POULTRY MANURE'S IMPACT ON GROUNDNUT (Arachis hypogea L.) GROWTH, YIELD, AND BEACH SAND IN ABAKALIKI, SOUTH EAST NIGERIA

Pethnis Siame
[1]Department of Soil Science and Environmental Management, Ebonyi State University, Abakaliki

Research Article

Date of Submission: 02-12-2025
Date of Acceptance: 22-01-2026
Date of Publication: 23-03-2026

Abstract
This study was conducted at the screen house of the Department of Crop Science and Landscape Management at Ebonyi State University in Abakaliki to investigate the impact of chicken manure on beach sand, groundnut (Arachis hypogea L.) growth, and yield. The beach sand was gathered from Ogoja Local Government Area's Nkpana Beach. The test crop was groundnuts of the Samnut 22 type. Five treatments and four replications were used in the fully randomized design (CRD) marijuana trial. The rates at which the chicken manure was administered were 5, 10, 15, and 20 tha-1, and the control was equal to 4.5, 9.0, 13.5, and 18 g pot-1 to 7.0 kg of beach sand in each pot. Two groundnut seeds were put in each pot, and the seeds were subsequently reduced to one stand. The gathered data was statistically analyzed. The bulk density, total porosity, and gravimetric moisture content at 20 tha-1 of chicken dung were all considerably greater ($p<0.05$) than the control. In comparison to the control, pots treated with 20tha-1 had considerably ($P<0.05$) higher soil pH, accessible P, CEC, OC, and exchangeable acidity of the beach sand. The available phosphorus improved in the following order: 0 t ha-1 < 5 t ha-1 < 10 t ha-1 < 15 t ha-1 < 20 t ha-1. Plant height increased in the following order: 20 t ha-1 > 15 t ha-1 > 10 t ha-1 > 5 t ha-1 > C, with corresponding percentage increases of 38%, 25%, 19%, and 6%. In contrast, grain yield increased in the following order: C < 5tha-1 < 10tha-1 = 15 tha-1 < 20tha-1, or 0.4, 0.6, 0.7, 0.8, and 0.9 tha-1. At 20tha-1 of the modification, the highest yield parameters were found. Various PM rates, particularly 20t ha-1, have been shown to be better at improving beach sand quality; nonetheless, 15t ha-1 is advised for increased production without sacrificing environmental health.

Keywords: Poultry manure, beach sand, soil properties, groundnut yield

INTRODUCTION

Although it originated in South America, groundnuts (Arachis hypogea L.) are now grown all over the globe (Ranga et al., 2010). It used to be a major export crop for Nigeria, contributing up to 20% of the country's total foreign revenues and meeting local dietary needs. Groundnuts are grown on sandy soils in tropical and subtropical parts of the globe, according to Okello et al. (2013). Additionally, the crop may be cultivated in areas with 200–1000 mm of annual rainfall. Day duration and light intensity have an impact on yields, but clear days with sufficient sunshine provide the best results (Cranfurd et al., 2006; Angin and Yaganoglu, 2011). For optimal production, the ideal temperature range is between 20 and 30 degrees Celsius (Prased et al., 2003).Due to the high prevalence of rosette disease, insufficient rainfall, and poor plant nutrient availability, groundnut farming has seen low yields over the last several decades, to the point that Nigerian exports have decreased (Babalola et al., 2005). Since groundnuts are grown underground, soil selection and fertilizer requirements are crucial. Light-colored sand, loamy sand, or sandy loam soil that drains effectively is ideal for groundnut cultivation (Lourduraj, 1999). Although groundnuts are thought to be tolerant of acidic soils, certain cultivars may thrive in slightly alkaline soils with a pH > 8.0 because it promotes nitrogen fixation (Prasad et al., 2003; Lourduraj, 1999). Groundnuts produce the most in soils with a pH of 6.0–6.5. For groundnuts to grow and develop well, nitrogen and phosphorus must be available.Numerous constraints restrict the use of tropical sandy soils for agriculture, including limited water storage, acidity, nutrient shortages, and generally poor physical characteristics (Maniyunda, 2018; Asadu et al., 2008). The economic sustainability of agriculture on sandy soils would be significantly impacted if these limiting constraints were not well handled. Sandy soils frequently have low nutrient levels. For instance, crops grown on these soils frequently exhibit multiple nutrient disorders that limit crop productivity (Mbah et al., 2018; Amuyou et al., 2013; Obi and Ebo, 1995). In southeast Nigeria, sandy soils were deficient in macro and micronutrients like N, P, K, Zn, Cu, and Mo (Maniyunda, 2018; Akamigbo and Asadu, 1983). Sandy soils often contain less organic stuff.

