EFFECTS OF POULTRY MANURE ON THE GROTH AND YIELD OF BASIL PLANT *(Ocimun gratissimum)* IN A TROPICAL UTILSOL soil

ABSTRACT

Ocimum gratissimum commonly called Basil plant or scent leaf is one of the less known, neglected vegetable with high economic value as food, medicinal and industrial uses . Studies were **therefore** conducted to determine the effects of poultry manure on the growth and yield of *Ocimum gratissimum* in the Teaching and research Farm, Department of Agronomy, Faculty of Agriculture , Cross River University of Technology, Obubra , Cross River State, Nigeria. The experiment has nine (9) rates of poultry manure: 0 , 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 6.5 t/ha laid out in a randomized complete block design with three replications. The application of poultry manure at 3- 4t/ha was more beneficial than higher rates. Results showed that poultry manure significantly($p>0.05$) increased number of leaves, branches per plant and plant height. The highest Leaf index value plant height, leaves and branches per plant was obtained at 16weeks after planting with 6.5t/ha .Poultry manure. While 4t/ha poultry manure gave the highest growth rate , Leaf fresh yield , dry matter of leaf, stem and seed yield per plant and per hectare. Farmers are advise to apply 3-4t/ha of poultry manure to cultivate Ocimum gratissimum for optimum growth and seed yield under the utilsol conditions .

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Key words : *Ocimum gratissimum,* poultry manure, growth & yield.

1. INTRODUCTION

Scent leaf (*Ocimum gratissimum*) belong to the family *Lamiaceae* is of the less known Nigerian vegetables cultivated for its medicinal and domestic uses (Osuagwu and Edeoga 2010, Altetor and Adeogu, 2012). The leaves, flowers (inflorescences), stems and roots have high economic value.

The leaves and young immature stems are used as spices in preparing soup, stew and other local dishes because of its aromatic taste (Osuuagwu,G.G.E and Edeoga,.(2010).). The leaves and flowers (inflorescences) are used to season meat (Altetor, and Adeogu, O.A.(2012) . Osuagwu and Edeoga 2010, 2005 reported that extra extract from the leaves are used to cure diarrhea, tooth ache, fever, menstrual and abdominal pains in women. The plant extract has ethanoic, anti-

septic and anti-diabetic properties and other medicinal compounds used as food preservative agent and control of black pod diseases of cocoa (Nwanjo et al;2008).

The soil fertility is one of the vital factors that affect the growth and yield of crops in the tropics. Many researchers have reported that the soil of the tropics are often predispose to high temperature, rainfall and erosion that cause lost of soil nutrients and increase in acidity(Rembialkowska, (2003).

Awodun (2007) noted that the application of poultry manure play significant roles in enhancing yield of crops in the southern part of Nigeria. Dauda, *et al* (2008) reported that poultry manure increased the leaf area total chlorophyll content and grain yield of maize and watermelon. The application of poultry manure mineralizes faster than other animal manure such as cattle or pig dung; hence it releases its nutrients for plant uptake and utilization rapidly (Nweke, and Obasi, 2013).

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Earlier researchers in organic matter (Essoka *et al*, 2014, Benjamin *et al*; 2017)) reported that poultry manure contains basic nutrients required for enhancing growth and yield of crops. The further stated that application of poultry manure increases carbon content, water holding capacity, aggregation of soil, and decreases bulk density . Amhakhian and Isaac (2016). reported that poultry droppings applied at the rate of 10 t/ha and 20 t/ha, increased plant height, number of leaves and fruit yield of Pepper.

Despite the economic importance of *Ocimum gratissinum* plant, farmers who wish to cultivate the crop are faced with same major constraint which hinder its cultivation in commercial quantities (sale). These constraints include dearth of information in ignorance of plant spacing and appropriate rate of fertilizer application that will affect the productivity of this important crop. The few farmers who cultivate the crop in the background garden still grow the crop without proper knowledge of it nutrients requirements, fertilizer application and harvest it unconventionally, this affect its survival as well as the yield of *Ocimum gratissimum*. On the other hand , There is paucity of literature on the effects of poultry manure on the growth and yield of *Ocimum gratissimum* in Nigeria. Few workers have tried **to assess**to assess the importance of organic manures in crop production. Fawole *et al*, 2010) have reported beneficial effects of organic manure on soil properties such as bulk density (; soil moisture

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content (Adeleye *et al*, 2010); water–holding capacity and other soil physical properties with increase in crop growth and yield.

According to Ojeniyi (2000), published works on the organic manure use in Nigeria is rather scanty. Currently in Cross River South-South Nigeria , there are no recommended standards with respect to rate of poultry manure require for enhancement of the growth and yield of *Ocimum gratissimum* in commercial quantities in the study area.

