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Effect of different rates of poultry droppings and plant spacing on soil chemical properties and yield of Cucumber

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ABSTRACT

The effect of three different rates of poultry droppings (0kg/ha, 12kg/ha, 24kg/ha) and plant spacing (30cm x 50cm; 40cm x 50cm; 50cm x 50cm) and the soil chemical properties and yield of cucumber was studied in a field trial at Igbariam south eastern, Nigeria. The experiment was conducted as a 3x3 factorial laid out in randomized complete block design (RCBD) with two replications. The result of the study showed that poultry droppings and plant spacing significantly (p=0.05) increased the growth and yield of cucumber and improved the soil chemical parameters assessed. The values obtained increased as the rate of poultry droppings increased from zero level and decreased as the planting distance increased. The closest plant spacing (30cm x 50cm) and poultry droppings at the rate of 24kg/ha recorded the highest value in both crop and soil parameters assessed in this trial. Though the result of Mg^{2+} showed a decrease as the rate of poultry droppings increased and Ca^{2t} result did not follow any particular trend. The spacing and poultry droppings interaction was significant for fruit yield (Weight of fruit), length of fruit and vine length, but generally showed non-significant for all the soil parameters measured. The result of the study showed that cucumber production could be enhanced at 24kg/ha poultry droppings and at a closer plant spacing of 30cm x 50cm for optimum yield.

Introduction

The fertility of soil usually declines when farmers are unable to efficiently compensate for nutrient losses that result from crop harvest, leaching, and environmental factors and in competence in management strategies. Another related problem is population increase which creates much pressure on available land that led to higher nutrient out flows and breakdown of many traditional soil fertility maintenance. These traditional fertility maintenance strategies such as bush fallowing, intercropping cereals with legume crops, mixed cropping, livestock farming and opening new lands for crop production was argued by Sanders et al. (1996) to have not been adequately replaced by an effective fertilizer supply. Hence soil nutrient replenishment has become very important for maximum crop yield, for soil to support an increasing pressure in agricultural activities cum crop yield. It must be incorporated with organic or inorganic fertilizer which will improve soil fertility and subsequently crop yield. Soil nutrient replenishment especially with organic manure which is bio degradable is very desirable as it cushions off the effect of adverse environmental conditions, make up for nutrient losses due to leaching and plant uptakes enhances the water holding capacity of the soil and provides a conducive environment for microbial activities to thrive without the contamination of chemical substances. According to Desksissa et al; (2000), and Gbaribarian et al, (2008),poultry droppings contains high nitrogen, phosphorus, potassium and other essential nutrient in contrast to mineral fertilizer, it adds organic matter to soil which improves soil structure, nutrient relation, aeration, soil moisture holding capacity and water infiltration. It was also observed that poultry droppings are more readily supplies P to plants than other organic manure sources (Gar and Bahla, 2008), low C: N ratio than composts resulting N (Hue 1997) and a good source of Mg and Ca (Mengbo et al. 1997). Hence vegetables yield increase in response to poultry manure applications.

Plant spacing which is the distance apart if you plant several of the same plant in a particular piece of land has been found to influence the productivity and yield result of crops. Closer spacing often result in smaller sized vegetables, but does not necessary reduce the yield because of the increased quantity, Jonathan et al; (1996), Paulo et al; (2003), and Nelson, (2005) reported increases in fruit yield as plant density increased. While Ekwu and Ekporie (2002), Amans (1987) and Ahmed (1981) obtained higher fruit yield at a reduced or closer plant spacing. Babalola and Olaniyi (1999) and Olaniyi et al; (1998), reported that yield per plant increased with spacing in vegetables and pepper respectively. While Schipper (2000) observed that wider spacing (15-30cm apart each way) in fertilized soils improves harvesting periods thus increased the yield result. Plant spacing in vegetable crops production, however, depends on the variety and whether they are grown on flat, beds, ridges, pots, staked and unstaked. According to Schipper, (2000), spacing in the field depends on the types of crop grown and number of harvest envisaged as well as the soil condition which may not give unified information on the best population density that will enhance optimum utilization of available environmental resources.

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Cucumbers are high yielding, but required good fertile soil and space to meet up the high yielding attributes which can be quantified by factors such as fruits quality and fruit size. The growth of cucumber plant and soil conditions as well as other associated factors can be modified for good by the application of poultry droppings and land spacing to suit desired result. Thus, the essence of the present study is to evaluate the effect of poultry droppings and plant spacing on the growth and yield of cucumber and soil chemical properties.