levels than heavier textured soils given similar rainfall, temperature, land use and tillage (Kolo, 2019). Clay levels on deep sandy soils may be too low to protect organic matter from oxidation (Kolo, 2019). High percolation rate and leaching of N and other nutrients may also limit the soil productivity even when water is not limiting. Acidity and salinity are common on sandy soils (Asadu *et al*., 2008) but for arain fed crops, acdity may give rise to a range of fertility constraints including Al and Mn toxicities and deficiencies of nutrients(Dierolf *et al*., 2001). Poor N fixation in legumes is often a consequence of soil acidity due the low tolerance of rhizobia to acidity and low levels of plant available Mo (Maniyunda, 2018).

Productivity on sandy soils tends to be low even when recommended agronomic practices are followed due nutrient deficiency, but application of organic manures can supply nutrients in slowly available forms and improve soil physicochemical properties (FAO, 2000). Nitrogen can be supplied in the soil by the plant through fixation but P is not and has to be provided from the soil through input amendments such as poultry manure. Poultry manure (PM) is composed mostly of feaces, urine and part of chicken feeds which contains mineralizable nutrients capable of promoting soil productivity (Tewolde *et al.,* 2005). It is a good source of essential plant nutrients, majorly organic matter which restores and improves the physical chemical and biological conditions of soil (Diana *et al.,* 2008). Mubarak (2004) reported significant yield and yield components with application of poultry manure. Sandy loam which is the best soil for groundnut production is gradually becoming scarce in the study area due to urbanization and population increase, in view the above, an alternative could be developed from river sand amended with organic manure like poultry droppings. Studies on groundnut and nutrient management are vast in literature (Nwite *et al*., 2022; Okello *et al*., 2013; Mubarak, 2004). However, information on management of beach sand and performance of groundnut is highly limited. It is on account of this that the study becomes imperative. The objectives of the investigation are to find the effect of poultry manure on amelioration of condition of beach sand as well as study effect of treatment on yield of groundnut.

MATERIALS AND METHODS

Site location

The experiment was carried out at screen house of Department of Crop Science and Landscape Management, Ebonyi State University, Abakaliki. The area lies between latitude 06° 4[1]N and Longitude 08°6[1]E in the derived savanna zone of southeastern Nigeria. There are two marked seasons in Abakaliki area, the dry and rainy seasons. The area experiences bimodal pattern of rainfall usually spread from April-July and September- October with a dry spell in August. The rainfall ranges from 1700 to 2000mm with mean annual rainfall of 1800mm (ODNRI, 1989; Anyadike 2002). The dry season begins in November and ends in March. The mean annual temperature ranges from 27°C to 31°C throughout the year. The relative humidity is 80% during rainy season but declines to 65% in the dry season (ODNRI, 1989; EBADEP, 2005)

Field Methods

Beach sand was collected from Nkpana river beach and 7kg each of beach sand was weighed into pots of 3 m x 5 m dimensions. Poultry manure at rates of 0,5,10,15 and 20 t ha^{-1} equivalent to 0,4.5, 9.0, 13.5 and 18kgpot^{-1} were weighed out and mixed with beach sand in each pot. The pots were arranged in completely randomized design (CRD) with 0.5cm space between pots. Treatments were replicated four times to give a total of 20 experimental pots.

Groundnut (*Arachis hypogea*L) seeds were planted at two seeds per pot two weeks after treatment application. Thinneg was carried out to one plant per pot at two weeks after planting (WAP). The pots were irrigated adequately with 5mm of water per day till maturity. Weeds were removed with hand every two weeks.

Soil sampling

Soil samples were collected before and after planting using core samplers and hand trowel at 0 – 15 cm depth. The samples collected were bulked to obtain composite samples, which were air-dried, passed through 2mm sieve and analyzed for physicochemical properties whereas the core samples (undisturbed samples) collected were used for other physical properties determination in accordance with the standard procedures.

