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Soil properties and chilli pepper (C*apsicum annum L.)* performance as influenced by organo-mineral fertilizer rates in Obio Akpa, Nigeria

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Abstract
Field experiment was conducted within the Teaching and Research Farm of the Faculty of Agriculture, Akwa Ibom State University, Obio Akpa Campus in Oruk Anam Local Government Area in two locations. The objective was to determine the effects of rates of organo-mineral fertilizer (OMF) on soil properties and on the performance of chilli pepper (Capsicum annum L.). Four rates (0, 2, 4 and 6 t/ha) of OMF was laid out on a randomized complete block design with four replicates. The soil used for the experiment was loamy sand with a pH of 5.3. Results obtained showed that the application of OMF at all rates significantly improved the soil properties (total nitrogen, organic carbon, available phosphorus, exchangeable Ca, Mg, ECEC, base saturation) relative to control. Chilli pepper responded positively to the application of OMF at all rates but superior increases in fruit number, fruit length, fruit width, fruit weight and fruit yield were obtained from plants treated with 4 t/ha of OMF. The highest fruit yield (1.92 t/ha) was obtained from the 4t/ha of OMF closely followed by the 6 t/ha (1.82 t/ha), then the 2 t/ha treated soil (1.35 t/ha) while the least value was obtained from the control (0.31 t/ha).Relative yield increase of treated soils over the control was 335.5%, 519.4% and 487.1% *for 2, 4 and 6 t/ha rates of OMF, respectively. Based on the findings from this study, addition of OMFespecially at4t/ha is appropriate for sustainable production of chilli pepper in Obio Akpa.*

Keywords: Organo-mineral fertilizer, pepper, soil properties, *ultisol*, yield

Introduction
Sustainable crop production needs sustained support of both organic and inorganic fertilizer inputs. The use of both organic and inorganic sources of nutrients for crop production will go a long way in not only increasing yield of crops but will provide a better habitat for soil microbes and thereby improving the soil health. Inorganic source of fertilizers do not add organic matter to the soil, they supply mostly only the primary nutrient elements; nitrogen, phosphorus and potassium without the secondary and micronutrients which invariably leads to soil nutrient imbalance and

soil acidification (Iren *et al.*, 2014). On the other hand, organic source of fertilizers not only add organic matter to the soil but also contain all the essential nutrients needed by crops. The slow pattern of nutrient release enables the nutrient to be available throughout the crop growing period.

However, the common disadvantages of organic sources of fertilizers are their bulkiness, unavailability of the manure in large enough quantity needed and the low nutrient content of most of the manure.

The blending of organic manure with mineral fertilizer may help to increase the productivity of crops on fragile soil by reducing the problem of nutrient losses via leaching.

Organo-mineral fertilizers (OMF) are made up of natural components enriched and complemented with chemical elements for fast action (John *et al.*, 2013; Iren *et al.*, 2016a & 2017a) which promotes high nutrient analysis of the material thereby reducing the quantity required. The organic substances act as added enrichment for the humus content of the soil. Combined application of organic manure and inorganic fertilizers often goes with such additional advantages as buffering the soil against undesirable acidification and increasing the availability of nutrients (Iren *et al.*, 2014, 2016b, & 2017a).

Pepper (*Capsicum spp.*) is an important fruit vegetable which belongs to the family *Solanaceae* and in the genus *Capsicum*. It is commonly divided into two groups, pungent and non-pungent, which is also called hot and sweet pepper. Pepper is used in seasoning sauces, soup and other dishes. As a medicinal plant, pepper is used in the prevention and treatment of cold and fever (Udoh and Ndon, 2016). The non-pungent forms are eaten raw as salads while the stronger flavoured types (chillies) are popular in all kinds of cookery in Nigeria giving its characteristic taste as a pungent spice. The nutrient and other phytochemical composition of peppers vary with color and/or maturity stages (Deepa *et al.*, 2007).