This investigation is needed to provide agronomic information suited, to build conservation capacity, domestication,, improve cultural practices, of *Ocimum gratisimum.*,..

The objective of this study therefore, was to determine the most appropriate rate of poultry manure require for optimum growth and yield of *Ocimum gratissimum* in ultisol soils of Obubra, Cross River State, South – South Nigeria.

II. Materials and Methods

Description of experimental site –

Field experiments were carried out at the Research and Teaching Farms of Department of agronomy, Faculty of Agriculture, Obubra, Cross River University of Technology, Cross River University of Technology, Cross River State , South-South, Nigeria. Obubra is Obubra is located at latitude 05° 59'N and longitude 08° 15" E (Cross River Agricultural Development Project (CRADP),
1992). The experiment was conducted during the 2017/2018 cropping seasons in a typical humid environment that is characterized by a bimodal rainfall pattern with peaks in July and September and an interrupted dry spell in August . The site used for this study is a tropical rainforest vegetation origin but has been reduced to derived savannah because of continuous use of land for farming . The land was under two years fallow period as at when it cultivated for this experiment.

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Land preparation

The land measuring 30 x 10 m^2 with area (m^2) was prepared manually by clearing , ploughed harrowed and marked out into three blocks . Each block was divided into nine

plots of 6 x 4m (24 m^2) separated by 0.5m from the adjourning plot , while each block was separated by one meter .

Soil samples were collected with steel auger to a depth of 0 to 20 cm from forty representative locations before planting on10th April, 2017 and 2018). These soil samples collected before planting were bulked together from where a composite was obtained for laboratory analysis in order to assess the initial phyisco-chemical properties of the site, using standard laboratory methods.

Experimental Design

The experimental design was a randomized complete block design .Treatments were nine rates of poultry manure: 0 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, and 6.0 tones per hectare. These rate were used for the study because previous research in this location have used higher poultry manure rates of 10, 20, 30, 40 ,50 and above (Ade, 2015, Essoka *et al;* 2014). But poor resource farmers complained that it was very difficult and expensive to get such quantizes of poultry manure

Application Of Poultry Manure

Well cured poultry manure was collected was collected from poultry pens in Obubra, Cross Cros River State, South- South, Nigeria. The poultry manure was stored in sack bags well tie for one month before application. The chemical analysis of the poultry manure used for the experiment was also evaluated using appropriate methods as described in the IITA manuals.The required rate (quantity) for each plot was applied according to the schedule rate of the nine treatments (1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, and 6.0) tones per hectare as described in the experimental design.

Planting

Ocimum gratissimum was propagated by seeds . Mature seeds were collected from an old peasant farmer who grow it as a compound crop for specie and medicinal purposes since there is yet no source for improved seed materials. The seeds were first sown in the nursery for four weeks to raised seedlings before transplanting to the field experimental plots. Nursery was prepared in march 3rd ,2017 and 2018, among the activities carried out for the production: manually clearing, ploughed, harrow , watering , broadcasting the seeds , mulching and partial

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provision of shade was done close to the site of the experimental field. Transplanting of *Ocimum gratissimu*m seedlings was done on 10th April, 2017 and 2018 when seedlings were 4 weeks old. They were uprooted with ball of earth to reduce loss of moisture and death from transplanting shock during and after transplanting of the seedlings.

Cultural practices

Weeding was done manually by hand weeding hoe five times in each year (2017 and 2018) to keep the plots as weed free as possible.

Data collection

Data were collected on plant height (cm) was determined by measuring the height of the plant from the soil level to the topmost apex leaf using a measuring tape. The number of branches and leaves per plant was determined by taking a visual count of the green leaves.

Leaf area index

Leaf area index was determined form leaf area. Leaf area was measured by random collection of 10 ten plants from the middle row and used to measure the leaf area using the leaf area meter (Model-MK-2). The measured leaf area was used to determine the leaf area index based on the relationship as stated by Shortal and Liebbardt (2000).

$LAI = Y \times N \times A_1 \times (Ap)^{-1}$

Where: LAI =leaf area index, Y=population of plants per plot,

N=Average number of leaves per plant, A_1 =Average area per leaf,

and Ap=Area of plot.

Plant dry matter

Destructive sampling of two plants per plot was done and the plants were taken to the laboratory for dry matter determination. The destructively sample plants were separated into fractions: (leaves, stem and roots) put in a paper envelops and oven dried at 80 ^{0}C to a constant weight for three days for the dried matter determination of leaves, stem and roots per plant using a electronic . weighing balance in both 2017 and 2018 seasons, respectively.