Agronomic determinations

The following agronomic parameters were collected starting from four weeks after planting (WAP); plant height, leaf area index, no of braches and yield. Plant height, leaf area index, no of braches and yield. Plant height (cm), leaf area index (cm^2) and number of branches were determined at four and ten weeks after planting (WAP). Number of pods and yield were determined at maturity.

Laboratory Methods

Particle size distribution was determined using Bouyoucos hydrometer method (Gee and Bauder, 1986). Textural class of the soil was determined using a textural triangle. Soil bulk density was determined using the core method according to

Blake and Hartage (1986), Total porosity was evaluated from soil bulk density data using particle density of 2.65gcm^{-3}. Hydraulic conductivity was assessed by method of Klute (1986). Moisture content was determined by gravimetric method (Obi, 2000).

Soil pH was determined using glass-electrode pH meter. The pH was determined on a 1:2.5 soil: solution ratio in both water and 0.01M $CaCl_2$ solution (Mc Lean, 1982). Available phosphorus was obtained by the Bray-2 method as described by Olson and Sommers (1982). Organic carbon was determined by Walkley-Black dichromate wet oxidation method (Nelson and Sommer, 1982), Total Nitrogen was extracted using the micro- kjeldahl technique (Bremner and Mulvaney, 1982).

Exchangeable H^+ and Al^{3+} were extracted with 0.1N (Normal) KCl and the extract titrated with 0.05N NaOH (Mclean, 1982). The total exchangeable acidity was estimated by summing the amounts of H^+ and Al^{3+} determined (Grant, 1982). Exchangeable bases (Ca^{2+}, Mg^{2+}, K^+ and Na^+) were extracted with 1N (Normal) neutral ammonium acetate (NH_4OAC) solution (Grant, 1982) Ca^{2+} and Mg^{2+} were determined by titration, while K^+ and Na^+ were measured by flame photometry (Grant, 1982). Cation exchange capacity was obtained by the summation of exchangeable bases and acidity. Base saturation was obtained using the formula:

$$\%BS = \frac{TEB}{CEC} \times 100$$

Where, BS = Base saturation
TEB = Total Exchangeable Bases and CEC = Cation Exchange Capacity

Data Analysis
Data obtained from the pot experiment with completely randomized design (CRD) were analysed using analysis of variance (ANOVA) Obi (2002). Separation of treatment means for significant effect was done using Fisher's –Least significance difference (F-LSD).

RESULTS AND DISCUSSION

Initial Soil Properties
Physical and chemical properties of the soil before the experiment are shown in Table 1.The result of pre-planting analysis shows that the soil was 92.30% sand, 1.90% silt and 5.80% clay. The soil pH was 4.20 with total N 1.0gkg^{-1} available P was 0.88mgkg^{-1} and organic carbon 4.8gkg^{-1} Exchangeable K, Ca, Na and Mg were 0.14, 2.0, 0.15 and 1.80 cmolkg^{-1} respectively. The exchangeable acidity was 0.32 comlkg while base saturation was 96% (Table 1).The soil was characterized by low organic matter, total N,available P, K, Na and CEC (Enwezor *et al.,* 1981). Ca and Mg recorded higher values of 2.00 and 1.80 comlkg^{-1} and dominated the exchange complex of the soil (Table 1).

The textural class was sandy soil and the soil is acidic. Generally, the soil was poor in soil nutrients (Landon 1991; Asadu and Nweke, 1999) and of low fertility status for economical crop production. The low level of nutrients in the soil was probably due to its sandy nature (Busari *et al,* 2005). The nutrient composition of the poultry manure applied to the soil is shown on Table 2.

Properties of Poultry Manure

Poultry manure had a pH of 5.90, total N of 2.56%, available P of 21.6mgkg^{-1}, organic carbon 17.33%, exchangeable K 1.10cmolkg^{-1}. Content of Ca, Na and Mg were 1.61, 1.78 and 0.54cmolkg^{-1}respectively. Generally, the result shows that the nutrient concentration was higher in the amendment (poultry manure) than in the soil and contained adequate amount of nutrient element suitable for plant growth and development (Table 2).