Nigeria is known to be one of the major producers of pepper in the world accounting for about 50% of the African production (Idowu-Agida *et al.*, 2010). Although pepper is widely cultivated in Nigeria, the yields obtained are often very low due to low fertility of the soil (Adigun, 2001; Iren *et al.*, 2016b).Good quality yield of pepper mostly depends on nutrient availability in soil which is related to the judicious application of fertilizer. Judicious application of fertilizer has also been found to encourage early maturity, uniformity in ripening, increase fruit size and yield of pepper (Iren *et al.*, 2017b).

Therefore, this study was conducted to evaluate the changes in soil properties as well as the response of pepper to different rates of organo-mineral fertilizers with the aim of establishing the optimum rate for pepper production in an acidic *ultisol* of Akwa Ibom State.

Materials and methods

The study area

The experiment was conducted within the Teaching and Research Farm of AkwaIbom State University, ObioAkpa Campus in OrukAnam Local Government Area of AkwaIbom State. The area is situated between latitude 4^0 30' N and 5^0 30'N and $7^0$30E and $8^0$00E (SLUS-AK, 1989). The area is in the humid tropical region, characterized by two seasons; rainy (March – October) and dry (November – early March) seasons with a short dry period in August otherwise called August break. The Monsoon air mass blowing over the Atlantic Ocean sweeps through this zone resulting in heavy rainfall of 2000-2500mm in the wet season. The annual temperature range is about 24^0C-30^0C and the annual relative humidity range of 75-79% (SLUS-AK, 1989). The soil of this area is a TypicTropohumult, fine-loamy, kaoliniticisohyperthermic formed from the coastal plain sands parent materials and is classified as an *ultisol* based on the United States Department of Agriculture (USDA) system of classification (Soil Survey Staff, 1999). The vegetation of the area was originally tropical rainforest but is now predominantly secondary forest. The topography is undulating with gentle hills and slopes.

Research materials

Pepper (*Capsicum annum L.)* seeds were obtained from the Akwa Ibom State Agricultural Development Project (AKADEP) office. Organo-mineral fertilizer (OMF) was obtained from John Ker Company, located at Ikot-Ekpene Local Government Area of Akwa Ibom State.

A nursery bed measuring 3 m x 1 m was made under a partial shade. Six kilograms of poultry manure(equivalent to 20 t/ha) was evenly distributed on the bed using broadcasting with incorporation method and allowed for one week (Iren *et al.*, 2011) before planting pepper seeds. At 6 weeks after planting, the seedlings were matured for transplanting.

Land preparation, experimental design and treatments

The experimental site was manually cleared, tilled and flat beds measuring 2.4m x 1.2m ($2.88m^2$) made. An alley of 1m was left between blocks and 0.60m between plots. The experiment was laid out in a Randomized Complete Block design (RCBD) with four replicates; each replicate had four rates (0, 2, 4, and 6t/ha) of OMF with the 0 t/ha serving as the control.

Field studies

Prior to land preparation, one composite soil sample was collected from 0 to 15 cm depth using soil auger for physico-chemical properties analysis. The various rates of OMF were applied to specified plots one week before planting using broadcasting with incorporation method (Iren *et al.*, 2011).Young seedlings of pepper (six weeks old seedlings) were transplanted from the nursery and were sown at a planting distance of 40 cm x 40 cm giving a plant population of 18 plants/2.88 m^2 plot size and 62,500 plants/ha. The seedlings were watered before uprooting from the nursery for easy pulling.

Four plants from the centre row (0.4 m x 1.6 m) were selected, tagged and used in growth measurements. Growth parameters measured were plant height, stem girth, number of leaves per plant and number of branches per plant. These parameters were assessed 2 weeks after transplanting (WAT) and subsequently at 2 weekly intervals in both plantings. Yield components (number of fruits per plant, fruit length, fresh fruit yield) were taken at each harvest and calculated from the first harvest until the end of the experiment (8 WAT) in the two planting periods. At the end of the experiment, composite soil samples at 0 - 15 cm depths were taken per plot for chemical analysis. The soil samples were air-dried and sieved with 2 mm sieve to remove materials greater than 2 mm in diameter before analysis.

