

**DETERMINATION OF GROWTH AND YIELD OF INTERCROPPING OKRA (*ABELMOSCU M ESCULENTUS L. MOENCH*) AND GROUNDNUT (*ARACHIS HYPOGAEA*) USING THREE LEVELS OF POULTRY MANURES.**

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**ABSTRACT**

*The experiment was conducted at the Teaching and Research Farm of School of Agriculture and Agricultural Technology, Federal polytechnic, Nekede during the late planting season in October 2021. The aim is to determine the growth and yield potentials of intercropping Okra (*Abelmoscus esculentus*) and groundnut (*Arachis hypogea*) using three level of poultry manure. The experiment was done in a Complete Random Design (CRD) using one factor (poultry manure) with three replicates. This experiment was carried out on sack and placed in an area of 250m<sup>2</sup>. Manure was mixed two weeks prior to planting to allow mineralization to take place. The crop were planted one per sack and two seeds for intercropping okra, one groundnut) making a total of 24 seedlings. Growth parameters such as plant height, number of leaves, stem growth etc and yield parameters were recorded in 2, 4, 6 and 12 weeks. Data collected were subjected to Analysis of Variance (ANOVA) using least significant difference ( $p \leq 0.05$ ). Result of the experiment shows that application of poultry manure at 5 and 10t/ha shows a significant difference ( $p = 0.05\%$ ). However, 10t/ha shows the highest in growth and yield parameters of okra and groundnut intercrop from 4 weeks after planting. 0t/ha shows the least value in growth and yield values tested yield of 10t/ha was used highest in numbers of okra fruits and groundnut pods – 32.0, 55.00, 88.00 t/ha as shown in table 4.*

**INTRODUCTION**

Groundnut is an annual crop with an average length of 25-50cm in height with either spreading or bushy growth habitat. It has a deep taproot system with numerous lateral roots endowed with good nodulation potentials. It is classified into two based on growth habits, upright one and runner type (Uguru 2001),

Climatically, it requires rainfall of 750-1250mm during the growth period. It is a drought resistant crop. It does well in PH 7.0 with good soil content calcium, potassium and phosphorus. It originated from Brazil and requires shallow drilling and early weeding. It requires calcium for nodulation. It matures s in 14-20 weeks after planting. Yield depends on seed and specie and ranges 500-4,000kg per hectare. Major pests of groundnut include beetle, aphids, hoppers etc.

the pest is controlled by spraying the base of the plant with diazinon or denitrothion. Other serious pest includes rodent, millipedes etc. field hygiene helps to reduce the attack. The diseases includes rosette, wilt, leaf and root rot, leaf spot, groundnut rust and aflatoxin fungus caused by non proper storage of dried groundnut.

Okra is a seed that is highly sought after with the edible seeds containing 30% protein, 45% oil, 2% fibre, 2% ash and 5% water. After extraction, the residue is good source of protein useful in bakeries and in livestock feed production. Okra (*Hibiscus esculentus*) is another import crop indigenous to tropical Africa and now grown throughout the sub tropics. It fruit is eaten fresh or cooked in all West Africa countries. It is an erect annual herb attaining a height of 1-2m. It grows well in all forms of soil and requires an annual rainfall of 1020-2030mm.

Varieties vary from country to country, in Nigeria, long green pod, green velvet, long green and ladyfinger. In Liberia, Perkins dwarf and Clemson spineless are recommended (Komolafe 1985). It is propagated by seed 1-2cm deep per row with 60-90cm apart in row and 30cm along the row, a spacing of 60cm x 60cm is also used. Early type produces 50 days after planting.

Fruit picking continues for 2 months after which the plants are allowed to set seed for future sowing. Clean weeding and application of organic manure increases yield.

Yield can be high depending on the variety and length of picking. Yield of 0.6kg per plant or 6-7 tonnes per hectare have been obtained at the university of Liberia farm.

The disease of okra includes leaf curl caused by virus, powdery mildew caused by fungi while pest include beetle and other insects. Spraying and dusting with the appropriate insecticide should begin as soon as the seedling emerges.

Intercropping is an advanced method of farming where two or more crops are planted simultaneously during cropping season. It ensures mass production of food and check crop failure. Intercropping okra and groundnut has advantage. Apart from food production, soil fertility is being maintained.

Furthermore, the use of alternative fertilizer which is too costly for poor resource farm is important

objective to this research. The use of poultry manure cannot be over emphasized. Poultry manure not only serves as manure but also soil amender.

### RESEARCH METHODOLOGY

Groundnut (*Arachis hypogea*) also called peanut is important food and cash crop grown across West Africa. The crop is cultivated mainly by small holder and resource poor farmers. It is a self pollinated tropical annual legume (Ntareat *et al.*, 2008). It is an important crop in Nigeria as it occupies 13-17% of total land area in some states of the country.