Materials and Methods

Site Location

The experiment was conducted at Crop Science and Horticulture Department Experimental Farm, Faculty of Agriculture, Anambra State University, Igbariam Campus, Anambra State. The experimental site lies on Latitude $06^0$14'N and Longitude $06^0$45^0'E. The soil of the study area is of the sandy clay loam textural class, hydromorphic and poorly drained, classified as typic Tropaqualf (FDALR, 1985). The rainfall pattern of the area is bimodal, the first rain begins around March and last till July with a peak in June, and the rainy season is followed by a short dry break in August. This break is broken by a short rainy season starting early September and lasting to mid October is followed by a long dry season from late October to March. Annual temperature ranges from 25 – 35^{oc}. The annual rainfall is 1268mm and the relative humidity of the study area is moderately high all year round with highest 85% during the wet season and lowest 64% during dry season.

Land preparations, experimental design and Treatment applications

The study site was manually cleared of the natural vegetation and debris removed. The field measured 11m x 27.5m giving total plot size of 302.5m^2. Raised field beds were manually cultivated using hoe and they were divided into two equal blocks. Each block consisted of 9 plots, given a total of 18 test plots. Each plot measured 3m x 4m with 0.5m between adjacent rows. The replicates were separated with an alley of 1m apart. Guard row was created to prevent pest attack and to prevent the flow of flood from washing away treatments as the area is poorly drained. The experiment was conducted as a 3 x 3 factorial laid out in randomized complete block design (RCBD) with two replications. Three plant spacing (30cm x 50cm, 40cm x 50cm, 50cm x 50cm) and three rates of poultry droppings (0kg, 12kg and 24kg) were the treatments used in the study. The treatments were applied evenly on the respective plots and incorporated into soil one week before planting to allow for proper decomposition and mineralization of nutrients in fertilizer. Cucumber seed sourced from Agricultural Development Program (ADP) Awka, Anambra State, were planted two per hole at about 2cm depth. After 5days seedlings were thinned down to one plant per hole and supply were made to empty hill. The plots were kept relatively weed free manually using hand hoe till harvest. The agronomic parameters evaluated were number of branches, number of flowers, number of leaves/plant, length of vine, length of fruit, number of fruit/plant and weight of fruits.

Soil Sampling

Soil Samples were collected from different representative locations of the site using soil auger, to a depth 30cm. The samples were bulked and made into composite samples and used for the determination of physical and chemical contents of the study site (Table 1). At the end of the harvest, soil samples were collected from each plot. These soil samples were air dried and sieved with 2mm mesh, after which chemical analysis were determined. Soil pH was determined both in water and KCL at 1:2.5 solid water ratios using digital pH meter. Organic carbon was analyzed by the method of Nelson and Sommers (1982) and the value for organic matter was obtained by multiplying the carbon value with the conventional Van Bemmelar factor 1.724. Total nitrogen was determined by a semi-micro-kyeldahl procedure as described by Bremner and Mulvancy (1982). Available phosphorous was determined by Bray II method. Exchangeable bases were extracted using $INNH_4OAC$. Potassium and sodium were determined on flame photometer while calcium and magnesium were determined by EDTA titration. While cat ions exchange capacity (CEC) was determined by Ammonium acetate technique. Exchangeable acidity was determined by the titrimetric method of Mclean (1982).

Data Analysis

All data generated during the experiment were subjected to statistical analysis using the procedure outline by steel and Torrie (1980) for a factorial experiment in randomized complete block design (RCBD) and separation of treatment means for significant effect was by the use of least significant difference (LSD) at 5% alpha level.

Results

Effect of poultry droppings and plant spacing on the growth and yield parameters of Cucumber

Poultry droppings at the rate of 24kg/ha produced cucumber plants with more number of branches than the other treatment rates (Table 2a) and there was statistically significant (p=0.05) differences among the treatment rates. The number of branches increased as the rate of poultry droppings increased. The number of branches decreased as the plant spacing increased from 30cm x 50cm to 50cm x 50cm. The closest plant spacing (30cm x 50cm) produced the highest number of branches while 50cm x 50cm produced the least number of branches and they differed significantly among themselves (Table 2a). The Table also shows that the number of branches was significantly affected by both the plant spacing and rates of poultry dropping.