Crop growth rate analysis

Crop growth rate was evaluated at three stages 6- 10 Weeks After Planting (WAP), 10 -16 WAP, 16 – 20 WAP in 2017 and 2018 cropping seasons. This was done through destructive sampling of one plant per plot using the growth analysis techniques described by Shortal and Liebbardt

(2000): Crop Growth Rate (CGR) = W2 - W1 / SA (t2 - t1) g/m2/day

Where

W1 and W2 = dry weight of nodule at beginning and end of the interval of growth period. t1 and t2 = sampling time 1 and 2, SA = the area occupied by the plant at sampling.

Harvesting

Harvesting was done on 10WAP, 14WAP and 20WAP in 2017 and 2018 by cutting the fresh shoot leaves and soft stems towards the apex manually using a sharp knife. Yield data were collected at harvest. Each plant was harvested separately the flowers influence that contain the seeds were carefully separated and seeds were collected .After each harvest, both the leaves and seeds yield per plant and hectare were recorded using electronic weighing balance in 2017 and 2018.

Statistical analysis

Data collected were statistically analyzed using the analysis of variance (ANOVA) procedure for randomized complete block design experiments as out lined by Gomez and Gomez (1984). Fishers least significance difference (F-LSD) at 5% probability as out line by level as described by Obi (2002).

RESULTS AND DISCUSSION

The data on the initial physico-chemical properties of the soils used for the study is presented in (Table 1). The physical and chemical properties shows that the soil texture was sandy loam, low in fertility, as indicated by the low content of organic matter (1.38 % in 2017, 1.43% in 2018) , total nitrogen, (0.09% 1n 2017, 0.07% in 2018). Soil p H was acidic with mean values of (5.09 in 2017, 5.07 in 2018) in water and in KCl (4.73 and 4.65) in 2017 and 2018) . The available **phosphorus** P and water soluble potassium were seemingly low .

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The results indicate that it is obvious that the fertility of the soils used for these experiments were inherently low. Based on the nutrients rating for soil fertility classes in Nigeria (Obigbesan, 2000) and this implies that cultivating the soil without the use of soil amendments will not give high economic yield that will justify return of the input resources.

Therefore there is need to supplement with poultry manure. These result of the low fertility status of the soil in the experimental sites obtained in present study agreed with the results reported by earlier researchers in this location (Essoka ,2014,Okoli and Nweke 2015). They observed that most ultisols of humid tropics are strongly weathered ,highly acidic due to high rain fall with the associated erosion and leaching in the area. The recommended the addition of soil amendment with organic manure such as poultry manure to increase the soil fertility for high crop yield.

The application of poultry manure significantly increased the number of leaves and branches per plant (Table 3). At all periods of measurement (6, 10 and 16WAP) the number of leaves and branches increased consistently with increases in the poultry manure rates . The highest number of leaves (46.33, 47.23) and branches (8.22, 8.34) were obtained in poultry manure rate of 6.5t/ha at 16 weeks after planting in 2017 and 2018 cropping seasons respectively. The least number of leaves and branches produced per plant were recorded from control plots where poultry manure was not applied. The poor development of vegetative growth parameter (leaves, LAI, branches and plant height) observed in treatment without poultry manure (control) further confirmed the report of Benjamin, et al; (2017). Akanbi 2002, that nutrient, availability especially nitrogen determine plant vegetative growth such as leaves, branches and plant height

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The responses of leaf area index (LAI) to poultry manure closely follow the same trend as the number of leaves per plant which increases with increment in pPoultry manure rate. At 16WAP, the poultry manure rate of 6.5 t/ha consistently produced the highest leaf area values (LAI) of 2.5234 in 2017 and 2.6359 in 2018. This findings corroborate the result obtained by Okoli and Nweke (2015) who reported significant increased in the vegetative growth

parameters such as higher leaves, branches and leaf area index in response to higher rate of poultry manure of 20 to 30t/ha.

Result showed that taller plant **height** were observed in poultry manure treated plots as compared to the untreated plots (Table 3). Throughout the period of observation either at 6, 10 or 16 WAP the tallest *Ocimum gratissimum* plants were obtained in plots that had 6.5t/ha poultry manure in the two cropping seasons. The results of the present study for this plant height character is in agreement with the findings of Altetor and Adeogu (2012) they reported that the application of poultry manure resulted in increased in the growth of plant height. This might be due to the application of poultry manure which increased the availability of soil nutrients for the absorption and utilization by the *Ocimum gratissimum* plants resulted in higher parameters as compared to those that were not applied with poultry manure. The application of poultry manure to *Ocimum gratissimum* plants that resulted in the significant increment in the all the growth parameters recorded in the present study.

