

EFFECTS OF FARMYARD MANURE, SAWDUST AND NPK 15-15-15 FERTILIZER ON GROWTH AND YIELD OF (*CUCUMIS SATIUS* L.)

J. F. OWOLABI, E. OPOOLA., M. A. TAIWO AND P. UNAH

ABSTRACT

A study was carried to determine the effect of inorganic and organic fertilizer for cucumber production. This is to assess and establish the type that will produce optimum yield. The fertilizer types evaluated were poultry manure, sawdust, NPK 15-15-15. The study was conducted on Alfisol soil at kabba. The experimental design used was Randomized Completely Block Design (RCBD) with five treatments. The treatment were poultry manure (25 tons/h) , sawdust 25 tons/h , NPK 15-15-15 (400kg/ha), poultry manure (25 tons/ha) + NPK 15-15-15 (400kg/ha) and control (No fertilizer application) . All the treatments were replicated four times to give a total of twenty (20) experimental plots. The result of this study showed that the combination of poultry manure and NPK 15-15-15 significantly increased ($P < 0.05$) the Number of leaves, Number of fruits and weight of fruits (fruit yield). The yield performance sequence was in the order poultry manure+ NPK 15-15-15 > poultry manure > sawdust > NPK > control.

KEY WORDS: Poultry Manure, Sawdust, NPK 15-15-15, Cucumber, Alfisol

INTRODUCTION

Agriculture in developing countries has the economic potential to produce sufficient food for its inhabitants (FAO 2001). However, in the tropics diets are often not balanced not only because of ignorance of solid dietary principles and food prejudice but also because of lack of good species and varieties (FAO 2001)

Moreover, most people lack the economics resources to purchase nutritionally balanced diets. However, vegetable fruits could be used as a low income source vitamins and minerals lacking in most of our diets. One of the vegetable fruits that hold such promise attribute is cucumber (*cucumis sativus*).

Cucumber is an important fruit vegetable and its versatility for use in the preparation of various dishes; make it increasingly popular in Nigeria. The fresh fruits are edible. Information is lacking of appropriate fertilizer use and management for the production of cucumber in Nigeria. There is also the need to evaluate the available organic and inorganic fertilizers for their potentials for producing cucumber. The price of inorganic fertilizers has steadily increased from ₦1,500/50kg/bag in Kogi and Kwara states in 2010 to ₦2,200 and ₦3,400/50kg/bag in Kogi and Kwara States in 2012 to give a 90% fold price increase (Kogi ADP 2013), which is not only beyond the reach of the local farmers but has almost reduced farming to an unprofitable venture.

As an alternative, organic fertilizer materials are readily available or can be easily generated by the farmer. In addition to their slow release of the whole range of minerals required by the crop, organic manure improves soil physical and chemical properties which positively improved crops yield.

Hati, *et al.*, (2006) strongly recommended the use of inorganic fertilizer along with organic manure in order to produce the decomposition of the latter. He also said that using organic manure with inorganic fertilizer raises farmer's yields by above 25% than when using fertilizers alone. Therefore this experiment was aimed at evaluating some alternative sources of fertilizer for producing cucumber

Materials and Methods

The field experiment was carried out in the Teaching and Research Farm of College of Agriculture Kabba, Kogi state, Nigeria. The area lies between latitude $07^{\circ} 56'$ North and Longitude $06^{\circ} 45'$ East and 427m above sea level with an average rainfall of 1362.20mm with bimodal distribution. The area has two distinct seasons in a year, the rainy and dry seasons.

The soil type used for the experiment has been classified by USDA (1975), as Alfisol. Surface soil samples (0-15cm) were collected randomly from the experimental site. They were analyzed using the IITA (1979) method of soil Analysis. The site of the experiment was left fallow for two years. The site was manually cleared, stumped and leveled to give a fine tilth, afterwards demarcated into plots.

The experimental design used was Randomized Completely Block Design (RCBD) with five treatments. The treatment are poultry manure (25 tons/h) T1, sawdust from gmelina logs 25 tons/ha (T2), NPK 15-15-15 (400kg/ha) T3, poultry manure (25 tons/ha) + NPK 15-15-15 (400kg/ha). T4, control (No fertilizer application). All the treatments were replicated four times to give a total of twenty (20) experimental plots. The gross experimental site was 25m x 11m (275m²). Each bed was 1m x 5m (5m²). Planting was carried out using 2 seeds per hole with a spacing of 60cm x 60cm. The

J. F. Owolabi, Ahmadu Bello University, Division of Agricultural colleges, Kabba college of Agriculture
E. Opoola, Ahmadu Bello University, Division of Agricultural colleges, Kabba college of Agriculture
M.A. Taiwo, Ahmadu Bello University, Division of Agricultural colleges, Kabba college of Agriculture
P. Unah, Department of crop and Environmental protection, Faculty of Agric. University of Agriculture, Markurdi,

plant population per bed was 32 plants and for the whole plots were 640 plants. Vertox 85 was sprayed twice at the rate of 5 large full match box (140gm) to 10 litres of water at 2 and 4 weeks respectively, after planting.