Table 1: Initial soil properties

Parameters	Values
Sand(gkg^{-1})	923
Silt (gkg^{-1})	19
Clay (gkg^{-1})	58
Textural Class	Sandy Soil
pH (H_2O)	4.20
Available phosphorus (mgkg^{-1})	0.88
Total Nitrogen (gkg^{-1})	1.0
Organic Carbon (gkg^{-1})	4.8
Organic matter (gkg^{-1})	8.4
Calcium (molkg^{-1})	1.00
Magnesium (molkg^{-1})	0.10
Potassium (molk^{-1})	0.04
Sodium (molkg^{-1})	0.15
Exchangeable acidity (molkg^{-1})	0.32
CEC (molkg^{-1})	3.03
Base saturation (%)	49.0

CEC = Cation Exchange Capacity

Table 2: Nutrient composition of Poultry Manure (PM)

Parameters	Values
pH	5.90
Available phosphrous (mgkg^{-1})	21.60
Total Nitrogen (gkg^{-1})	25.6
Organic carbon (gkg^{-1})	173.3
Calcium (cmolkg^{-1})	2.00
Magnesium (cmolkg^{-1})	0.54
Potassium (cmolkg^{-1})	1.10
Sodium (cmolkg^{-1}	8.4

Effect of poultry manure on some soil physical properties.

The physical properties of soil after amendment are shown in Table 3. The bulk densities ranged between 1.25 – 1.44 gcm^{-}3. The bulk density obtained at 20 t ha^{-1} was lower than other rates of amendment compared to control. The pots amended with PM significantly (P< 0.05) improved the bulk densities of the soil. The order of decrease of bulk density of the soil is 20 t ha^{-1}< 15 t ha^{-1}< 10 t ha^{-1}< 5 t ha^{-1}< C and the percentage decrease is as follows; 13%, 11%, 8% and 3% compared to control. Soil bulk density values of the amended plots were significantly (P<0.05) lower relative to the control. The lowest value for bulk density (1.25gcm^{-3}) was observed in pots amended with 20 t ha^{-1} of PM which may be attributed to large quantity of organic matter and carbon in poultry droppings which helps in opening the soil (Abiven *et al.,* 2007). The higher bulk density (1.44gcm^{-3}) recorded in control could be due to the low organic matter (OM) and organic carbon (OC) observed in the soil.

Total porosity: Poultry Manure at 20 t ha^{-1} recorded the highest total porosity of 52.5% (Table 3). All amended pots significantly (P< 0.05) recorded higher total porosity when compared with control. Generally, total porosity increased with increase in PM. The trend in enhancement of total porosity by the different rates of PM application is 20 t ha^{-1}> 15 t ha^{-1}>10 t ha^{-1}> 5 t ha^{-1}> C and the order of percentage increase of total porosity is 13%, 12%, 9% and 4% compared to control. The general increase of total porosity as the PM increases could be attributed to organic carbon content which increases soil volume and therefore reduces soil bulk density (Nwite *et al*., 2018). The total porosities of both pots amended with PM and control ranged from critical to limiting values for soil productivity (Nwite *et al*., 2018).The highest value recorded by pots amended with 20 t ha^{-1} PM was significantly higher than other amended pots and which agrees with Mbah and Mbagwu (2006) that reported increased total porosity of the soil due to animal waste application.

Hydraulic conductivity: The soil hydraulic conductivity was higher in the amended pots compared to the control. The values range from 0.82 – 1.09 cmhr^{-1}. The result shows that there was a significant difference (P < 0.05) among the treatments with respect to hydraulic conductivity (Table 3).Pots amended with 20 t ha^{-1} of PM recorded the highest value for hydraulic conductivity which is higher (1.09%) than the pots amended with 15 t ha^{-1} of PM 0.9%.The higher hydraulic conductivity in amended pots agrees with Anikwe (2000) that amended soil with low bulk density and high total porosity increases hydraulic conductivity.

Gravimetric moisture content: The result shows that the values for gravimetric moisture content ranged from 4.75 – 12.00%. Generally, gravimetric moisture content of the amended pots increased greatly when compared with control. There was significant difference (P<0.05) between pots amended with 20 t ha^{-1} PM and the ones amended with 15 t ha^{-1}. The treatment with 20 t ha^{-1} of PM recorded 22.9% increase of gravimetric moisture content compared with that of 15 t ha^{-1}. The order of increasing values of gravimetric moisture content is 20 t ha^{-1}> 15 t ha^{-1}>10 t ha^{-1}> 5 t ha^{-1}> C. The higher values of gravimetric moisture content recorded by amended pots agrees with the findings of Obi and Edo (1995) and Nwite *et al*. (2022) that stated that increased moisture content may be attributed to the colloidal content of organic manure which increased water holding capacity.