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Results indicates significant higher leaf and stem dry matter weight per plant in plots applied with poultry manure than the plots not applied with poultry manure (Table 4). Throughout the period of data collection (6,10 or 16WAP) leaf and stem dry weight per plant increased significantly with successive increases in poultry manure rate . The observed increment in leaf and stem dry weight in response to poultry manure application was up to 4 t/ha of poultry manure rate beyond this rate , both the leaf and stem dry weight began to decrease as poultry manure rate increase. The highest leaf dry weight (10.36g per plant in 2017 and – 10.43g/ plant in 2018) and vine dry weight of (61.38g/ plant in 2017 and 66.23g/plant in2018) was produced by plots that received 4t/ha.

Similarly, plant growth rate measured as dry matter accumulation in leaf and vine in grams per meter square per day showed that poultry manure treated plants had more dry matter accumulation in their leaves and vines as compared to those not treated with poultry manure. The was faster dry matter accumulation rate in plants that received 2.0 – 3.5t/ha than the lower rates or where poultry manure was not applied at all. Plant that were treated with 4.0t/ha of poultry manure was always show evidence of the highest leaf (2.1354g/m^2/day in 2017, 2.2435 in 2018) and stem (6.3251g/m^2/day in 2017 and 6.5543 in 2018) growth rate at 16 WAP in the two planting seasons.

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The significant increased in the vegetative growth parameters (such as: leaf and stem dried weight) per plant and their growth rate (dry matter accumulation rate in $g/m^2/day$) in response to poultry manure application observed in the present study agreed with the work of Amhakhian and Blessing (2016) who obtained significant increases in dry weight of okra due to poultry manure application. This improvement could probably be due to the contribution of essential plant nutrients elements contained in the applied poultry manure that are associated with increased photosynthetic efficiency and dry matter production (Ogbonna and Ubi, 2005).

The effects of poultry manure on the *Ocimum gratissimum* fresh leaf and seed yield per plant and hectare is shown in Table 5. In the present study reported here, it was observed that fresh and dry leaf yield and seed **yield** were better in poultry manure plots than where it was not applied. The poultry manure rate of 4.0 t/ha seemed most satisfactory in obtaining the highest **t** *Ocimun gratisimum* seed fresh weight yield of (0.852 t/ha in 2017) and (0.872 t/ha in 2018) and seed yield of (0.0096 t/ha in 2017) and (0.0098t/ha in 2018) in both cropping seasons. Beyond this rate (4 t/ha poultry manure), increases in poultry manure application had no additional advantage on boosting *Ocimum gratissimum* fresh and dry leaf and seed yield under Obubra utisol growing conditions. This probably indicate on set of luxury consumption of N**nitrogen** and the production of vegetative growth at the expense of higher seed yield that occurred beyond the poultry manure rate of 4t/ha as observed in this study. The increased in higher *Ocimum gratissimum* seed yield in poultry manure amendment plots than those not amended with poultry manure could be attributed to the increased in soil **nitrogen**N, K, P and Mg**potassium and phosphorus and magnesium** for the plant use. These nutrients have been implicated in the synthesis of chlorophyll, photosynthesis efficiency and enhancement of foliage growth in plants (Ramlingam, 2003). The increased in yield parameters obtained in this present study could be attributed to improved physical and biological properties of the soil resulting in better supply of nutrients to plants. This corroborate findings of Ainika and Amans (2011) that application of organic application of organic materials could ameliorate slightly **acidic** tropical soil to improve crop production.

CONCLUSION

Based on the result obtained from this study, the use of poultry manure in the cultivation of *Ocimum gratissimum* is desirable . The application of poultry manure at 3- 4t/ha was more beneficial than higher rates. Poultry manure rate of 4t/ha gave the highest fresh , and dry leaf and seed yield per plant and hectare. Farmers are advise to apply 3-4t/ha of poultry manure to cultivate *Ocimum gratissimum* for optimum growth and seed yield. It is also easier, more

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economical to use lower than higher rates of poultry manure that are readily available, cheap and ease to handle by the poor resource base farmers to cultivate the crop under the utilsol condition of Obubra , Cross River state, South-South agro ecological zone of Nigeria.

REFERENCE

Abou-El-Magd, M., El-Bassiony, A.M. and Fawzy, Z.F (2006). Effect of organic manure with or without chemical fertilizers on growth yield and quality of some varieties of broccoli plants. Applied Science vol 2, 791-798

Agba, O. A.**,** Adinya, I. B., Agbogo, E. A., Oniah., M. A., Tiku, N., Abam, Prince and Lifu, M. (2009). Responses of Egusi Melon (*Colocynthis citrollus* L) to poultry manure in Obubra , Cross River South-South Nigeria. *Wilolud Online Journals, Continental Journal of Agronomy.* 3 :13-18.