Already Cured poultry manure plus sawdust were applied at the rate of 25 tons/ha and 40 tons/ha respectively at -2 weeks before planting. They were incorporated into the soil during land preparation while NPK fertilizer was applied at 2 weeks after planting at the rate of 400kg/ha. Hoe weeding was carried out twice at 2 and 4 weeks after planting. 10 plants were collected randomly from each bed for data collection and analysis. Traits taken for analysis include, number of leaves, number of fruits and weight of fruits (fruit yield) kg/plot and projected into ton/ha.

Data collected were analyzed using analysis of variance (Anova)

RESULTS AND DISCUSSION

Table 1 show the result of physical and chemical analysis of soil, sawdust and poultry manure used on the experimental site. Table 2 shows the summary of the result of the effect of the treatments applied. The treatments applied significantly ($P < 0.05$) influenced the number of leaves per plant, number of fruits per plant and fruits yield of cucumber at 5 weeks after planting followed by plots that received the combination of poultry and NPK, then sawdust. The trend of the results obtained for number of leaves at 5 weeks might be due to the fact that by 5 weeks the poultry manure applied would have release its nitrogen gradually to the soil for the crops intake to produce more number of leaves. The trend of performance with reference to the number of fruits with respect to the treatments applied was in the order poultry + NPK was greater than poultry sawdust NPK control. The

CONCLUSION

From the study, it was observed that the use of poultry manure + NPK 15-15-15 is desirable in Alfisols soil of Nigeria.

Table 1: Physico-chemical properties of the experimental Soil, Sawdust and Manure

Properties	PCPS	Sawdust	Poultry manure
	Type: Afisol (FAO)		
pH	6.58	7.00	7.50
Ca mol Kg ⁻¹	2.47	1.53	18.0
K Mol kg ⁻¹	0.11	2.00	1.30
Na mol kg ⁻¹	0.30	0.40	3.0
Mg mol kg ⁻¹	1.53	0.95	11.57
Ex. acidity	0.08	0.03	0.01
CEc	4.53	4.98	33.99
Base saturation %	97	98	100
Organic carbon %	1.69	3.95	5.98
Total N %	0.18	0.43	0.59
Available phosphors	19.76	33.7	58.88
Sand %	83.20	N/A	N/A
Silt %	12.25	N/A	N/A
Clay %	6.66	N/A	N/A

N/A—Not available; PCPS=Physico-chemical properties of the soil.

explanation for the trend observed may be because the poultry manure was able to improve the soil structure and the soil water holding capacity. which consequently supplies the crop with adequate moisture to produce more fruits as was observed in the experiment. The following reasons could be given for the trend of the result obtained. Poultry manure was able to release its nutrients gradually to the plant for effective nutrient utilization. The poultry manure had the ability to improve soil structure and the water holding capacity of the soil. The trend of result obtained in this study agreed with the findings of Hossain and Ishimine (2007) who reported that soil supplied farmyard manure retains moisture longer than soil supplied inorganic fertilizer. This is because moisture is essentially required at the fruiting stage of garden egg. Also the findings in this study agreed with the finding of Kaurk *et al.* (2005) who reported that organic manure are superior to inorganic fertilizer in improving plant growth. The order of performance with reference to weight of fruits with respect to the treatments applied was in the order PM + NPK, PM, sawdust, control (Table 2). The trend of the result obtained in this study agreed with the findings of Sarkar *et al.* (2003), who all concluded that FYM and mineral fertilizers usually give higher yields.

Also according to Sarka *et al.* (2003) FYM can sustain good crop yield under intensive cropping to that of mineral fertilizer because of the former's slow nutrient release factor, its ability to buffer the soil P^H against undesirable fluctuations. When FYM is applied together with mineral fertilizers, the latter aids the decomposition of the former.

Satyanarayana *et al.* (2002) also strongly advocated for supplementary use of inorganic fertilizer along with organic manure in order to promote the decomposition of the latter. He also discovered that using organic manure with inorganic fertilizer raises farmer's yield than using Inorganic fertilizers alone.

Table 2: Growth and Yield Traits of Cucumber

Treatment	Number of leaves	Number of fruit	Weight of fruit
Poultry T ₁	21	57	14.23
Sawdust T ₂	16	43	11.08
NPK T ₃	10	33	7.95
15-15-15			20.1+NPK
Poultry Manure T ₄	17	68	
15-15-15			5.8
Control T ₅	13	27	6.19
LSD	5.21	18.27	

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