The length and number of fruits results showed statistical significant differences among the plant spacing and rates of poultry droppings. Table 2a indicated that the values of length and number of fruits increased as the rates of poultry droppings increased and decreased following an increase in the plant spacing. The poultry droppings applied at the rate of Okg/ha and the widest plant spacing (50cm x 50cm) gave the least value in length of fruit and number fruits. The result obtained showed that poultry droppings and plant spacing had effect on the length of fruit and number of fruit of cucumber harvested. The plant spacing x poultry dropping interaction for length of fruit was significant at p = 0.05. The values recorded for number of flowers (Table 2a), leaves and vine length (Table 2b) showed that plant spacing and rates of poultry droppings have significant (p=0.05) effect on these parameters assessed. The result (Table 2b) showed that higher values are recorded in closest plant spacing (30cm x 50cm) and the higher rate of poultry droppings (24kg/ha). The Table 2b also indicated that the values obtained for plant spacing decreased following an increase in spacing and for poultry droppings the value increased with the increase in dosage of application from zero level. The interaction between plant spacing and poultry droppings on vine length was observed to be significant (p=0.05).

The result of weight of fruits showed a consistence increase in yield with increase in dosage of poultry droppings application from zero level and the rates were statistically significant among themselves. The 24kg/ha rate of the poultry droppings gave the highest yield weight while the least value was obtained from

0kg/ha rate poultry droppings. The trend of yield obtained for plant spacing follow the order 30cm x 50cm > 40cm x 50cm > 50cm x 50cm, the values were also statistically significant among themselves except for the values of yield obtained from 30cm x 50cm and 40cm x 5ocm plant spacing at 0kg/ha rate of poultry droppings that were statistically similar but significantly better than 50cm x 50cm yield value. The yield result (Table 2b) clearly reveled that both plant spacing and poultry droppings have significant effect on the weight of fruit. Their interaction (plant spacing x poultry droppings) was equally observed to have significant effect on the weight of fruits.

Effect of poultry droppings and plant spacing on the chemical parameters of the soil

Statistical significant differences among treatment means were observed in the result of pH and Nitrogen (N) recorded for both plant spacing and rates of poultry droppings (Table 3a) which indicated that poultry droppings and plant spacing have effect on pH and N content of the soil. The result showed that the values of pH and N increased as the rate of poultry droppings increased and poultry droppings at the rate of 24kg/ha gave the highest value of pH and N. With respect to plant spacing the values decreased with an increase in plant spacing and the values of N obtained was found to be non-significant. There was no interaction (plant spacing x poultry droppings) effect on the content of soil N and pH level.

The values recorded for Na^+, K^+ (Table 3a) Ca^{2+},Mg^{2+},CEC and available P (Table 3b) indicated that plant spacing and rates of poultry droppings have no significant effect on all these parameters assessed. However, the result showed that higher values were recorded in 24kg/ha poultry droppings compared to other rates of poultry droppings, except for the value obtained for Mg^{2+}. The CEC values of 0kg/ha and 12kg/ha obtained in 30cm x 50cm spacing were similar as well as Mg^{2+} values recorded in 40cm x 50cm. The values of Na^+, K^+, CEC and available P increased with an increase in rates of application of poultry droppings. The values obtained for Ca^{2+} and Mg^{2+} did not follow any particular trend, though the result of Mg^{2+} showed decrease as the rate of poultry droppings increased. The result of plant spacing indicated that the values of Na^+, K^+, Ca^{2+}, Mg^{2+} and CEC decreased as the plant spacing increased. The highest were obtained from the closest (30cm x 50cm) plant spacing. Though the values of Na^+ and K^+ decreased in 40cm x 50cm and increased in 50cm x 50cm, while the value of CEC obtained in 30cm x 50cm and 40cm x 50cm spacing were similar. The result of available P showed that the value obtained from 40cm x 50cm and 50cm x 50cm plant spacing was relatively similar and also the result did not follow any particular trend. Generally, from the results obtained it was observed that the interaction of poultry droppings and plant spacing have no significant effect on all the soil parameters assessed in this trial.