Table 3: Effect of Poultry Manure on physical properties of beach sand.

Treatment	Bulk Density (g/cm^3)	Total porosity (%)	Hydraulic Conductivity (Cm/hr)	Gravmetic moisture content (%)
Control	1.44	45.75	0.82	4.75
5 tha^1 of PM	1.39	47.50	0.87	6.75
10tha^{-1} of PM	1.32	50.00	1.02	7.75
15tha^{-1} of PM	1.28	52.00	1.08	9.25
20tha^{-1} of PM	1.25	52.75	1.09	12.00
FLSD (P<0.05)	0.05	1.85	0.3157	1.87

PM – Poultry manure

Table 4 : Effect of poultry on chemical properties of beach sand

Treatment	pH	P ($mgkg^{-1}$)	N (gkg^{-1})	OC (gkg^{-1})	OM (gkg^{-1})	Ca	Mg	K $cmolkg^{-1}$	Na	CEC	EA	BS%
Control	7.40	6.97	0.4	3.8	6.6	3.09	2.17	0.10	0.13	5.65	0.16	97.16
5 t ha^{-1} PM	6.2	11.77	0.7	7.2	12.3	9.47	4.80	0.15	0.17	14.90	0.32	97.33
10 t ha^{-1} PM	6.3	13.17	0.5	7.4	12.7	9.87	4.53	0,19	0.15	14.90	0.16	98.67
15 t ha^{-1} PM	6.4	14.63	0.7	8.9	15.4	10.53	4.93	0.15	0.19	16.00	0.19	98.83
20 t ha^{-1}) PM	6.5	28.03	1.3	11.9	22.0	8.93	5.20	0.14	0.21	14.46	0.24	98.36
FLSD (P<0.05)	NS	8.74	0.05	0.53	0.91	NS	NS	NS	NS	NS	NS	NS

PM = Poultry Manure N-Nitrogen, P = Phosphorous, OC – Organic carbon OM – Organic Matter, CEC = Cation exchange capacity, EA = Exchangeable acidity, BS = Base saturation.

Effect of poultry manure on soil chemical properties.

Table 4 displays the soil's pH after planting. The pH values ranged from 4.20 to 6.50, with pots modified with 20 t ha-1 PM having the highest value (6.50). The pH of the soil improves from an acidic medium to a moderately acidic medium when an amendment is treated in the following ways: 0 t ha-1 < 5 t ha-1 < 10 t ha-1 < 15 t ha-1 < 20 t ha-1 (i.e. 4.20 < 6.20 < 6.30 < 6.40 < 6.50). The pH of the soil did not significantly alter (P<0.05) between the treatments, according to the data. The pH of the soil was found to have typically risen after treatment. The indicated pH values are suitable for groundnut growth since they are known to flourish in slightly acidic soils with an optimal pH range of 5.5 to 6.5 (Prasad et al., 2003; Gibbons, 1980). Available phosphorus: The available P (mgkg-1) for control (C), 5 t ha-1, 10 t ha-1, 15 t ha-1, and 20 t ha-1 were 6.97, 11.77, 13.17, 14.63, and 28, according to Table 4. All treatments showed significant changes (P < 0.05), especially between 20t ha-1 and 15t ha-1, where the former showed a 48% increase in comparison to the latter. Accessible phosphorus has improved in the following order: 0 t ha-1 < 5 t ha-1 < 10 t ha-1 < 15 t ha-1 < 20 t ha-1. It was shown that the different treatment rates considerably increased the amounts of available phosphorus. The increase was larger at a higher application rate of chicken manure (20 t ha-1). The findings showed that the soil in pots treated with chicken dung had significantly (P≤0.05) more available phosphorus than the control. However, the enhanced mineralization and release of the organic manure may be the cause of this (Mbah and Mbagwu, 20003; Azeez and Adetunjii, 2005).Except for those changed with 20 t ha-1, all pots modified with PM showed low levels of accessible P (<15 mg/kg) (Enwezor et al., 1).

