

DETERMINATION OF ECONOMIC COST BENEFIT RATIO OF PEPPER (*Capsicum annum*) PRODUCTIVITY USING SOME ORGANIC MANURE IN OWERRI IMO STATE NIGERIA.

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ABSTRACT

Field experiment was conducted at the Teaching and Research Farm of Federal University of Technology, Owerri, to determine the effects of palm bunch ash and poultry manure on the growth and yield of pepper (*Capsicum annum*). The experiment was carried out using a 3x3 factorial in Randomized Complete Block Design with three replications. The treatments studied were palm bunch ash and poultry manure at 0, 5, and 10 tons/ha, respectively. Growth parameters were collected at 2, 4, 6 and 8 weeks after planting while the yield parameters were measured at harvest in the 12th week. Data collected were subjected to analysis of variance and significant levels were separated using Least Significant Difference (LSD @ p < 0.05). Results of the experiment showed that application of poultry manure and palm bunch ash at 10 t/ha significantly (p < 0.05) increased the growth parameter of pepper from 4 weeks after planting. Also, the total financial expenditure of the production and the total revenue accrued after harvest sales were determined. The cost benefit ratio showed that the cost of producing pepper using 5 tons/ha is more economical or beneficial than using 10 tons/ha although, both tonnes were enterprising.

Keywords; organic, manure, pepper, cost benefit

INTRODUCTION

Pepper (*Capsicum annum*) originated from West Indies, Peru and Mexico and have spread to tropics and sub-tropics. It is an annual erect herb or sub-shrub with many branches. The unripe fruits are big, roundish green or purple but become red, orange, yellow or brown when ripe. In Nigeria, it is grown solely for export. (Komolafe *et al* 1985). They are propagated using seeds that retain viability for 2-3 years. Seeds are sown on nursery or flats and germination occurs 6 to 10 days. The seedlings are sown when the height is 10-13 cm high. The seedlings are watered until they are established. Spacing is 60-90 cm apart. Yields vary with variety and system of cultivation. Average fruit of 2240-3300 kg per ha. There is an increase of 70 percent if 90.7 kg of 15:15:15 fertilizer is applied or 130 kg of 10:10:10 per ha. is applied 7-10 days after planting followed by a top dressing of Sulphate of Ammonia 2 weeks later. With high irrigation and good cultural practices, 6720-22400 kg fresh fruits per ha are possible." Some common diseases of pepper include

mosaic and leaf curl, damping off and leaf spot and fruit diseases while the main pest is Nematode" (Ian Macdonald *et al* 1984)

It belongs to the family of *Solanaceae* and genus *Capsicum*. Other members of the family include, *Lycopersicon esculentum* (tomato) and *Amaranthus Specie* (garden egg) (Greenleaf, 1986).

Organically, it has been shown that Palm bunch ash and Poultry manure are very viable for pepper production and economic purposes. The materials are eco-friendly, cheap and biodegradable and affordable, unlike inorganic fertilizer. The materials also amend the soil structure (Ahaiwe, 2008).

RESEARCH METHODOLOGY

Research has shown that poultry manure application increased the growth and yield of pepper. Organic matter improves the soil by lowering bulk densities, reduces soil erosion and improves soil fertility (Brandy *et al* 2007). Organic matter encourages the formation of soil crumb structure thus, improving soil internal drainage, infiltration and aeration. Colours that form with increasing Organic matter content improves soil temperature relations, which improves essential microbial activity and root development of pepper (Ahaiwe, 2008).

Poultry manure has been shown to improve the biodiversity and long term productivity of crop (Ewulo *et al.*, 2008). Poultry manure increases the abundance of soil organisms such as termites, fungi by providing Organic matter and micronutrients for organism such as Fungi and Mycorrhizia (Pimental, *et al.*, 2005). The supply of Poultry manure allows the direct uptake by plants of specific chemicals needed for the development of their immune system. It contributes to the anti-phyto pathogenic potentials of soils. This is particularly important in the case of Fungi damping off disease such as Rhizotinin, Fusarium and Pythium (Lampkin, 1990). Various studies found that in Organic versus conventional agriculture, Organic crop yielded 91% (Stanhill, 1990) or 100% along with 50% lower expenditure on fertilizer and energy. Crops applied Poultry manure withstand severe weather conditions better than conventional farms sometimes yielding 70 - 90%, more than conventional no-till farming which suggests long-term yield benefits from Organic farming (Doncomis, 2007). Poultry farms and other agro allied industries produce high amount of Poultry manure that are typically rich in nutrients which can

well be used in agriculture to conserve nutrients as well as reduce waste discharged from the use of chemical fertilizers (Ogudare, 2012).