It is a major crop grown either for its nut, oil or its vegetable residue. Groundnut provides high quality edible oil used in cooking for margarine making, salad, easily digestible protein (20-28%) and about ½ of the 13 essential vitamins and more than 2/3<sup>rd</sup> of the 20 essential minerals necessary for normal human growth and maintain.

It provides high quality fodder for livestock production (Taruat *et al.*, 2008). Groundnut may be prostrate or erect. Okra is a very important crop and its importance is quite immeasurable and highly indispensable in our diet, hence, there is need to make okra available and affordable for human consumption. Okra is domesticated species of plant genus in the family *Malvaceae*. It originated from the tropical Africa (Johnson *et al.*, 2005), where it was probably first domesticated.

Its potential use and benefits to mankind covers many areas such as food, medicine and finances. It was also reported that okra originated from Abia (Mecullum, 1980; Tindall, 1983). Though there are various views by different authors regarding the specific place and origin and documentation. Tindoll 1983 reported that okra was known in Egypt in the 12<sup>th</sup>-13<sup>th</sup> century in many tropical countries. Okra is valuable for its immature green okra crop has significant role in supplying vitamin minerals and medically important compound (Ude *et al.*, 1997)

The process of intercropping these two important crops is a positive and proactive move in developing the nutritional and economic value of our people and the farmers.

Intercropping is an advanced agro system of cultivating two or more crops. In the same place at the same time.

Uzoigwe (2019) it has been practiced in the past decades and achieved the aims and objectives of

agriculture. Increase in productivity per unit of land via better utilization of resources, minimizes the risk, reduces weed competition and stabilizes the yield, selection of compatible crops, planting density, time of planting as well as socio-economic status of farmers and religion.

Intercropping land is effectively utilized and land equivalent ratio is used to measure the productivity of land.

In small farms, the farmer raises the crop as a risk minimizing measure against total crop failure and to get different product to take care of his family food, income and other diversification. World population is increasing geometrically and has to fill increasing productivity and labour utilization per unit area available land to intensify land use. This can be increased by growing several crops simultaneously or in succession with each other in farms devoted to short maturing annual crops.

The use of inorganic fertilizer are not affordable to most peasant farmers in Nigeria as a whole, hence, organic manure can be immensely helpful. Organic materials are matters composed of organic compounds that come from the remains of plant and animal and their waste product in the environment.

Organic matter is present throughout the ecosystem. When the organic matter has broken down into a suitable substance that resists further decomposition, it is called humus. Humus releases plants nutrients such as nitrogen, phosphorus and potassium. Humus also helps to hold the soil structure thereby preventing erosion. It also helps the soil to stick together which allows nematodes and other micro organism like bacteria to decay the nutrients in the soil (Komolafe, 1985). An organic matter encourages the formation of soil crumb structure thus, improving soil internal drainage, infiltration and aeration. Colour that form with increasing organic matter content improves soil temperature relations which improves essential microbial activity and root development of crops (Ahiwe, 2008).

All forms of organic materials added to the soil put back nutrients and improves soil structure. Organic manure has specific advantage or importance which favours growth and yield of okra intercropping with groundnut. These farming materials are abundant and biodegradable in our environment. Poultry manure has rich plant nutrients which on application in an intercrop produces a surplus food for man.

### RESULTS AND DISCUSSIONS

**Table 1; chemical analysis of poultry manure used in the study.**

| Sample                | Poultry manure |
|-----------------------|----------------|
| Soil PH in water      | 6.6            |
| Nitrogen (N %)        | 20.8           |
| Organic carbon (OC %) | 16.8           |
| Organic matter (OM %) | 28.9           |
| Calcium (Ca %)        | 0.21           |
| Magnesium (Mg %)      | 0.17           |
| Phosphorus (P %)      | 24.84          |

The result of the table 1 shows that poultry manure contains nutrient elements needed by plants for growth and yield. The component includes nitrogen (%) 20.8, organic carbon 16.8 and phosphorus 24.84.

these elements in high percentage provides alternative to NPK fertilizer for the farmers and use of organic manure which not only provide nutrients but also act as soil amenders.