Total nitrogen: Total N varied from 0.4 to 1.3 g kg-1 (Table 4).In comparison to the control, the pots containing 20 tha-1 PM showed a 69% increase in total N. While pots altered with 10 t ha-1 PM reported a lower value (0.5), pots amended with 5 t ha-1 and 15 t ha-1 recorded the same value (0.07%) for total N. The pace of its mineralization may be the cause of the total N's erratic trend. In general, the total nitrogen values were very low in comparison to the suggested critical levels of 0.2%N, or 2 g/kg (Akinrinde & Obigbesan, 2000).Organic Carbon (OC): According to Table 4, the reported organic carbon levels varied from 3.8 to 11.9. The outcome demonstrated that the amendment led to an increase in soil organic carbon. The percentage rise is 47%, 49%, 57%, and 68%, and the sequence of growth is 20 t ha-1 > 15 t ha-1 > 10 t ha-1 > 5 t ha-1 > C. The findings demonstrate that the treatments varied significantly in terms of organic carbon. The addition of chicken manure (PM) has increased the soil's organic carbon content. The ability of chicken manure to improve the nutritional condition of the soil may be the cause of the increase in organic carbon content seen in the altered pots (Mbah et al., 2018). Considering the suggested essential level of 3.0% (or 30 g/kg) OC for crop development, the levels of organic carbon found in all the pots utilized for the research were generally low (Akinride and Obigbesan, 2000). This state suggests that the soil's nutritional level is poor. Exchangeable cations: Table 4 displays the outcomes for exchangeable cations (Ca, Mg, K, and Na). Ca and Mg showed medium (3.17-5.20 cmolkg-1) and high (5.09-10.53 cmolkg-1) levels, respectively. Low levels for K and Na were reported, ranging from 0.12 to 0.19 and 0.15 to 0.21 cmolkg-1, respectively. Exchangeable calcium has an increasing order of 15 t ha-1 > 10 t ha-1 > 5 t ha-1 > 20 t ha-1 > C, whereas exchangeable magnesium has an increasing order of 20 tha-1 > 15 tha-1 > 5 tha-1 = 10tha-1 > C. Compared to plots altered with 20 tha-1 PM, those changed with 15 t ha-1 PM showed a 15% rise in Ca. While the plots altered with 20 t ha-1 PM recorded a higher value (0.21 cmolkg-1) for Na than other pots, the pots changed with 15 t ha-1 PM had a comparatively higher exchangeable K value (0.19 cmolkg-1). In general, there is no discernible difference in the therapies for exchangeable cations. It has been reported that the application of organic waste has increased exchangeable cations (Das, 2008, Olayinka, 1990; Howeler, 1996; Landon, 1991). There have also been reports of low Na and K levels in tropical treated soil (Asadu and Nweke, 1999; Akirinde and Obegbesan, 2000).

Cation exchange capacity (CEC): The findings indicated that CEC values varied from 5.65 to 16.00 comlkg-1. Compared to 20 tha-1 with 10%, the value at 15 tha-1 was much greater. The CEC values increased in the following order: 15 tha-1 > 10 tha-1 = 5tha-1 > 20tha-1 > C. According to Ogunlade (2008), Olowoake (2009), Asadu and Akamigbo (1990), and Akande et al. (2010), applying chicken manure or organic fertilizer greatly enhanced the soil's ability to exchange cations in tropical regions.

Exchangeable Acidity (EA): The range of exchangeable acidity (comlkg-1) values was 0.16 to 0.24. The therapies do not seem to vary much from one another. The result is consistent with the findings of Adeniran (2003), who found that by removing Al^{3+} from the exchange site, animal wastes reduced exchangeable acidity (EA). The PM-amended soil had considerably ($P<0.05$) greater exchangeable acidity (EA) than the control.

Effect of poultry manure on agronomic parameters.

Plant height: At 10WAP, the height varied from 36.75 cm to 54.05 cm (Table 5). Pots treated with 20 tha-1 and control had the greatest and lowest plant height values, respectively. Plant height increases in the following order: 20 t ha-1 > 15 t ha-1 > 10 t ha-1 > 5 t ha-1 > C, with corresponding percentage increases of 38%, 25%, 19%, and 6%. When compared to other treatments and the control, the addition of 20 tha-1 of PM markedly boosted the plant height, reaching its maximum height at 10WAP. This is consistent with the findings of Yanduraju et al. (1980), who found that using chicken manure significantly increased plant height. Branch count: The findings indicate that there were between 11 and 20 branches at 10WAP (Table 5). The number of branches varied significantly between the various treatment rates when PM was added to the soil. At 10 WAP, the pots treated with 20 tha-1 of chicken manure (PM) had the most branches. Yanduraju et al. (1980) concur with this as well.
Index of Leaf Area (LAI). The pots modified with poultry had greater LAI values.

manure compared to the control pots (Table 5). The highest value (9.60 cm) was recorded by the pots amended with 20 t ha^{-1} and least value (5.62 cm) recorded among the treated pots was by 5tha^{-1}. However, 20 tha^{-1} of PM significantly increased leaf area index when compared with other treatment rates. Generally, the amended pots were statistically different when compared with control, this agrees with the findings of Nwite *et al.* (2022).

