Gao *et al.,* 2020). Organic fertilizers activated many species of living organisms to release phytohormones and stimulate the growth and nutritional status. They detected that, safety food; production by bio-organic fertilization and bio-pesticides; which they contain more vitamins, antioxidants and less unhealthy fatty acids like organic wheat, potatoes, cabbage, tomatoes, onions, lettuce, cucumber, squash, eggplant, watermelon and molokhia (Abou El Goud, 2006 and 2010; Audi *et al.* 2013, Aniekwe and Nwokwu, 2015; Zhao *et al.,* 2018 and Abou El Goud, 2020). The productivity study of MOF (8t/fed) + B.M.+ VTS3; which is contains nitrogen fixing bacteria "*Azotobacter; Rhizobium* and *Azospirrillum*"; potassium solubilizing bacteria "*B. circulans"* and phosphate solubilizing bacteria "*B. megatherium*". They are combination with "B.M." beneficial microbes, which lead to fix huge amounts of the atmospheric nitrogen and dissolve phosphorus and potassium in rhizosphere for enhancable nutritional plant (Abou El Goud *et al,* 2010; Yoganathan *et al.,* 2013; Fatahi *et al.,* 2014; Joshi *et al.,* 2016; Abd El Lateef *et al.,* 2018; Umadevi *et al.,* 2019 and Soraya *et al.,* 2020).

Table 1. Effect of MOF, VTS3 and B.M. on vegetative and yield parameters of cowpea "*Vigna unguiculatea*" at two different sites, 2019

T.	Plant height cm		No. of branches / plant		No. of pods / plant		Total chlorophyll in leaves (SPAD)	
	Site1	Site 2	Site1	Site 2	Site1	Site 2	Site1	Site 2
T1	81.6 i	81.7 m	2.67 k	3.0 j	10.5 m	10.73 L	16.9 m	16.77 m
T2	89.43 hi	89.57 L	3.67 j	3.33 ji	11.2 L	11.5 L	18.4 L	18.3 L
T3	100.37 ghi	100.0 k	4.33 ji	4.33 hi	13.0 k	13.07 k	21.03 k	20.53 k
T4	110.5 ghi	110.23 j	5.0 hi	4.67 gh	14.13 j	14.57 j	23.23 j	23.37 j
T5	122.47 gh	123.3 i	5.67 gh	5.77 fg	16.13 i	16.07 i	25.30 i	25.4 i
T6	135.4 gf	136.6 h	6.33 gf	6.0 f	17.67 h	17.9 h	28.57 h	28.43 h
T7	106.27 ghi	151.7 g	7.0 ef	6.67 ef	19.63 g	19.4 g	31.63 g	31.47 g
T8	167.27 f	166.47 f	7.65 e	7.67 de	22.2 f	22.03 f	35.13 f	35.27 f
T9	186.53 e	185.37 e	8.67 d	8.33 d	24.5 e	14.27 e	39.13 e	39.07 e
T10	207.43 d	208.03 d	9.33 d	9.68 c	27.6 d	27.5 d	43.20 d	43.33 d
T11	230.47 c	230.2 c	10.33 c	10.67 bc	30.27 c	30.30 c	48.23 c	48.33 c
T12	258.0 b	258.58 b	11.67 b	11.33 b	33.23 b	33.27 b	54.0 b	53.9 b
T13	281.47 a	281.57 a	12.67 a	12.67 a	37.6 a	37.7 a	60.27 a	60.23 a

T1= control (recommended doses of ammonium nitrate 33.5% = 250 kg/fed. + super phosphate 15.5%=150 kg/fed. + potassium sulphate 48% = 75 kg/fed.), T2= MOF (4 t/fed.), T3 = MOF (4 t/fed.) + VTS3, T4 = MOF (4 t/fed.) + B.M., T5 = MOF (4 t/fed.) + B.M. +VTS3, T6= MOF (6 t/fed.), T7= MOF (6 t/fed.) + VTS3, T8= MOF (6 t/fed.) + B.M., T9= MOF (6 t/fed.) + B.M. +VTS3, T10= MOF (8 t/fed.), T11= MOF (8 t/fed.) + VTS3, T12= MOF (8 t/fed.) + B.M., T13=MOF (8T/fed.) +B.M. + VTS3.