Discussion

Effect of poultry droppings and plant spacing on the growth and yield of cucumber

Significant differences in growth and yield parameters of cucumber assessed in this study were observed among the poultry droppings and spacing treatments. All the growth and yield parameters was found to be increased from 0kg/ha to 24kg/ha and decreased as the plant spacing increased from 30cm x 50cm to 50cm x 50cm. The result of this study showed that poultry droppings and plant spacing had effect on vegetative growth and yield of cucumber. Abel-Mawgoud et al; (2007) observed that two management practices such as plant spacing and fertilizer application greatly influenced crop yield. Also the report by FAO, (2001) indicated that most African soils show nutrient deficient problems after only on short period of cultivation because of their nature as well as prevailing environmental condition. The most commonest practice by the poor resource farmers in many parts of Nigeria, especially the Southeastern part of Nigeria, were growing of two or more crops (mixed cropping) on the same piece of land, the result of this, being that these famers usually and unknowingly grow their crops at wide and random spacing because of the systems of cropping. However, as more farmers grow their crop sole, specific plant population would be used and easier to assess the productivity and economic returns of the crop. Bodunde et al; (1997) observed that increasing economic yield of most crops is through cropping at high planting density. The knowledge of crop response to population density was reported by Adani et al; (1996) to provide the basis for accessing the effects of intra specific competition. The results of the study have shown that growth and yield of crops can be increased by the integration of two management practices; plant spacing and poultry droppings. The vegetative growth of cucumber increased as the rate of poultry droppings increased. This could be attributed to higher nitrogen content in the manure, resulting to an increase in more chlorophyll production and in cell division in the plant tissue, leading to the production of more photosynthetic surface and subsequently accumulation of photosynthetic product for more vegetative growth and root development. It has been reported that poultry manure contain higher nitrogen and phosphorous compare to chemical fertilizer or other manures as well as other essential nutrients associated with high photosynthetic activities that promotes roots and vegetative growth (Dekesissa *et al*; 2008, John *et al*; 2004, Ewulo; 2005, Gbariabarian *et al*; 2008). Nagdy *et al*; (1979) and Ekwu and Ekporie (2002) observed that varying plant spacing and rates of nitrogen application increased plant height, number of branches and leaves. Also by varying plant spacing, Nweke *et al;* (2013) observed increase in vegetative growth on the staked cucumber compared to non-staked. The vegetative growth parameters assessed were significantly influenced by spacing, there were differences in actual values, and these differences were statistically significant enough to affect the crop.

The number and length of fruits increased as the poultry droppings rate increased from 0kg/ha to 24kg/ha and was higher at the plant spacing of 30cm x 50cm than those produced at the wider spacing. This could be attributed to higher number of leaves, flowers and fruiting buds which may have increased fruit production and better and early canopy formation which may have checked weed growth and reduced competition for plant nutrients from weeds. It may as well be due to higher plant population density observed at 30cm x 50cm. Ekwu and Ekporie (2002), observed increase in the number and diameter of pepper fruit as the rate of nitrogen application increased from zero level and at reduced plant spacing 30cm x 75cm and Nweke et al; (2013) reported highest number of fruits at the closest plant spacing 50cm x 30cm. The nature of yield result (weight of fruit) obtained could be attested to the fact that addition of manure increases the soil water holding capacity and plant nutrient elements which means that nutrients would be made more readily available to crops where manures have been added to the soil compared to where it was not applied and the yield result could be due to balanced supply of plant nutrients from poultry manure throughout the development of the crop. Ma et al; (1999) and Garg and Saha (2008) reported crop increase in 1000gram weight with increased level of poultry manure.

Table 1. The physical and chemical parameters of the soil before treatment application

Parameter	Value
Clay	22%
Silt	22%
Fine Sand	42%
Coarse Sand	15%
Textural Class	sandy clay loam
Bulk Density	1.20g/cm^3
Total porosity	54.75%
Moisture Content	22.40%
pH H_20	4.9
pH KCL	3.9
OC	0.94%
OM	1.62%
N	0.20%
Na^+	0.25 $Cmolkg^{-1}$
K^+	0.26 $Cmolkg^{-1}$
Ca^{2+}	1.8 $cmolkg^{-1}$
Mg^{2+}	2.8 $cmolkg^{-1}$
Exchangeable Acidity $H^+ + Al^{3+}$)	1.6 $cmolkg^{-1}$
CEC	32.80 $cmolkg^{-1}$
Avail.P	2.80 $mgkg^{-1}$

Table 2a: The effect of poultry droppings and plant spacing on the growth parameters and yield of cucumber