Pod number: The result shows that pod number ranged from 4 – 9 with pot amended with 20 tha^{-1} recording thehighest value (9) for pod number (Table 5). Control pots recorded the lowest value (4) for pod number. Application of poultry manure affected the pod number (Nwite *et al.,* 2022).

Yield/ Seed tha^{-1}: The grain yield (tha^{-1}) ranged from
0.4 – 0.9 (Table 5). The increasing order of grain yield was C< 5tha^{-1}< 10tha^{-1} = 15 tha^{-1}< 20tha^{-1} corresponding to 0.4, 0.6, 0.7, 0.8 0.9 tha^{-1}. The increased groundnut grain yield could be attributed to higher nutrient in the poultry manure. This agrees with Mubarak (2004) who reported an increase of 10% grain yield of groundnut when poultry manure was applied at the rate of 5 tha^{-1}. Ahmed *et al.* (2010) reported highest dry matter accumulation and kernel yield when groundnut was fertilized with 3 t ha^{-1} of poultry manure.

Table 5: The effect of Poultry manure on some agronomic parameters

	Plant height (cm)		Number of leaves				
	4WAP	10WAP	4WAP	10WAP	Leaf Area (LAI)	Pod Number	Yield tha^{-1}
Control	20.38	36.75	6.0	11	5.40	4	0.4
5tha^{-1} PM	24.50	39.25	7.0	12	5.62	5	0.6
10tha^{-1} PM	27.43	45.38	7.5	14	7.68	6	0.7
15tha^{-1} PM	29.10	49.13	9.0	19	8.82	7	0.8
20tha^{-1} PM	31.50	54.05	9.5	20	9.66	9	0.9
FLSD (P<0.05)	2.36	2.46	0.7	2.9	1.02	NS	NS

WAP = Week After Planting

CONCLUSION

According to the research, applying chicken manure at a suitable amount (20 t ha-1) on river sand enhanced its productivity and raised groundnut growth and output. The physical and chemical characteristics of the soil were greatly enhanced by the organic manure. In contrast, compared to other rates, chicken manure at 20 tha-1 greatly enhanced beach sand productivity, growth, and groundnut output. When it comes to managing beach sand for increased production, PM application seems to be a good strategy. 20 tha-1 of PM is advised for both high groundnut yield and beach sand treatment in order to preserve and improve beach sand productivity.

REFERENCES

Abiven S, Menasseri S, Angers DA, Leterme P. (2007) Biological binding agents and aggregation stability dynamics during organic material degradation. Journal of Soil Science in Europe, 58:239-247.

Singh RK, Ahmed S, Rafay A, and Verma UK (2010). Groundnut types' reactions to various manure sources and weed-control methods. Asadu CL A, Akamigbo FOR, Indian Journal of Agronomy 31(3): 248-251 (1986). The impact of topo-sequence on some soil characteristics in certain regions of the south-eastern state of Anambra Nigeria, Journal of Soil Science 6: pp. 35–46 Akande MO, Oluwatoyinbo FI, Makinde EA

Okra's reaction to organic and inorganic fermentation (Adepoju ES, Adepoju IS, 2010). 8.11:261-266 in Nature & Science Obigbesan GO, Akinrinde EA (2000). An assessment of the fertility of certain soils in five Nigerian ecological zones for agricultural production. 279–288 in Proceedings of the Soil Science Society of Nigeria's 26th Annual Conference. Amuyou, U.A., Eze, E.B., Essoka, P.A., Effiong, J., and Egbai, O.O. (2013). The Obudu Mountain Region in Southeast Nigeria exhibits spatial variability in soil properties. Humanities and Soil Sciences International Journal 3 (1): 1–11 impact of applying sewage sludge on the chemical and physical characteristics of a wind-affected soil (Angin I, Yaganoglu AV, 2011). Agricultural Science Technology Journal, 13, 757-768. Anikwe MAN (2000). Amelioration of heavy clay loam soil using rice dust and its influence on Soil physical characteristics and maize production. Technol. Biores, 74: 169-173.