Laboratory studies

The OMF and soil samples collected were analyzed in the laboratory using standard procedures as described by Udo *et al.* (2009): Particle size distribution was determined by the Bouyoucous hydrometer method. Soil pH was determined using a ratio of 1:2.5 in soil-water medium and read with adigital pH meter. Organic carbon content was determined by Walkley-Black dichromate oxidation method. Organic matter was obtained by multiplying total carbon by a factor of 1.724.

Total nitrogen (N) was determined by the microkjeldahl method. Available phosphorus (P) was extracted by the Bray 1 extraction method, and the content of P was determined colorimetrically using a TechnicoAAII autoanalyser (Technico, Oakland, Calif). Determination of exchangeable bases was by neutral ammonium acetate extraction and read with an atomic absorption spectrophotometer (AAS). Exchangeable acidity was determined by the 1 N potassium chloride (KCl) extraction method and titrated with 1*M* sodium hydroxide

(NAOH)using phenolphthalein as an indicator. The effective cation exchange capacity (ECEC) was the summation of total exchangeable bases and exchangeable acidity. Base saturation was calculated by dividing the sum of exchangeable bases by ECEC and multiplied by 100.

Statistical Analysis

Soil and plant data collected were subjected to analysis of variance (ANOVA) and means compared using Fisher's Least Significant Difference (FLSD) at 5% probability level (Wahua, 1999).

Results and discussion

Physicochemical properties of the experimental soil used

The soil used for the experiment was loamy sand in texture with a pH of 5.3. The OMF used contained 2.8% N, 1.2% P and 2.2% K. The detailed chemical properties of the soil used for experiment and the chemical composition of the organo-mineral fertilizer are shown in Tables1 and 2, respectively.

Effects of OMF rates on soil physicochemical properties

The effects of different rates of OMF on soil physicochemical properties are shown in Table 3. The results showed that the application of different rates of OMF had no significant effect on the soil texture. The sand content ranged from 89.00 to 91.53%, silt from 2.93 to 5.20% and clay from 5.13 to 7.00% giving a loamy sand texture. Sand dominated the particle size distribution of the soil, and this may be attributed to the parent material in which the soil was formed.

The soil pH and electrical conductivity of the treated soils were not significantly affected by the different rates of OMF (Table 3). However, the highest pH value of 5.87 was obtained from soil treated with 4t/ha followed by soil treated with 6t/ha (5.27) while the least value was obtained from the control plot (5.10). The reverse was the case for electrical conductivity in which the highest value was obtained in the control soil (0.20 d/Sm). The result obtained from this study contradicts the findings of Iren *et al.*(2017a) who reported significant increase in soil pH as the rates of OMF increased.

The low electrical conductivity (EC) of the soil is an indication of the fact that the fertilizer was non-saline and therefore would not contribute to soil salinity. Electrical conductivity is used as a means of appraising soil salinity as a result of high concentration of salt (basic cations) in the soil. Esu (2010) reported that EC level above 2d/Sm indicate soil salinity.

Soil organic carbon and total nitrogen were significantly ($p \leq 0.05$) increased in all the treated plots when compared with the control (Table 3). The highest soil organic carbon content value of 1.79% was obtained from soil treated with 6t/ha OMF but was not significantly higher than the values obtained from other rates of application. Generally, the organic carbon content increased as the rates of application of OMF increased. A similar trend was observed for soil total nitrogen content. This result is similar to those of Nasef *et al.* (2004) and Iren *et al.* (2017a & b) who reported significant increases in soil organic carbon and total nitrogen as a result of the amendments applied.

Application of OMF at all rates significantly ($p \leq 0.05$) increased the soil available phosphorous content relative to the control plots with the highest obtained in soil treated with 4t/ha (Table 3). Significant increase was observed between 4t/ha and the other rates but no significant ($p > 0.05$)differences in available phosphorus contents between soils treated with 2and 6t/ha rates of application. Exchangeable K, Na and exchangeable acidity levels were not increased significantly but exchangeable Ca, Mg, ECEC and base saturation status of all the treated soils were increased relative to control with the 4 t/ha treated soil recording highest values.