**Table 2; effects of poultry manure on plant height at 4 weeks after planting in cm.**

| Cropping system | 0t/ha | 5t/ha | 10t/ha | Mean  |
|-----------------|-------|-------|--------|-------|
| Okra            | 5.80  | 7.30  | 12.20  | 17.17 |
| Groundnut       | 2.80  | 3.20  | 3.50   | 3.17  |
| Okra x G.nut    | 3.84  | 5.00  | 7.60   | 5.60  |
| Mean            | 9.88  | 12.33 | 7.70   |       |

LSD (0.05) for poultry manure 0.38

LSD (0.05) for okra = 0.43

LSD (0.05) for groundnut = 0.44

LSD (0.05) for okra x groundnut = 0.64

Table 2; shows the effect of poultry manure on plants height 4 weeks after planting. The table shows a rapid growth of the treatment, 5t/ha and 10t/ha. There is a significant difference among the poultry manure treated treatments. Okra recorded (12.20) in 10t/ha, groundnut (3.50), okra x groundnut (7.60) values. The growth in the poultry manure treatment is in line with Duruigbo (2007) findings that poultry manure supplies some nutrient plant needs and carbon containing compounds which improves the structure of soil, cementing the particle together. This structural improvement increases aeration, drainage and

encourages good root growth by providing enough pores of the right size and preventing the soil from becoming too rigid when dry or completely water logged and contains varying percentage of nitrogen and their nitrogen will require some days to neutralize after incorporation into the soil. Poultry manure application into the soil significantly increases the yield and growth of crops (Samuel, 1985). It is also organic matter to the soil which may improve soil structure, aeration, soil moisture, holding capacity and water infiltration (Bandjes, 1996).

**Table 3; effects of poultry manure on plant height at 6 weeks after planting (cm)**

| Cropping system | 0t/ha | 5t/ha | 10t/ha | Mean  |
|-----------------|-------|-------|--------|-------|
| Okra            | 6.80  | 10.38 | 18.38  | 11.66 |
| Groundnut       | 3.60  | 4.32  | 5.50   | 4.50  |
| Okra x G.nut    | 4.80  | 8.50  | 10.30  | 7.87  |
| Mean            | 5.07  | 7.80  | 11.10  |       |

LSD (0.05) for poultry manure (0.38)

LSD (0.05) for okra (0.46)

LSD (0.05) for okra x G.nut (0.65)

Table 3 shows the effects of poultry manure on plant height 6 weeks after planting. The plant height grows geometrically as the application of the poultry manure. The height value of okra (18.38) from 10t/ha, followed by (10.30) from the intercrop (okra x G.nut). The 5t/ha had (10.38) for okra (4.0) for groundnut while the intercrop had (8.00). The 0t/ha had the least value of height (6.80) from okra (3.00) from groundnut (4.80) intercrop. This high growth of intercropped system was as a result of poultry manure

application which (Brandjes, 1996) observed that it contains nitrogen which varies in manure of different animals. Approximately, 75% of the total nitrogen and majority (90-100%) of the phosphorus and potassium poultry litter are available for plant during the year of application (Hammond *et al.*, 1997). It application increase total carbon and nitrogen in soil, while the application of nitrogen fertilizer (inorganic) increased neither carbon or nitrogen in the soil (Dick and Christ, 1995).

**Table 4; effect of poultry manure on number of okra fruit and groundnut pods.**

| Cropping system | 0t/ha | 5t/ha | 10t/ha | Mean  |
|-----------------|-------|-------|--------|-------|
| Okra            | 11.90 | 22.00 | 32.00  | 21.90 |
| Groundnut       | 38.00 | 65.00 | 55.00  | 63.70 |
| Okra x G.nut    | 25.00 | 38.00 | 88.00  | 47.30 |
| Mean            | 26.60 | 44.00 | 62.70  |       |

LSD (0.05) for poultry manure (0.38)

LSD (0.05) for okra (0.22)

LSD (0.05) for groundnut (0.23)

LSD (0.05) Okra x G.nut x poultry manure (0.38)

Table 4 shows effects of poultry manure on groundnut and okra yield 12 weeks after planting. Groundnut (55.00) made second to the highest value followed by intercrop of okra x groundnut (88.00) which was highest. Both high values came with 10t/ha poultry manure. This confirms the finding of Lorinbin *et al.*, (1991) which says the use of organic manure especially poultry manure and house hold refuse for crop production is an age long agricultural practice in subsistence farming (Samuel, 1985), state also that poultry manure application into the soil significantly increases the yield of crop. It is also organic matter to the soil which may improve soil aeration, soil structure, soil moisture holding capacity and water infiltration (Brandjes, 1996).

Udo et al (2009) manual of soil science and water analysis. Sibon book publisher ltd. Nigeria, pg 183.

### CONCLUSION

Poultry manure is agricultural waste that contains essential plant nutrients and their application in an acidic soil of the tropics improves soil fertility status. As the rate of poultry manure increases, there is an increase in growth and yield of the parameters measured. Also, the intercrop yield was highly encouraging on the 10t/ha application of poultry manure. Hence, for varieties of yield intercropping is recommended.

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