Amhakhian Sunday O. and Isaac Iye Blessing (2016). Effects of Organic Manure on the Growth Parameters and Yield of Okra in Anyigba, Kogi State, North Central, Nigeria. Journal of Agricultural Science and Engineering. Vol. 2, No. 4, 2016, pp. 24-30. http://www.aiscience.org/journal/jase

Altetor, V.A. and Adeogu, O.A.(2012).Nutients and anti nutrients components of some tropical leafy vegetables .Food Chem. 54:375- 379.

Adeoye, E. O. (2009).Proximate analysis of some under utilized Ghana vegetables. Ghana Journal of Science .39;91-92

Ainika, J. N. and Amans, E. B. (2011). Growth and yield responses of vegetable Amaranthus to NPK fertilizer and farm yard manure. Proceedings of 29th Annual National Conference of Horticultural Society of Nigeria Vol. 5 Pp 375.
[10]

Awodun, M.A., 2007. Effect of poultry manure on the growth, yield and nutrient content of fluted pumpkin (*Telfaria occidentalis* Hook F). Asian J. Agric. Res., 1: 67-73.

Ayeni, L.S., T.O. Omole, E.O. Adeleye and S.O. Ojeniyi, 2010. Integrated application of poultry manure and NPK fertilizer on performance of tomato in derived Savannah transition zone of Southwest Nigeria. Sci. Nat., 8: 50-54.

Akanbi, W. B. (2002). Growth, nutrient uptake and yield of maize and okra as influenced by Compost and nitrogen fertilizer under different cropping systems. Ph. D Thesis, University of Ibadan. Pp. 1-7.

Akande, M. O., Oluwatoyinbo, F. I., Adediran, J. A., Buari, K. W. and Yusuf, I. O. (2003). Soil amendments affect the release of P from rock phosphate and the development and yield of okra. Journal of Veg. crop Production, 9 (2):3-9.

Benjamin Osae Agyei, Hypolite Bayor (2017). Effect of Poultry Manure and Nitrogen, Phosphorus,and Potassium (15:15:15) Soil Amendment on Growth and Yield of Carrot *(Daucus carota).* World Academy of Science, Engineering and Technology International Journal of Agricultural and Biosystems Engineering . Vol:11, No:2,

Cross River State Agricultural Development(CRADP) (1992).Report on wet lands of Cross River State ,Nigeria. 115pp.

Dauda, S. N., Ajayi, F. A., and Ndor, E. (2008). Growth and yield of water melon (*Citrulluslanatus)* as affected by poultry manure application. Journal Agric. Soc. Sci., 4, 121-124.

Eghareyba, R.K.A. and Ogbe, F.M. (2002). The effects of different levels of organic and mineral fertilizers on the yield performance of two amarathus (Amarathu cruentus) cultivars. Plant Scientist vol.3:62-72

Essoka, A.N., Essienetok, E.U., Essoka,P.A., and **Agba, O.A.,** (2014). Characterization and rate of rice husk application for crop production . *ISOR Journal of Agriculture and Veterinary Sciences.* Vol. 7. Issue 5. pp 44-47.

Gomez, K. A. and Gomez, A. A. (1984). Statistical Procedures for Agricultural Research. Second edition. John Wiley and Sons Inc. New York, USA.

Mnkeni, A.P. (2005). The underutilized plant with high nutritional quality and economic potentials Agricultural and Rural Development Research Institute, Newsletter, University of Fort Hare, July to December 2005

Nwanjo, H.U.,Okafor,M.C., Oze, G.O. (2008).Anti-lipid peroidative activity of Gogronema latifolium Ocimum gratissimum in Sttptozotocin-induced diabetic rats. Nig.J.Physiol. Sci. 21(1-2);61-62

Nweke, I.A. and Obasi, M.N. (2013). Effect of different levels of pig manure on the growth and yield of Okra Proceedings of the 47th Annual Conference of the Agricultural Society of Nigeria, Ibadan, 2013, pp 23-26

Obi, I. U. (2002). Statistical methods for detecting differences be-tween treatments means for field and laboratory experiments. Sec-ond Edition published in Nigerian by A. P. Express published Lim-ited 3 Obollo Road, Nsukka, Nigeria 117pp.

Ogbonna, P.E.and Ubi, I. U.(2005).Effects of time of planting and poultry manure application on the growth and yield of maize (Zea mays L.) in a derived savannah. Agro-Science Journal of Tropical Agriculture, Food, Environment and Extension (2); 133-338.