All forms of organic materials added to the soil puts back nutrients and improves soil structure. Organic manures, green manure, farmyard and compost have specific advantage or importance which favours Pepper production.

Uses of Pepper: The potential uses of pepper covers food, medicine, plant based insecticides and finances (Dangnoko et al 2013). Pepper is a fruit that is highly needed in our diet due to its richness in vitamin C. The colourful aspect of pepper increases the visual appeal of the food making it more appetizing. The presence of Capsinoids in Pepper gives it a very strong taste (Grubben and Denton, 2004). Pepper is used in our industries as a condiment in meat processing. The fruit being sweet makes it very suitable for salad or cooked as vegetable. Pepper is rich in vitamin A. The importance of pepper in traditional medicine is highly significant due to Capsaicin, which is used in modern medicine. Pepper is the second most important vegetable after tomatoes (Nwachukwu *et al*, 2007). It plays an important role in food digestion as it contains alkaloids that aids digestion and ointment for relief of Arthritis and neuropathic pains (Nwachukwu *et al*, 2007). The productivity of pepper has been on decrease for many years now. This could be attributed to climatic change, poor variety, poor cultural practices, presence of pest and diseases. Better adaptable and well performing variety with improved cultural practices can boost pepper production.

RESULTS AND DISCUSSIONS

Effect of palm bunch ash and poultry manure on number of fruit harvested

Results showed that number of fresh fruits harvested was significantly affected ($p < 0.05$) by the application of manure. The highest number of fresh fruits harvested was recorded in soil amended with admixture of PM and PBA at 10t/ha each which recorded 53 fresh fruits of pepper. Results showed that number of fresh fruits harvested was significantly affected ($p < 0.05$) by the application of manure. Increase in the number of pepper fruits with manure application could be attributed to the nutrients contained in the manures. Considering the nutrients supplied by poultry manure, it was observed that, the major nutrients that contributed to the high yield of pepper included nitrogen, phosphorus, potassium, and magnesium and each element had its unique contribution to the yield of the crop. For instance, the addition of nitrogen promoted vegetative growth as well as the setting of flower and fruits and so applying these manures is expected to increase the number of fruits. Increase in the number of pepper fruits with manure application could be attributed to the nutrients contained in the manures. Considering the nutrients supplied by poultry manure, it was observed that, the major nutrients that contributed to the high yield of pepper included nitrogen, phosphorus, potassium, and magnesium and each element had its unique contribution to the yield of the crop. This findings are in concord with the previous works of Adeniyi and Ojeniyi, (2005) recorded increase in the Maize cob with manure application and stated that agricultural wastes increases the nutrient contents of the soil and its uptake by maize and also stated that organic manure increases the availability of phosphorus in the soil through the organic anion thereby preventing phosphorus bound to the soil.

Table1 Effect of palm bunch ash and poultry manure on number of fruit girth harvested

Palm bunch ash (t/ha)	Poultry manure(pm) (t/ha)			Mean
	0	5	10	
0	0.00	23.70	32.30	18.66
5	21.70	27.30	32.00	27.00
10	29.70	37.70	52.70	40.03
Mean	17.13	28.80	39.00	
LSD _(0.05) for poultry manure(PM)=7.43				
LSD _(0.05) for palm bunch ash (PBA)=7.43				
LSD _(0.05) for PMXPBA=12.87				

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Table 2 Effect of palm bunch ash and poultry manure on number of fruit harvested

Production cost and benefits Cost Ratio analysis The production cost and benefits cost ratio analysis

Palm bunch ash (t/ha)	Poultry manure(pm) (t/ha)			Mean
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of Palm Bunch ash and Poultry manure on pepper production;

From the input cost analysis of Pepper in year 2016 cropping season, Total cost was obtained by adding the individual expenditure during the production process. 10% contingency was obtained by dividing the total cost by 10, while the Total variable cost (TVC) was obtained by adding the total cost and 10% contingency.