	Spacing (cm)	Rate of Poultry Dropping kg/ha			
		0kg	12kg	24kg	Mean
Number of branches	30 x 50	1.55	3.50	4.25	3.10
	40 x 50	1.30	3.10	3.65	2.68
	50 x 50	1.10	3.15	3.50	2.53
	Mean	1.32	3.25	3.80	
Length of fruit (cm)	30 x 50	7.0	15.07	17.90	13.32
	40 x 50	2.50	12.39	15.58	10.16
	50 x 50	0.0	9.95	13.75	7.9
	Mean	3.17	12.47	15.74	
Number of fruits	30 x 50	1.0	2.5	3.25	2.25
	40 x 50	0.5	2.45	2.85	1.93
	50 x 50	0.0	1.95	2.70	1.55
	Mean	0.5	2.3	2.95	
Number of flowers	30 x 50	4.85	16.8	21.3	14.32
	40 x 50	3.0	15.15	20.75	12.97
	50 x 50	2.3	11.35	18.4	10.68
	Mean	3.38	14.45	20.15	

Branches
LSD 0.05 = 0.67 (for comparing spacing & Poultry combination means)
LSD 0.05 = 0.39 (comparing spacing or Poultry means)
Spacing X Poultry = NS
Length of fruit
LSD 0.05 = 0.55 (comparing space & Poultry means)
LSD 0.05 = 0.32 (comparing spacing or Poultry means)
Spacing X Poultry = 0.39

Number of flowers
LSD 0.05 = 2.44 (comparing spacing & Poultry Means)
LSD 0.05 = 1.41 (comparing spacing or Poultry means)
Spacing X Poultry = NS
Number of fruits
LSD 0.05 = 0.54 (comparing spacing & Poultry means)
LSD 0.05 = 0.32 (comparing spacing or Poultry means)
Spacing X Poultry = NS

Table 2b : The effect of poultry droppings and plant spacing on the growth parameters and yield of cucumber

	Spacing (cm)	Rate of Poultry Dropping kg/ha			
Number of leaves	30 x 50	7.65	32.15	34.80	24.87
	40 x 50	4.95	30.75	31.80	22.5
	50 x 50	4.55	26.35	30.10	20.33
	Mean	5.72	29.75	32.23	
Vine length (cm)	30 x 50	15.45	136.40	295.35	149.07
	40 x 50	11.10	107.85	140.85	86.60
	50 x 50	8.25	107.55	137.30	84.37
	Mean	11.6	117.27	191.17	
Weight of fruit (kg/ha)	30 x 50	0.35	7.3	12.85	6.83
	40 x 50	0.15	5.4	11.10	5.55
	50 x 50	0	4.2	10.70	4.97
	Mean	0.17	5.63	11.55	

Number of leaves
LSD 0.05 = 3.23 (comparing spacing & Poultry means)
Spacing X Poultry =NS
LSD 0.05 = 1.87 (comparing spacing or Poultry means)

Vine Length
LSD 0.05 = 4.99 (comparing spacing & Poultry means)
LSD0.05 =2.88(comparing spacing or Poultry means}
LSD 0.05 = 3.53 spacing X Poultry interaction

Weight of fruit
LSD 0.05 = 0.73 (comparing spacing & PD combination means)
LSD 0.05 = 0.42 (comparing spacing or PD means)
LSD 0.05 = 0.52 spacing X Poultry interaction.

Table 3a. Effect of poultry droppings and plant spacing on the chemical parameters of the soil

	Plant Spacing	Rates of poultry droppings			
		0kg	12kg	24kg	Mean
pH H_20	30 x 50	6.2	8.1	8.2	7.50
	40 x 50	5.9	7.0	6.8	6.57
	50 x 50	5.6	4.1	5.4	5.03
	Mean	5.9	6.4	6.8	
% N	30 x 50	0.14	0.25	0.29	0.23
	40 x 50	0.15	0.24	0.28	0.22
	50 x 50	0.13	0.23	0.27	0.21
	Mean	0.14	0.24	0.28	
Na^+	30 x 50	0.29	1.03	1.39	0.90
	40 x 50	0.21	1.02	1.23	0.82
	50 x 50	0.25	1.01	1.19	0.82
	Mean	0.25	1.02	1.27	
K^+	30 x 50	0.41	0.83	0.98	0.74
	40 x 50	0.37	0.79	0.89	0.68
	50 x 50	0.39	0.69	0.83	0.64
	Mean	0.39	0.77	0.90	

pH H_20
LSD 0.05 = 2.14 (comparing Poultry & Plant spacing)
LSD 0.05 = 1.23 (comparing Poultry means or plant spacing means
Plant spacing X Poultry = NS