Okoli, P.S.O And Nweke I. A(2015). Effect of Different Rates of Poultry Manure On Growth and Yield of Amarathus (Amaranthus Cruentus)**.** *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) e-I. Volume 8, Issue 2 Ver. II, PP 73-76 www.iosrjournals.org*

Obi, I. U. (2002). Statistical methods for detecting differences be-tween treatments means for field and laboratory experiments. Sec-ond Edition published in Nigerian by A. P. Express published Lim-ited 3 Obollo Road, Nsukka, Nigeria 117pp.
Somen Acharya and Hitesh Kumar (2018)

Osuuagwu,G.G.E and Edeoga, H.O.(2010). Effects of fertilizer treatment on the antimicrobial activity of the leaves of *Ocimum gratissimum* L. and *Gongronema latifolium* Benth Aft. J. Biotechnolol. 9 (52); 8918-8922.

Rembialkowska, E. (2003). Organic farming as a system to provide better vegetable quality Acta Hortic. 604, 473-479.
Shortal, J.G, and Liebbardt, W.C. (2000). Techniques for Evaluation of crop growth .J.Environment Qual. 4. (2).186-191.

Somen Acharya and Hitesh Kumar (2018). Effect of Some Organic Manure on Growth and Yield of Garlic in Greenhouse Condition at Cold Desert High Altitude Ladakh Region . Defence Life Science Journal, Vol. 3, No. 2, pp. 100-104, DOI : 10.14429/dlsj.3.12569 2018, DESIDOC

Table 1: Initial phyisco-chemical properties of the soils used for the Experiments

.**Parameters Measured**	**Values obtained**	
	2017	**2018**

Mechanical Properties		
Particle size fractions (%)		
Coarse sand (%)	18.3	17.7
Fine Sand (%)	77	74
Silt (%)	15.6	13.9
Clay (%)	7.5	7.1
Textural class	Sandy loam	Sandy loam
Chemical properties		
pH in water	5.09	5.07
pH in KCl	4.73	4.65
Organic carbon (%)	0.77	0.81
Organic matter (%)	1.38	1..43
Total Nitrogen (%)	0.09	0.07
Available phosphorus (cmol/kg)	4.54	4.39
Base Saturation (%)	1.532	1.591
Exchangeable cation (cmol /kg)		
Potassium	0.48	0.51
Magnesium	1.38	1.46
Calcium	3.51	4.14
Sodium	0.18	0.19
Aluminium	0.15	0.14
Hydrogen	0.53	0.51
Cation exchange capacity (cmol/kg)	83.51	84.3

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Table 2. Nutrients content of poultry manure used for the experiment

Nutrient	**Values obtained (%)**	
	2017	2018
Organic matter	36.74	38.38
Organic carbon	61.36	63.24
Phosphorus	1.52	1.46
Calcium	4.54	4.18
Nitrogen	1.46	1.46
Magnesium	1.98	1 . 88

Source: Laboratory results values from analysis of poultry manure used for the experiments in 2017 and 2018.

Table 3. Effects of poultry manure on the plant height (cm), number of leaves, branches per plant and leaf area index on *Ocimum gratissuimium* in 2017 and 2018 cropping season .