Effects of different rates of organo-mineral fertilizer on growth parameters of pepper

Table 4 shows significant increases in plant height and number of branches of chilli pepper at different growth stages as affected by the different rates of OMF applied. At 2, 4, 6 and 8 weeks after transplanting (WAT), there were significant increases inplant height and number of branches by all the rates of application relative to the control. The plants treated with 4 t/ha of OMF produced the tallest plants and highest number of branches across all the growth stages. Production of taller plants and high number of branches in treated soil compared to the control could be attributed to the higher mineralization potential of the amendment enabling it to actively and quickly release its nutrients for plant uptake and use (Iren *et al.*, 2017b).

Positive increase in plant height and number of branches of pepper have also been reported by Shehata *et al.* (2004) and Iren *et al.* (2017b) as a result of using organic manure. Awodun (2007) also reported that organic manure applied to the soil significantly increased number of branches of vegetables.

Rates of application of OMF did not affect pepper stem girth and numbers of leaves significantly ($P > 0.05$) at the initial stage of growth (2 WAT) but significant increases were recorded at 4, 6and 8 WAT. The widest stem girth (3.63cm)was obtained from plants treated with 4 t/ha of OMF at 8WAT, though not significantly different from plants treated with other rates of OMF (Table 5). A similar result was observed by Shehata *et al.* (2004) and Iren *et al.* (2017b) whereby stem girth of pepper was increased by adding organic manure to the soil. Number of leaves per pepper plant was significantly increased by all the treatments across all growth stages relative to control (Table 5), with the highest value (450.33)obtained from plants treated with 4 t/ha of OMF at 8 WAP. This result agrees with that of Ewulo *et al.* (2007) who reported growth increase with cow dung treatment at 2.5t/ha.

Effects of different rates of organo-mineral fertilizer on yield components and yield of chilli pepper

The effects of different rates of organo-mineral fertilizer on the mean yield components and yield of chilli pepper are shown in Table 6. Fruit number of chilli pepper was significantly (P>0.05) increased by the application of OMF rates but the highest value of 24.08 was obtained by plants treated with 4t/ha of OMF. However, all the treated plants recorded higher number of pepper fruits compared with the control. This result is in agreement with the findings of Nair and Peter (1990) and Aliyu (2000) who reported that application of organic manure of up to 5t/ha increased fruit number, fruit weight and fruit yield of chilli pepper.Mean fruit length and fruit girth of chilli pepper were significantly affected. The highest fruit length (8.65cm) and fruit girth (8.83cm) of chilli pepper was obtained by plants treated with 4t/ha of organo-mineral fertilizer.

Mean fruit weight per plant was also significantly affected by OMF application rates with the 4t/ha treated soil producing the highest weight of 138.61g, while control produced the least fruit weight (22.74g). Fresh fruit yield per hectare was also significantly affected by different rates of OMF compared with control. The highest fruit yield (1.92 t/ha)was obtained from the soil treated with 4t/ha of OMFclosely followed by the 6 t/ha treated soil (1.82 t/ha), then the 2 t/ha treated soil (1.35t/ha) while the least value was obtained from the control (0.31 t/ha).

The highest mean fresh fruit yield of 1.92 t/ha obtained from plants treated with 4 t/ha OMF differed significantly from other rates and control. The increased in number of fruits per plant and fresh fruit yield of pepper as a result of the application of OMF could be attributed to the fact that the organic substances and mineral elements combined in the fertilizer source supplied essential nutrients for enhanced crop and soil productivity. Relative yield increase of treated soils over the control was 335.5%, 519.4% and 487.1% for 2, 4 and 6 t/ha rate of OMF, respectively. Positive increases in chilli pepper yield as a result of amendments applied have been documented in several studies (Nair and Peter,1990;Aliyu, 2000& 2002;Sharu*et al.*, 2001;Shehata *et al.*, 2004;Alabi, 2006; Ewulo *et al.*, 2007 and Iren *et al.*, 2017b).