% Nitrogen
LSD 0.05 = 0.07 (comparing Poultry & Plant spacing means)
LSD0.05 = 0.04 (comparing poultry means)
Spacing X Poultry = NS

Table 3b. Effect of poultry droppings and plant spacing on the chemical parameters of the soil

	Plant Spacing		Rates of poultry droppings		
Ca^{2+}	30 x 50	1.8	3.1	2.9	2.60
	40 x 50	1.6	2.9	2.8	2.43
	50 x 50	1.4	2.4	2.7	2.17
	Mean	1.6	2.8	2.8	
Mg^{2+}	30 x 50	2.1	2.0	1.0	1.70
	40 x 50	1.8	1.8	0.9	1.50
	50 x 50	1.5	1.6	0.6	1.23
	Mean	1.8	1.8	0.8	
CEC	30 x 50	39	39	51.20	43.07
	40 x 50	32	39	49.50	40.17
	50 x 50	25	36	44.50	35.17
	Mean	32	38	48.40	
Avail P	30 x 50	2.8	18.01	29.60	16.80
	40 x 50	2.9	17.34	28.71	16.32
	50 x 50	2.7	17.81	28.42	16.31
	Mean	2.80	17.72	28.91	

Reducing plant spacing was observed to have increased the cucumber fruit yield. Similar result was observed by Ahmed, (1981) and Ekwu and Ekporie (2002), who obtained the highest tomato fruit yield at a closer plant spacing and nitrogen application. While Amans (1987) argued that reducing plant spacing increased tomato fruit yield and significantly reduced the percentage of rotted fruits. However, this is contrary to the findings of Phamthic (1991), Paulo et al; (2003), who reported highest yield at higher plant spacing. The interaction effects of poultry droppings rates and spacing on some growth and yield parameters of the cucumber plant was definite in that 30cm x 50cm x 24kg/ha produced plant with higher fruit weight, length of fruit and vine lengths, probable owing to enhanced soil fertility in the crop ecology as the dosage of poultry droppings application increased from zero level. However, increasing plant spacing with added nutrients through poultry manure application did not result in increased fruit yield in higher plant spacing probable owing to sub-optional utilization of added nutrient by the relative low number of plants. Therefore, in order to maximize fruit yield in cucumber production through manure application, there is need to reduce the spacing for efficient utilization of added nutrients.

Effect of poultry droppings and plant spacing on the chemical parameters of the soil

The result of the soil chemical parameters indicated that poultry droppings and plant spacing had effect on the chemical parameters of the soil, although most of the parameters measured were non-significant at p = 0.05, the value obtained however, increased as the rate of poultry droppings increased and decreased with increasing plant spacing, except for the value of K^+ and Na^+ at 40cm x 50cm spacing at 0kg/ha and available phosphorous and nitrogen at 40cm x 50cm of 0kg/ha. The soil pH and nitrogen content were significantly affected by poultry droppings and plant spacing. This shows that poultry droppings and plant spacing can affect the chemical properties of the soil, chemical properties provide and adequate environment and sufficient nutrients to the organisms for optimal biological activity which in turn improves the soil chemical properties through improved soil structure and nutrient cycling that invariable transformed to increased yield observed in the study. Opara and Asiegbu (1996) observed that poultry manure increased yield and raised soil pH content, they equally observed an increase in plant available aluminum. Hue and Sobieszczyyk (1999), found a positive linear relationship between application rates of poultry manure and increasing soil pH. In another study, Boateng *et al*; (2006) reported that poultry manure application registered over 50% increase of N level in the soil and that the exchangeable cat ions increase with manure application.

Conclusion

The result of the present study has shown that poultry manure is an excellent organic fertilizer in cucumber production as its application led to increased yield and improved soil nutrient content, showing that yield of crops and fertility of the soil could be sustained with the addition of poultry manure. Therefore, it is recommended, that for maximum yield of cucumber poultry droppings at the rate of 24kg/ha an equivalent of 20t/ha and closer plant spacing of 30cm x 50cm should be used for optimum yield.

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