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Treatments	Number of leaves per plant						Leaf Area Index(LAI)						Number of Branches per plant						Plant Height(main vine length (cm)					
Poultry manure Rate(t/ha)	2017			2018			2017			2018			2017			2018			2017			2018		
	6 WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP
0	7-.12	15.23	22.31	6.32	13.14	20.22	0.0132	0.0324	0.5042	0.0126	0.0353	0.5512	0.12	2.21	3.23	0.22	2.14	3.21	14.46	23.36	32.52	13.63	21.75	33.75
1.0	9.21	19.23	27.23	11.11	20.23	26.31	0.0327	0.0632	0.8453	0.03156	0.0641	0.7986	1.13	3.11	4.13	1.22	3.12	4.21	18.35	29.27	41.43	20.13	26.78	43.32
1.5	13.23	22.14	31.21	14.11	23.12	32.13	0.0421	0.0975	1.0132	0.04312	0.0869	1.0212	1.21	3.24	5.21	1.31	3.23	4.31	23.41	31.34	48.56	25.22	33.42	46.94
2.0	17.13	25.14	35.22	16.21	26.24	36.31	0.0497	0.1215	1.2798	0.04799	0.1178	1.2854	1.34	3.41	5.23	1.23	3.43	5.13	29.45	40.13	55.37	28.45	39.67	53.84
2.5	21.22	28.14	38.31	20.13	29.14	39.24	0.0536	0.3254	1.5769	0.05474	0.3376	1.61253	1.24	4.12	5.32	1.32	4.21	5.23	33.42	44.32	63.45	31.26	42.43	61.36
3.0	24.2	32.23	40.21	25.32	31.22	41.14	0.05832	0.4345	1.7045	0.0579	0.4425	1.6104	2.11	4.33	6.24	1.52	4.4	6.35	38.42	49.27	67.41	36.15	47.35	68.51
3.5	27.14	35.22	42.24	26.11	33.12	43.21	0.0675	0.7565	1.9462	0.06543	0.7812	1.8975	2.13	4.41	6.21	2.13	4.35	6.41	44.23	53.74	73.26	42.24	51.48	68.25
4.0	29.33	37.22	44.15	30.10	36.32	43.15	0.07234	0.9785	2.1045	0.0765	0.9674	2.2087	2.22	4.32	7.13	2.32	4.42	7.23	47.21	57.29	78.41	48.69	58.38	74.32
6.5	30.2-2	39.14	46.33	32.21	39.22	47.23	0.0842	1.0345	2.5234	0.08678	1.0424	2.6359	2.31	4.41	8.22	2.24	4.45	8.34	50.12	64.56	81.43	51.35	60.58	83.28
LSD(0.05)	1.22	2.10	1.13	2.12	1.5	1.7	00.01	0.02	0.04	0.001	0.02	0.02	NS	0.10	0.51	NS	0.10	0.51	2.11	3.10	3.2	2.2	2.3	4.1

Table 4.Effects of poultry manure on dry matter weight of leaves, stem per plant (g) and their growth rate (g/m^2/day) on *Ocimum gratissiumium* in 2017 and 2018 cropping season .

Treatments	Leaf dry wt.(g) per plant						Stem dry wt.(g) per plant						Leaf growth rate (g/m^2/day)						Stem growth rate (g/m^2/day)					
Poultry manure Rate(t/ha)	2017			2018			2017			2018			2017			2018			2017			2018		
	6WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP	6 WAP	10 WAP	16 WAP	6-10WAP	10-16WAP	16-20WAP	6-10 WAP	10-16WAP	16-20WAP	6-14WAP	10-16WAP	16-20 WAP	6-10WAP	10-16WAP	16-20WAP
0	0.3482	1.2231	4.32	0.41	1.27	4.13	1.47	5.35	11.24	1.62	6.10	13.25	0.0114	0.2175	0.5332	0.0112	0.2157	0.4496	0.3231	1.3432	2.1357	0.3416	1.5221	2.0645
1.0	0.6785	2.13.	6.38	0.55	2.15	5.89	3.25	8.47	22.34	3.34	8.39	20.79	0.1324	0.4357	0.9683	0.1245	0.4735	0.9487	0.7146	1.5174	3.2637	0.8221	1.6115	3.1986
1.5	0.8632	2.75	6.86	0.8413	2.882	6.76	3.89	9.64	26.35	3.92	10.25	27.26	0.1431	0.5693	1.1234	0.1487	0.6111	1.1169	0.9112	1.8425	3.6124	0.9345	1.9321	3.8963
2.0	0.94	3.24	7.52	0.972	3.27	7.32	4.32	12.36	32.15	4.18	13.17	34.35	0.16342	0.7124	1.3268	0.1673	0.7321	1.3321	1.2483	2.1574'	4.1325	1.3134	2.2342	4.2528
2.5	1.2452	3.68	8.27	1.264	3.78	8.41	5.48	17.51	39.43	5.67	18 .5	40.35	0.1752	0.7946	1.4564	0.1789	0.8123	1.5112	1.5426	2.3835	4.6411	1.6253	2.5311	5.1112
3.0	1.4632	4.15	9.34	1.5127	4.21	9.15	6.35	21,31	46.29	6.47	23.23	48.24	0.2342	0.8232	1.7056	0.2243	0.9478	1.6893	1.7483	2.6475	5.3333	1.8114	2.7894	5.8966
3.5	1.6321	4.69	9.88	1.7034	4.56	9.25	6.84	25.31	53.57	6.78	27.26	56.74	0.2478	0.8934	1.957	0.2478	0.9384	1.8795	1.9231	3.0682	5.7832	1.9735	3.124	6.3465
4.0	1.7342	5.13	10.36	1.82	5.21	10.43	7.34	32.18	61.38	7.48	34.35	66.23	0.2546	0.9518	2.1354	0.2612	0.9853	2.2435	2.8534	3.6956	6.3251	2.0351	3.7412	6.5543
6.5	1.8534	4.43	8.36	1.837	3.99	8.27	5.22	13.32	36.27	4.88	11.46	33.57	0.1212	0.3124	0.4321	0.1257	0.4231	0.5124	1.7636	2.2352	2.41236	1.824	2.1345	2.2563
LSD(0.05)	0.01	0.32	1.1	0.01	0.31	1.01	0.43	1.52	2.13n	0.32	1.20	2.2	0.01	0.02	0.03	0.001	0.02	0.03	0.04	0.11	0.41	0.12	0.12	0.42

