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Economics of *Amaranthus* Production under Different NPK Fertilizer Regimes

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Abstract

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This paper examined the economics of *Amaranthus* production under different NPK fertilizers regimes. This is predicated on the fact that the increasing production of vegetables among farmers necessitates the need for optimum use inputs for increased production. The main objective of this study is to examine the gross margin analysis of the different level of N.P.K. (15:15:15) fertilizer on the yield of *Amaranthus* hybrids and specifically the yield of *Amaranthus* hybrids under different level of N.P.K. (15:15:15) fertilizer was determined. The experiment was conducted at the school farm of Lagos State Polytechnic Ikorodu campus Lagos State. The experimental site is located in the tropical rain forest zone of Nigeria. The experiment design was randomized complete block design replicated three times. The result of the analysis shows that the revenue realized from the sale of *Amaranthus* hybrids followed the trend of quantities of was realized from treatment two with the sum of N564.50k while treatment one with the sum of N372.60k and treatment three which is the control having the lowest revenue of N280.80k. The average yield of treatments 1, 2 and 3 are 24.84 kg, 37.64 kg and 18.72 kg respectively which means that the availability of nutrients to each treatment differ in terms of quantity, although the nutrients requirement are the same for the three treatments. Treatment 2 has the highest gross margin of N303.40. The study recommends that the drilling method of planting be adopted, to facilitate easy application of fertilizer for maximum utilization by the crop.

Key words: economics, *Amaranthus*, NPK fertilizer, fertilizer regimes

Introduction

Vegetable growing is the most important branch of horticulture in view of the value of its products. About 89% of the total production of vegetable is taken in fresh stage while the remaining 11% are processed. Nigeria is abundantly blessed with many varieties of local vegetables and some foreign vegetables are included in business. In the past in Nigeria, a good proportion of the vegetables grown are in-

tercropped with other crops such as maize and yam etc. Recently, realizing the economic importance of vegetable, which includes its nutritive value couple with the income, and stable job it provides for the farmers, there exists sole vegetable production. Vegetables are classified into various categories according to the part consumed as food. *Amaranthus* hybrides belong to the family of amaranthaceous. There are four different kinds of amaranthus that are widely grown in Nigeria and these are small leafy *Amaranthus*, large leafy *Amaranthus*, white Amaranthus, and red *Amaranthus*.

Amaranthus hybridus is usually short-lived annual crops, grown up to 1m height; stem is erect, often thick and fleshes, sometime grooved. The leaves are often green or purple, normally alternate petiolate and entire tip often obtuse. *Amaranthus* responds to soil with high inorganic content, with adequate mineral reserve. It is tolerant to relatively high temperature range of 22-30^{o}C. It is grown during both wet and dry season, through irrigation system or wetting device is normally required for dry season. Crops seeds are often mixed with dry sand or drill in the soil when planting. *Amaranthus* hybridus grow rapidly and may be harvested 30-50 days from sowing, when they are 15-20 cm high. Either the whole plant may be uprooted or established plant may be cut back to within 15cm of the base to encourage lateral growth which will provide successive harvesting. The increase in number of people engaged in vegetable production has necessitated the need that optimum level of production in terms of input use be determined in order to encourage vegetable production. Be it as it may, fertilizer is key input on vegetable production as the growth is stimulated in order to attain market value within a short period (Adewuyi et al., 1992).

Materials and Method

The experiment was conducted at the school farm of Lagos State Polytechnic Ikorodu campus Lagos State. The experimental site is located in the tropical rain forest zone of Nigeria. The experiment design was randomzed complete block design replicated 3 times. The different fertilizer treatments were, 150, 200 and 0 as control. The yield of *Amaranthus* for different treatments was obtained and the current market price was used to analyze the gross margin. The main objective of this study is to examine the gross margin analysis of the different level of N.P.K. (15:15:15) fertilizer on the yield of *Amaranthus* hybrids and specifically the yield of amaranthus hybridus under different level of N.P.K. (15:15:15) fertilizer was determined. This is similar to the methodology of Alasiri (2000), Babataola et al. (2000) and Fasina et al. (2000).

Results and Discussion

The ultimate goal of any production process is the output. *Amaranthus* hybridus was produced under different level of NPK (15:15:15) fertilizer to know the level that will produce the best output. The average yield per plot is different in relation to the treatment applied to each plot. It was observed that, treatment 2 has the highest yield per plot follow by treatment one while the treatment 3 has the lowest yield per plot (Table 1). The analysis of variance as shown in table 2 with average yield in kg of amaranthus hybridus per treatment was not significant in term of blocking. This means that blocking was not

Table 1

Average yield of *Amaranthus* hybrids per plot, kg

Treatment	R1	R2	R3	Average yield
1	8.81	7.86	8.17	8.28
2	11.61	13.3	12.7	12.54
3	7.22	5.33	6.17	6.24

effective at 5% level. However, there was significant difference in *Amaranthus* hybridus yield when different level of NRK (15:15:15) fertilizer at 5% level.