Table 2. Effect of MOF, VTS3 and B.M. on total pod yield of cowpea "*Vigna unguiculatea*" at two different sites, 2019

Treat.	Pod weight (g / plant)		Total pod weight (g/ plot)		Total pod weight (kg/ fed)	
	Site1	Site 2	Site1	Site 2	Site1	Site 2
T1	39.03 m	39.53 m	546.47 m	553.47 m	810.370 m	820.740 m
T2	44.43 L	44.67 L	622.07 L	625.33 L	921.481 L	925.926 L
T3	49.0 k	49.43 k	686.0 k	692.07 k	1016.296 k	1025.185 k
T4	54.57 j	54.63 j	763.93 j	764.87 j	1131.852 j	1133.333 j
T5	60.4 i	59.80 i	845.6 i	837.2 i	1253.333 i	1240.000 i
T6	66.73 h	67.33 h	934.27 h	942.67 h	1383.704 h	1397.037 h
T7	75.27 g	75..03 g	1053.73 g	1050.47 g	1561.482 g	1556.296 g
T8	83.47 f	83.70 f	1168.53 f	1172.27 f	1732.852 f	1736.296 f
T9	92.67 e	92.80 e	1297.33 e	1299.2 e	1921.482 e	1924.444 e
T10	102.67 d	102.87 d	1437.33 d	1440.13 d	2129.889 d	2133.333 d
T11	114.87 c	114.4 c	1608.13 c	1601.6 c	2382.222 c	2373.333 c
T12	127.57 b	127.03 b	1785.93 b	1778.47 b	2646.926 b	2636.556 b
T13	141.07 a	140.83 a	1974.93 a	1971.67 a	2926.926 a	2922.482 a

T1= control (recommended doses of ammonium nitrate 33.5% = 250 kg/fed. + super phosphate 15.5%=150 kg/fed. + potassium sulphate 48% = 75 kg/fed.), T2= MOF (4 t/fed.), T3 = MOF (4 t/fed.) + VTS3, T4 = MOF (4 t/fed.) + B.M., T5 = MOF (4 t/fed.) + B.M. +VTS3, T6= MOF (6 t/fed.), T7= MOF (6 t/fed.) + VTS3, T8= MOF (6 t/fed.) + B.M., T9= MOF (6 t/fed.) + B.M. +VTS3, T10= MOF (8 t/fed.), T11= MOF (8 t/fed.) + VTS3, T12= MOF (8 t/fed.) + B.M., T13=MOF (8T/fed.) +B.M. + VTS3.

Table 3. Effect of MOF, VTS3 and B.M. on grain components of cowpea "*Vigna unguiculatea*" at two different sites, 2019

T.	N % in grains		Protein % in grains		P % in grains		K % in grains	
	Site1	Site 2	Site1	Site 2	Site1	Site 2	Site1	Site 2
T1	1.17 L	0.97 m	7.29 L	6.04 m	0.11 m	0.12 m	0.21m	0.20m
T2	1.43 k	1.33 L	8.96 k	8.34 L	0.14 L	0.15 L	0.27 L	0.28 L
T3	1.73j	1.70 k	10.84 j	10.82 k	0.16 k	0.17 k	0.30 k	0.30 k
T4	1.86 j	1.87 j	11.69 j	11.67 j	0.19 j	0.20 j	0.34 j	0.33 j
T5	2.07 i	2.13 i	12.92 i	13.34 i	0.22 i	0.23 i	0.37 i	0.37 i
T6	2.31 h	2.33 h	14.63 h	14.59 h	0.23 h	0.24 h	0.42 h	0.42 h
T7	2.57 g	2.55 g	16.04 g	16.00 g	0.26 g	0.27 g	0.46 g	0.46 g
T8	2.82 f	2.79 f	17.53 f	17.29 f	0.29 f	0.28 f	0.52 f	0.50 f
T9	3.07 e	3.13 e	19.17 e	19.59 e	0.33 e	0.34 e	0.57 e	0.56 e
T10	3.47 d	3.53 d	21.67 d	22.09 d	0.36 d	0.37 d	0.64 d	0.62 d
T11	3.9 c	3.8 c	24.38 c	24.59 c	0.40 c	0.41 c	0.71 c	0.70 c
T12	4.3 b	4.4 b	27.33 b	27.29 b	0.45 b	0.44 b	0.79 b	0.79 b
T13	4.77 a	4.81 a	29.79 a	29.75 a	0.49 a	0.48 a	0.89 a	0.88 a

T1= control (recommended doses of ammonium nitrate 33.5% = 250 kg/fed. + super phosphate 15.5%=150 kg/fed. + potassium sulphate 48% = 75 kg/fed.), T2= MOF (4 t/fed.), T3 = MOF (4 t/fed.) + VTS3, T4 = MOF (4 t/fed.) + B.M., T5 = MOF (4 t/fed.) + B.M. +VTS3, T6= MOF (6 t/fed.), T7= MOF (6 t/fed.) + VTS3, T8= MOF (6 t/fed.) + B.M., T9= MOF (6 t/fed.) + B.M. +VTS3, T10= MOF (8 t/fed.), T11= MOF (8 t/fed.) + VTS3, T12= MOF (8 t/fed.) + B.M., T13=MOF (8T/fed.) +B.M. + VTS3.