Conclusion

Total nitrogen, organic carbon, available phosphorus, exchangeable Ca, Mg, ECEC and base saturation status of all the treated soils were increased relative to control. Chilli pepper responded positively to the application of OMF at all rates but superior increases in fruit number, fruit length, fruit width, fruit weight and fruit yield were obtained from plantstreated with 4t/ha of OMF. The application rate of 4 t/ha of OMF was adequate for optimum growth and yield of pepper in an acidic *Ultisol* of Akwa Ibom State. Based on the results obtained, farmers in Obio Akpa and its environs are therefore encouraged to intensify the use of organo-mineral fertilizer in their farms for the improvement of soil fertility, crop growth and yield.

References

Adigun, J. A. (2001). Influence of intra-row spacing and chemical weed control on the growth and yield of chilli pepper (*Capsicum frutescens* L.) in the Nigerian Northern Guinea Savannah. *Nigerian Journal of Horticultural Science*, 5: 64-17.

Aliyu, L. (2000). The effect of organic fertilizer on growth, yield component of Pepper (*Capsicum annum* L.). *Journal of Sustainable Agriculture and Environment*, 5: 92-98.

Aliyu, L., (2002). Analysis of the chemical composition of some organic manure and their effect on the yield and composition of pepper. *Crop Research*, 23: 362- 368.

Alabi, D. A. (2006). Effect of fertilizer phosphorus and poultry droppings on the growth and nutrient components of pepper (*Capsicumannum* L.). *African Journalof Biotechnology*, 5 (8): 671-677.

Awodun, M. A., Omonijo, L. I. &Ojeniyi, S. O. (2007). Effect of goat dung and NPK fertilizer on soil and leaf nutrient content, growth and yield of pepper. *International Journal of Soil Science*, 2(2): 42147. http://dxdio.org/10.39223.

Ewulo, B.S., Hassan, K. O. & Ojeniyi, S. O. (2007). Comparative effect of cowdung manure on soil and leaf nutrient and yield of pepper. *International Journal of Agriculture Research*, 2: 1043-1048.

Deepa, N., Kaur, C., George, B., Singh, B. & Kapoor, H. C. (2007). Antioxidant constituents in some sweet pepper (*Capsicum annum L.)*genotypes during maturity, LWT – *Lebensmittel-WissenschafUnd-Technologie. Journal of the Science of food and Agriculture* 40(1):121-129.

Esu, I. E. (2010). *Soil characterization, classification and survey*. Ibadan, HEBN Publishers Plc. 237pp.

Idowu-Agida, O. O., Nwaguma, E. I. & Adeoye, I. B. (2010). Cost implication of wet and dry season pepper production in Ibadan, Southwestern Nigeria. *Agriculture and Biology Journal of North America*, 1(4): 495-500. http://www.scihub.org/ABJNA

Iren, O. B, Asawalam, D. O. & Osodeke, V. E. (2011). Effects of time and method of pig manure application on growth parameters and yield of *Amaranthus cruentus* in a Rainforest *Ultisol* in Nigeria. *Production Agriculture and Technology(PAT) Journal* (Nasarawa State University, *Keffi*, 7(1): 103-116.

Iren, O. B., John, N. M. & Imuk, E. A. (2014). Effects of sole and combined applications of organic manures and urea onsoil properties and yield of fluted pumpkin (*Telfaria occidentalis*, Hook F.). *Nigerian Journal of Soil Science*, 24 (1):125-133.

Iren, O.B, Akpan, J. F, Ediene, V.F. &Asanga, E.E. (2015). Influence of cassava peels and poultry manure-based compost on soil properties, growth and yield of waterleaf (*Talinumtriangulare*Jacq.) in and *Ultiso*l of South-eastern Nigeria. *Journal of Soil Science and Environmental Management*, 6(7): 187-194.