Furthermore, there was statistical difference using the F-test analysis of variance (Table 2) in terms of difference level of fertilizer which means that there was significance difference in yield of *Amaranthus* hybrids. This is similar to the findings of Babatola et al. (2000) on the effect of different rates of poultry manure and NPK fertilizer on the performance of celosia argentia. Moreover, it was observed that there was a substantial difference between the yield of *Amaranthus* hybridus under the different level of NPK (15:15:15) fertilizer used. These can be attributed to differences in absorption of nutrients by the *Amaranthus* hybridus. The results of least significant difference between the three treatment shows significantly from the other in relating to the yield of amaranthus hybridus obtained at the end of the experiments. The yield of *Amaranthus* hybridus obtained in the experiment depends on the quantity of fertilizer applied, if no fertilizer is added to the crop, the yield will be 8.77 kg, but when the level of fertilizer is increased by 1 unit, the yield will also increase 9.11 kg. Therefore, the fertilizer applied influenced the yield of *Amaranthus* hybrids. Adebayo and Akoun (2000) reported a similar effect of organic manure on the yield of *Amaranthus* ernethis.

Table 2

Analysis of variance of yield of *Amaranthus* hybrids treatments

Source of Variance	Df	SS	MS	F
Total	8	65.92	8.24	
Block	2	0.21	0.11	0.12 NS
Treatment	2	62.15	31.08	34.92 S
Error	4	3.56	0.89	

NS = Not significant, S = Significant at 5%, LSD = 0.044

Analysis of Production Cost

The production cost involved in the production of *Amaranthus* hybrids under different level of NPK (15:15:15) fertilizer in this study is divided into two, that is, the fixed cost and the variable cost. The variation in the cost of fertilizer was due to the difference in level of fertilizer applied to the treatments one and two and treatment three as the control for the experiments. Treatment one and two require 0.15 kg per bed or 0.3375 kg and 0.45 kg per treatment. These brought about the differences cost applied hence, the total variable cost for each treatment. This is supported by the findings of Yakubu et al. (2000) on urban vegetable production in Zamani Lekwot Army barracks Ibadan. Treatment two gave the highest total variable cost of 261.20 k with treatment one having 258.95 as its total variable cost. Treatment three has the least total variable cost production but yield is relatively low due to lack of fertilizer in the treatment. It could be observed that different level of fertilizer has

significant effect on the yield or outputs.

The revenue realized from the sale of *Amaranthus* hybridus as shown in Table 3 followed the trend of quantities of was realized from treatment two with the sum of N564.50 k while treatment one with the sum of N372.60 k and treatment three which is the control having the lowest revenue of N280.80 k. If should be noted that all treatments had the same population and the variation in yield was statistically significant. There were appreciable differences in yield of the three treatments. The average yield of treatments 1, 2 and 3 are 24.84 kg, 37.64 kg and 18.72 kg respectively which means that the availability of nutrients to each treatment differ in terms of quantity, although the nutrients requirement are the same for the three treatments.

The gross margin realized from treatment 1 was N86.64 k and treatment 2 with N303.40k, followed by treatment 3 with N28.60 k (Table 4). From this result, treatment 2 has the highest gross margin of N303.40. The vegetable was sold at the same price per kilogramme, thus Gross Margin followed the quantity harvested from each treatment.

Table 3

Cost of *Amaranthus* hybrids per Treatme

	Yield, kg	Amount (N)
Treatment 1	24.84	372.6
Treatment 2	37.64	564.6
Treatment 3	18.72	280.8

Cost of *Amaranthus* hybrids per kg = N15

Table 4

Gross margin analysis

Treatment	Total revenue (N)	TVC (N)	GM (N) per 23.5m^2
T1	372.6	298.95	86.65
T2	564.6	261.2	303.4
T3	280.8	252.2	28.6

Conclusion and Recommendation

It can be deduced from the experiment that, the yield of *Amaranthus* hybridus got varies with the level of fertilizer applied to each treatment. It was found that the treatment two which is 200kg/ha of NPK (15:15:15) fertilizer produce the highest yield of 37.64 kg followed by treatment one which is 150kg/ha NPK (15:15:15) fertilizer with 24.84 kg of *Amaranthus*. Treatment three, which no fertilizer was added produced 8.28 kg. Analysis of variance was used to determine the effect of NPK (15:15:15) fertilizer, and it shows that there is significant difference between the three treatments applied and the least significant difference of the yield calculated show that the yield varies with the level of fertilizer applied, thus there is a relationship between the fertilizer applied to *Amaranthus* hybridus and the yield obtained.

The various cost of production of *Amaranthus* hybridus under different level varies due to different cost of fertilizer incurred on each treatment. The cost of fertilizer applied to treatment one and two are N6.75 and N9.00 per 23.5m^2 respectively with no cost incurred on the treatment three which is control. Variable cost incurred in this experiment varies from one treatment to another. The fixed cost of production are the cost incurred on all the treatment which are fixed that is the cost

of input whose level of utilization does not vary with the level of production.

Treatment 2 gave the highest gross margin N303.40k because of high level of NPK (15:15:15) fertilizer that was applied (0.45 kg), followed by treatment one with gross margin N86.65 k and lastly, by treatment 3 having the gross margin of N28.60k. Gross Margin reflects the quantity harvested for each treatment. Farmers intending to use NPK (15:15:15) fertilizer at the rate of 200 kg/hectare of can do so as: The system has been tried and proven to be relatively good and could be utilized on a fairly large scale given the rate of turn over for *Amaranthus* hybrids production enterprise. The drilling method of planting should be adopted, so as to facilitate easy application of fertilizer for maximum utilization by the crop. The practice is therefore recommended within the scope of the study to the small and large-scale farmers in the study area.

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