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Table 5. Effects of poultry manure on fresh leave , dry leaves and seed yield of *Ocimum gratissiumium* in 2017 and 2018 cropping season

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Treatment	Leaf fresh wt. per plant(g)						Leaf Dry wt. per plant(g)					Leaf fresh wt. per hectare (t/ha/)							Leaf Dry wt. per hectare (t/ha/)						Seed wt. per plant(g)		Seed wt. Per Ha(t/ha)	Seed wt. per Ha (kg/ha)
Poultry manure Rate (t/ha)	2017			2018			2017			2018		2017				2018			2017			2018			2017	2018	2017	2018
	10 wAP	14 WAP	20 WAP	10 WAP	14 WAP	20 WAP	10 WAP	14 WAP	20 WAP	10 WAP	14 WAP	20 WAP	10 WAP	14 WAP	20 WAP	10 WAP	14 WAP	20 WAP	10 WAP	14 WAP	20 WAP	10 WAP	14W AP	20W AP				
0	7.37	13.2	22..14	8.21	14.64	20.15	1.34	3.32	7.25	1.25	2.47	9.34	0.0121	0..0213	0.032	0.001	0.023	0.034	0.0001	0.0001	0.00043	0.0001	0.00001	0.0001	1.23	1.06	0.0012	0.0013
1.0	13.46	18.14	32.37	14.32	19.44	30.98	2.47	4.46	16.38	2.37	3.88	15.58	0.023	0.073	0.234	0.022	0.065	0.312	0.00023	0.00042	0.00063	0.0024	0.046	0.064	3.35	2.67	0.0043	0.0042
1.5	17.75	23.53	39.45	19.23	21.34	37.47	3.18	4.85	18.27	3.24	4.26	19.31	0.035	0.096	0.329	0.034	0.043	0.432	0.00044	0.00051	0.00082	0.0045	0.00075	0.00085	3.86	3.84	0.0054	0.0053
2.0	20.12	29.38	43.21	22.35	31.17	45.68	3.75	5.14	22.38	3.89	4.87	23.64	0.0532	0..104	0.403	0.048	0.121	0.513	0.00053	0.00063	0.00094	0.0054	0.00092	0.00096	4.27	4.13	0.0061	0.0062
2.5	26.82	35.95	58.43	28.27	37.25	52.19	4.10	5.89	25.12	4.32	5.54	27.17	0.073	0.134	0.512	0.069	0.142	0.621	0.00068	0.00076	0013	0.0067	0.0014	0.0016	4.86	4.54	0.0068	0.0067
3.0	31.53	42.34	61.62	34.31	40.47	59.32	4.85	7.22	29.44	4.65	6.48	30.22	0.08	0.153	0.573	0.078	0.162	0.587	0.0007	0.00099	0.0015	0.0007	0.00098	0.0017	5.18	5.34	0.0072	0.0073
3.5	38.27	49.25	70.35	39.43	47.33	68.58	5.07	7.95	32.27	5.31	7.53	34.58	0.097	0.182	0.634	0.085	0.176	0.685	0.00076	0.0012	0.0017	0.00084	0.0018	0.0019	5.79	6.11	0.0081	0.0083
4.0	44.57	53.12	74.28	41.36	52.94	72.56	6.32	9.65	40.32	6.23	8.78	39.99	0.121	0.231	0.852	0.133	0.312	0.872	0.00017	0.0024	0.00029	0.00018	0.0025	0.0014	6.52	7.03	0.0096	0.0098
6.5	20.12	32.47	43.34	18.48	28.57	39.26	2.58	4.78	14.31	2.19	3.75	23.15	0.0324	0.064	0.131	0.0012	0..021	0.234	0.00031	0.00032	0.00043	0.00045	0.00034	0.00047	2.11	2.31	0.0031	0.0032
LSD (0.05)	1.12	1.51	2.1	1.02	1.11	2.21	0.31	0.52	0.21	0.3	0.25	0.41	0.001	0.002	0.01	0.001	0.01	0.02	0.001	0.0001	0.0002	0.0001	.00002	0.0002	0.13	0.13	0.0001	0.000