Iren, O. B., Udoh, D. J., Ufot, U. O. &Chukwuemeka, J. N. (2016a).Influence of Local Lime Materials and Organo-mineral Fertilizer on Fluted Pumpkin (*Telfairiaoccidentalis*) Performance in an *Ultisol* of Southeastern Nigeria. *International Journal of Sciences*, 5 (5): 75-81.

Iren, O. B., Ijah, C. J., Asawalam, D.O.&Osodeke, V. E. (2016b). Comparative effect of pig manure, urea fertilizer and their combinations on the performance of *Amaranthuscruentus*in a Rainforest *Ultisol*, Nigeria. *Integrity Research Journal-Journal of Agricultural Science andPractice*, 1:52-57.

Iren, O. B., Ayito, E.O.,Okon-Inyang, P. O. &Ofem, K. I. (2017a). Soil nutrient status and yield of waterleaf (*Talinumtriangulare*Jacq.)as influenced by rates of organo-mineralfertilizer in a rainforest *Ultisol*, Nigeria. *International Journal of Applied Research*, 3(5):581-585.

Iren, O. B., Uwah, I. D. &Vincent, V. M. (2017b). Direct and Residual Effects of Animal Manures on Soil Properties and Yield Components of Pepper (C*apsicum annum L.*) in an *Ultisol* of Southeast Nigeria. *Asian Research Journal of Agriculture*, 3(3): 1-9.DOI: 10.9734/ARJA/2017/31907

John, N. M., Uwah, D. F., Iren, O. B. & Akpan, J. F. (2013). Changes in Maize (*Zea mays* L.) Performance and Nutrients Content with the Application of Poultry Manure, Municipal Solid Waste and Ash Composts. *Journal of Agricultural Science, Canadian Center of Science and Education*, 5(3): 270-277.

Nair, M. & Peter K. V. (1990).Organic and inorganic fertilizers and their combination on yield and storage life of hot chillies. *Journal of Vegetable Science*, 17: 7-10

Nasef, M. A., Khalil, A. A., Ghazal, F. M. & El-Emam (2004). The residual effects of organic manures with or without bio-fertilizer applied to wheat grown on sandy, calcareous and clay soils on growth and NPK uptake of rocket plants.*Egyptian Journal of Agricultural Research*, 82(2):235-246.

Sharu, S. &Meerabai, M. (2001).Effect of integrated nutrient management on yield and quality of Chilli. *Journal of Vegetable Science*, 28: 184-185.

Shehata S. A., Behairy A.G. & Fawzy, Z. F (2004). Effect of some organic manure on growth and chemical composition of sweet pepper(Capsicum annum L) grown in sandy soil. *Egyptian Journal of Agricultural Research*, 82 (2- special issue): 57-71.

SLUK-AK, (1989). Physical background, soil and landuse and sociological, problem.Technical report of the task force on soil. Government Printer,Uyo. 291pp.

Soil Survey Staff(1999). Soil Taxonomy: A basic system of soil classification for making and interpreting soil surveys (2nd ed.), Natural Resources Conservation Service, USDA, Washington DC, USA.

Udo, E. J., Ibia, T. O., Ogunwale, J. A., Ano, A. O. and Esu, I. E. (2009). *Manual of soil, plant and water analyses*, Sibon books Ltd. Lagos.457pp.

Udoh, D. J. and Ndon, B. A. (2016).*Crop production techniques for the tropics*. Concept Publications Limited Lagos,Nigeria University PressISBN: 9789785400540, 592pp.

Wahua, T. A.T. (1999). .*Applied Statistics for Scientific Studies*. Afrika-Link Books, Ibadan. ISBN: 9782915157. 356pp.