Akamigbo FOR, Asadu CLA (1990). Organic matter and clay fraction's relative contributions to Southeastern Nigerian soils' ability to exchange cations. Samru Journal of Agricultural Research, 7:17–23

Nweke FI, Asadu CLA (1999). Soils of Arable Crop Fields in Sub-Saharan Africa: Focus on Cassava – growing Area. Study of Cassava Africa in Collaboration. Working paper No. 18, Resources and Crop Management Division, IITA, Ibadan, Nigeria, 182 pages. Nweke F. I., Asadu, C.L.A., and Enete, A.A. (2008). Sub-Saharan Africa's traditional agricultural systems' intensification and soil characteristics. 7(3): 186-192 Agro Science Adetunji MT, Azeez JO (2005). An incubation research comparing the effects of inorganic and organic fertilizers on the chemical properties of soil. In: Managing Soil Resources for Food Security and Sustainable Environment, Salako FK, Adentunji MT, Ojanuga AG, Arowolo TA, Ojeniyi SO (Ede). The 29th annual Cont. of Soil Sc Soc. Proceedings. of Nigeria, 198–205 pages, at the University of Agric Abeaokuta, Nigeria. Babalola OA, Sadou MK, Sulaiman ON, and STO Lagoke (2005). Two groundnut varieties' reactions to the application of phosphorus and nitrogen under various tillage techniques in Abeokuta.In: Managing Soil Resources for Food Security and Sustainable Environment, Salako FK, Adentunji MT, Ojanuga AG, Arowolo TA, Ojeniyi SO (Ede). Proceedings of the 29th annual Cont. of the Soil Science Society of Nigeria, held at the University of Agriculture in Abeaokuta, Nigeria, pages 198–205.

Blake GR, Hartage KH (1986). density of bulk. Methods of Soil Analysis, Part 1, American Society of Agronomy, 409 Madison, Wisconsin, 364-375, Klute A (Ed). Total Nitrogen, Bremner JM, Mulvanney CS (1982). Methods of Soil Analysis Part 2 ASA, Madison, Wisconsin, pp. 595-624, Page A et al. (Eds.).

Busari MA, Adekunle 10, Azeez JO (2005) Poultry manure and phosphorus application's impact on two centrosema species' fodder quality and production in an Alfisol. In: 133–138 pages. Waliyar F, Taheri A, Prasad PVV, and Craufurd PQ (2006). Pod yield, pre-harvest, and drought. Das TK (2008). Basics and Applications of Weed Science, Jain Brothers, New Delhi, India, 495 pages. Beni C, Diana G, and Marconi S (2008). The effects of mineral and organic fertilization on the physical properties and boron dynamics of agricultural soil. Plant Anal. Commun Soil Sci. 39:1332-1351. EBADEP (2005) Annual Record of the Ebonyi State Agricultural Development Program. Sobulo RA, Udo FJ, and Enwezor WO (1981). Acid sands' production and fertility. In: Southeast Nigerian Acid Sands. Nigerian Soil Science Society Monongraph 1:56-73. FAO (2000). The Value of Organic Matter in Soils, FAO Soils Bulletin No. 80, Rome.

Asmare, M.B., Bobe, B.A., Fekadu, A., and Kibebew, K.A. (2018). Soil classification and characterization of the Yikalo Subwatershed in the Northwestern Highlands of Ethiopia Endalkachew's Lay Gayint District. Journal of Soil Science in Eurasia 7 (2): 151–166 Bander JW, Gee GW (1986). According to Soil SC SOC Am J. 43 1004-1007 JUO ASR (1979), the hydrometer technique of particle size analysis is a simplified version of routine textural analysis and sensitivity testing on mineral parameters. Selected

International Institute of Tropical Agriculture (IITA) Soil and Plant Analysis Methods. Nigeria's Ibadan

RW Gibbons (1980). Groundnuts are adapted and used in many agricultural techniques and locations. Advances in Legume Science, Royal Botanic Gardens, Kew, edited by Summerfield, R.J. and Bunting, A.H.