From the production cost and investment returns in pepper enterprise in year 2016, the Net benefit was obtained by subtracting the Total variable cost from Total Revenue for Pepper. The benefit cost ratio is obtained from dividing the total variable cost by Net-benefit.

of pepper enterprise shown in tables below indicate that the benefit cost ratio in all zero manure treatments (control) was less than one. This is an indication that (the production of pepper without poultry manure and palm bunch ash is not economically profitable due to poor yield returns. The highest benefit cost ratio of 6.36 was realized when 5t/ha poultry manure and palm bunch ash mixtures applied during the farming season with 10t/ha manure having the highest yield of 53tonnes per hectare. Therefore, for increased profits in pepper based crop production, cost of production will be reduced by using locally available poultry manure and palm bunch ash as soil amendments.

Table 3 Input cost analysis of pepper in year 2016 cropping season

Treatments	0	5	10	0	5	10	0	5	10
Poultry manure rate (t/ha)	0	5	10	0	5	10	0	5	10
Labour preparation(#)	3000	3000	3000	3000	3000	3000	3000	3000	3000
Labour for pepper planting (#)	1000	1000	1000	1000	1000	1000	1000	1000	1000
Pepper seedlings ((#)	1000	1000	1000	1000	1000	1000	1000	1000	1000
Poultry manure (N500/50kgbag)	_____	5000	10000	_____	5000	10000	_____	5000	10000
Palm bunch ash (N200/50kgbag)	_____	2000	4000	_____	2000	4000	_____	2000	4000
1 st weeding (4WAP) (#)	2000	2000	2000	2000	2000	2000	2000	2000	2000
2 nd weeding (8 WAP) (#)	2000	2000	2000	2000	2000	2000	2000	2000	2000
Harvesting of pepper (#)	500	500	500	500	500	500	500	500	500
Transportation cost (#)	500	500	500	500	500	500	500	500	500
Total cost(CT) (#)	11500	16500	23500	11500	16500	23500	11500	16500	23500
10% contingency (#)	1150.0	1650.0	2350.0	1150.0	1650.0	2350.0	1150.0	1650.0	2350.0

Table 4 Production cost and investment returns in pepper enterprise in year 2016

Treatments									
Poultry manure rate(t/ha)	0	5	10	0	5	10	0	5	10
Component crop(2016)									
Pepper fruit yield (t/ha)	00	22	38	00	24	32	00	27	53
Total revenue for pepper (N /ha)	00	21000	43000	00	21800	42000	00	22000	43800
Total variable cost (N/ha)	12650	18150	25850	1260	18150	25850	12650	18150	25850
Net benefit (N/ha)	-12650	2850	21250	-10450	5850	20660	-10450	6050	22450
Benefit cost ratio	0.00	6.36	2.02	0.00	3.74	2.04	0.00	3.64	1.95

CONCLUSION

Poultry manure and palm bunch ash are agricultural wastes that contain essential plant nutrients and their application in an acid soil improved soil fertility status and reduced the strength of the acidity. As the rate of poultry manure and palm bunch ash increases, there was a corresponding increase in the growth and yield of pepper. Application of 10 t/ha PM + 10 t/ha PBA recorded the heights growth and yield parameters of pepper when compared to other treatments studied. Combined application of poultry manure and palm bunch ash increased the growth and yield of pepper than when applied separately. The production cost and benefits cost ratio analysis of pepper enterprise shown in table above indicated that the benefit cost ratio in all zero manure treatments (control) is less than one. This is an indication that (the production of pepper without poultry manure and palm bunch ash is not economically profitable due to poor yield returns. The highest benefit cost ratio of 6.36 was realized when 5t/ha was used. Although both 5tonnes and 10tonnes are profitable, 5 tonnes are more economically profitable or beneficial.

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