Table 1. Physicochemical properties of the soil used for the experiment

Property	Value
Sand (%)	87.60
Silt (%)	3.88
Clay (%)	8.52
Textural class	Loamy sand
Soil pH (H_2O)	5.3
Total nitrogen (%)	0.07
Organic Carbon (%)	1.79
C:N Ratio	25.6
EC (dS/m)	0.09
Available P (mg/kg)	6.03
Exch. Ca (cmol/kg)	3.20
Exch. Mg (cmol/kg)	1.60
Exch. K (cmol/kg)	0.10
Exch. Na (cmol/kg)	0.05
EA (cmol/kg)	1.0
ECEC (cmol/kg)	5.95
Base Saturation (%)	83.19

Table 2. Chemical properties of organo-mineral fertilizer used for the study

Property	Value
N (%)	2.80
P (%)	1.20
K (%)	2.20
Moisture (%)	1.40
Organic carbon (%)	2.32
Organic matter (%)	4.00

Table 3. Effects of organo-mineral fertilizer (OMF) on some physicochemical properties of the soil

OMF Rates(t /ha)	Particle Size (%)			pH	EC	Org. C	TN	Av.P	Exch. bases (cmol/kg)				EA	ECEC	BS
	Sand	Silt	Clay	(H_20)	(d/Sm)	(%)	(%)	(mg/kg)	Ca	Mg	Na	K	(cmol/ kg)	(cmol/ kg)	(%)
2	91.00	3.80	5.13	5.57	0.10	1.73	0.11	25.89	5.47	2.23	0.07	0.16	1.76	9.69	81.84
4	89.00	5.20	5.80	5.87	0.14	1.76	0.12	36.88	6.37	3.10	0.06	0.20	1.80	11.53	84.39
6	90.07	2.93	7.00	5.27	0.11	1.79	0.11	23.33	6.37	2.60	0.07	0.21	1.84	11.09	83.41
Control	89.67	5.13	5.20	5.10	0.20	1.33	0.05	14.77	3.93	1.10	0.08	0.14	1.87	7.12	73.74
LSD ($P<0.05$)	NS	NS	NS	NS	NS	0.19	0.02	12.15	0.99	1.05	NS	NS	NS	1.76	3.76

Table 4. Effects of organo-mineral fertilizer (OMF) on plant height and number of branche at2, 4, 6 and 8 weeks after transplanting (WAT) of chilli pepper

OMF rates (t/ha)	Plant height (cm)				Number of branches			
	2	4	6	8	2	4	6	8
Control	12.3	16.3	21.3	25.3	1.0	1.3	2.6	2.6
2	15.3	19.0	26.7	34.7	2.3	6.6	10.0	10.0
4	20.0	27.7	37.7	40.7	2.6	7.3	10.3	10.3
6	17.3	25.3	35.7	39.7	1.3	4.3	6.0	6.0
LSD ($P\leq0.05$)	0.70	1.14	2.21	2.26	0.12	0.14	2.23	0.23

Table 5. Effects of organo-mineral fertilizer (OMF) on stem girth and number of leaves at 2, and 8 weeks after transplanting (WAT) of chilli pepper

OMFrates (t/ha)	Stem girth (cm)				Number of Leaves			
	2	4	6	8	2	4	6	8
Control	1.47	1.63	1.63	1.70	55.33	64.00	75.00	87.33
2	2.40	2.57	2.70	3.40	81.33	92.67	317.67	330.33
4	2.67	3.13	3.00	3.63	95.33	296.67	337.67	450.33
6	2.37	3.17	3.21	3.33	101.67	255.33	318.67	328.67
LSD ($P \leq 0.05$)	NS	0.90	1.02	0.61	NS	72.52	78.11	110.20

Table 6. Effects of organo-mineral fertilizer (OMF) rates on mean yield components and yield of chilli pepper

OMF rates (t/ha)	No. of fruits/plant	Fruit length (cm)	Fruit girth (cm)	Fruit weight/ plant (g)	Fruit yield per hectare (t/ha)
Control	10.58	4.51	3.77	22.74	0.31
2	18.33	6.82	6.96	97.59	1.35
4	24.08	8.65	8.83	138.61	1.92
6	19.00	8.54	6.98	119.38	1.82
LSD ($P \leq 0.05$)	1.55	1.77	0.86	43.35	0.60