CONCLOUSION

Organic production of crops by "Smart-Agritequnice", usage the high levels of the mixture of organic fertilizers as different sources, which they supplied all nutrients, vitamins, hormone, plant regulators, antibiotics, enzymes, humus, organic carbon and organic matter to soil stimulant. Vermitea as a biological control with the mixture of beneficial microbes B.M. "*Azotobacter + B. megatherium + B. circulans*" to increase the plant defines, health growth, safety production, improve the soil quality and fertility. Mixture of bio-organic fertilizers (MOF + B.M.) and bio-pesticides (VT) provide the best answer for ecological Smart Agriculture, which are farmers can use the mixture of different sources of organic fertilizers "MOF" at 8t/fed, biofertilizer (B.M.) and vermitea "VTS3" for replacing the chemicals (fertilizers and pesticides), reducing the total cost, protection the environment from chemical pollution and human's health.

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الإنتاج العضوي للوبيا بواسطة تكنيك الزراعة الذكية بإستخدام مستويات من مخلوط الأسمدة العضوية و شاي الفيرمي و الميكروبات النافعة

امال كرم أبو الجود

قسم النبات الزراعى – تخصص الزراعة العضوية - كلية الزراعه – جامعه دمياط

تم دراسة إستجابة النمو الخضري و إنتاج و مكونات حبوب اللوبيا ل 3 مستويات (4,6,8 طن / الفدان) من مخلوط الأسمدة العضويةMOF (25% فيرميكمبوست+25% سبلة كتكوت + 25% سباخ ماشية + 25% كمبوست نباتي) بمفردة أو مختلط بمجموعة الميكروبات النافعة.B.M مع 3 مرات إضافة لشاي الفيرمي VTS3 كريا للتربة. حيث تم إجراء تجربتين حقليتين بموقعين مختلفين بمزرعة بالعامرية بالكينج مريوط في 5 إبريل لعام 2019. و كل تجربة بها 13 معاملة و كل معاملة تكرر 3 مرات و تم التحليل الإحصائي بنظام القطاعات المتكاملة عشوائيا و المعاملات هي كالاتي: T1= control (R100% NPK), T2= MOF (4 t/fed.), T3 = MOF (4 t/fed.) + VTS3, T4 = MOF (4 t/fed.) + B.M., T5 = MOF (4 t/fed.) + B.M. +VTS3, T6= MOF (6 t/fed.), T7= MOF (6 t/fed.) + VTS3, T8= MOF (6 t/fed.) + B.M., T9= MOF (6 t/fed.) + B.M. +VTS3, T10= MOF (8 t/fed.), T11= MOF (8 t/fed.) + VTS3, T12= MOF (8 t/fed.) + B.M., T13=MOF (8T/fed.) +B.M. + VTS3. و النتائج أوضحت أن T13 أعطت أعلي قيم كمتوسطات في طول النبات (281.5 سم) , و عدد الافرع بالنبات (12.7) و عدد القرون(37.6) بالنبات و المحتوي الكلي للكلوروفيل بالورقة (60.25) و وزن القرون (141جم/ النبات) و المحصول الكلي للقرون (2924.74 كجم / الفدان) كمتوسط للموقعين. كما أن أقل قيم للمتوسطات عند T1 حيث أن طول النبات (81.6 سم) و عدد الفروع بالنبات (2.8) و عدد القرون بالنبات (10.6) و المحتوي الكلي لصبغة الكلوروفيل (16.8) و وزن القرون (39.3 جم/ النبات) و إجمالي المحصول للقرون (815.555 كجم / الفدان) كمتوسط للموقعين. بالإضافة أن المعاملة رقم 13 رأدت إلي الزيادة المعنوية في جودة حبوب اللوبيا و رفع محتواها من النيتروجين (4.7%) و الفوسفور (0.5%) و البوتاسيوم (0.9 %) و البروتين (29.8 %) كمتوسط للموقعين مقارنة ب الكنترول T1حيث أن نسبة النيتروجين (1%) و الفوسفور (0.11%) و البوتاسيوم (0.21 %) و البروتين (6.7%) كمتوسط للموقعين. كما أن المعاملة (T13=MOF (8T/fed.) +B.M. + VTS3) أدت إلي الزيادة المعنوية في قيم المتوسطات بواسة مخلوط الأسمدة العضوية و الحيوية مع المبيدات الحيوية لإعطاء أفضل النتائج بالنمو الخضري و إنتاج و جودة حبوب اللوبيا مقارنة بالكنترول T1 في الأراضي الفقيرة بالعناصر الغذائية. إنتاج اللوبيا العضوية بواسطة الأسمدة العضوية و الحيوية (مخلوط الاسمدة العضوية MOF بمعدل 8 طن/الفدان +مخلوط الميكروبات النافعة.B.M) في وجود شاي الفيرميكمبوستVTS3 بمعدل 3 ريات خلال الموسم لإمداد النبات بالعناصر الغذائية و الهرمونات و الفيتامينات و الميكروبات النافعة بدون أي كيماويات لحماية الصحة و إنتاج مناسب للمحصول اللوبيا بأقل التكاليف مع مصادقة البيئة .