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Main and Residual Effects of Broiler Droppings on Some Soil's Physical and Chemical Properties and on the Growth and Marketable Yield of Leaf Amaranth (Amaranthus Cruentus (Hybridus) L) Amaranthaceae

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ABSTRACT

The main and residual effects of broiler droppings (manure) were evaluated in two growing seasons on the soil properties of the experimental site, growth parameters and marketable yield of leaf amaranth (Amaranthus cruentus (hybridus) L) Amaranthaceae in a field experiment conducted on a slightly acid sandy loam Oxic Tropudalf at the Teaching and Research Farm, Ekiti state University, Ado-Ekiti. In the first planting season, the treatments consisted of 10, 20, 30 and 50 metric tonnes (MT) /ha of broiler manure and a control (0 MT/ha) in four replications making a total of 20 (twenty beds) on site 1. Plant height, leaf length, number of leaves, stem girth and marketable yield were measured at 5, 6 and 7 weeks after sowing. These experiment was repeated in the second planting season on site 1 and on a new site prepared beside site 1 referred to as site 2. The total beds in the second planting season were 40 (fourty) beds.

Generally speaking, analysis of soil samples taken from sites 1 and 2 before each sowing indicated that site 2 was more fertile than site 1. In the second planting season, there was generally an average improvement in the physical, chemical and aggregate characteristics of soils taken from the experimental site1 before planting at season 2 compared to the values obtained at the onset of the study indicating that application of broiler dungs improved the nutrient status of the soil and also gave high residual effects on soil fertility.

Plant height, number of leaves, stem girth, leaf area and marketable yield increased with the application of poultry manure from broilers. The application of 50 MT/ha rate of manure from broilers significantly (P<0.05) produced the highest number of leaves, plant height, stem girth, leaf area and marketable yield.

From the study, values from the two sites in the second planting season were higher than the values recorded from site 1 in the first planting season (due to residual and fallow effect respectively) while the values from site 1 in the second planting season were higher than the values recorded from site 2 in the same season. The highest values for all the parameters measured were recorded from site 1 in the second planting season, hence confirming the residual effect of broiler manure on the soils of the experimental site 1.

Keywords: Residual effect, planting seasons, broiler droppings, growth parameters, marketable yield, amaranth.

INTRODUCTION

The soil is a dynamic natural medium on the earth's surface in which plants grow and a sustainable management of its quality would benefit the soil, the environment and farm productivity. Soils in the humid tropics contain low levels of organic matter and available nutrients; hence their productivity and sustainability decline rapidly over time, especially when subjected to continuous cultivation (Zingore *et al*., 2003). The agricultural lands in Nigeria consist of fragile soils with a thin layer of coarse-textured topsoils and dominance of low activity clays, as products of intensive weathering and leaching processes (Ahn, 1993). The low inherent fertility status limits the development of sustainable crop production systems even as as nutrients are rapidly lost following the opening up of lands for cultivation. Hence, the need to maintain the fertility of upland soils for continuous crop production that emphazises the use of external inputs at economic levels (Opara – Nadi, 1993). The strategies that have been used regarding the build-up and maintenance of soil organic matter at adequate levels are central to this general improvement in soil fertility. Hence, the addition of organic

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materials as a routine best management practice would necessitate provision of information on the types and rates. Also, pressure from rapid population growth, urbanization and the development of socio-economic infrastructure is the cause of declining arable land. This imposes continuous cultivation and shortened fallows such that the use of fertilizers to supplement soil nutrients, especially nitrogen (N) required for succulent green leafy growth but whose defficiency is widespread, is a component of improved soil management practices. Thus, the recommendations are 60 kgN and 100 kgNha^{-1} for leaf amaranth plants (*Amaranthus cruentus hybridus*) L), *Amaranthaceae* to be harvested by uprooting and repeated cutting, respectively (Olufolaji and Denton, 2000). In many experiments conducted to compare organic manures with chemical fertilizers to supply an equivalent amount of N, the result had often favoured manure application because of its ability to modify the soil physical, biological and chemical properties (Ahn,1993). Also, farmers and gardeners have long recognized the role of manure in replacing nutrients of soils depleted by continuous cropping. These organic nutrient sources (livestock manure, crop residues, municipal wastes, biomass transfer etc) may be used as alternatives to chemical fertilizers. The most popular are manures derived from livestock (cattle, poultry, sheep and goats). The states located in the savannah zone have large populations of cattle, sheep and goats whose droppings (manures) have been used by the farmers. States in the (humid) forest zone are not conducive to large ruminant animals but favour poultry production (Uche, 1991). Poultry manure contain organic matter and nutrients which are available for improving and conditioning the soil for the nutrient supply of the crop and thereby increase crop yield (Alasiri and Ogunkeyede, 1999). Being naturally organic, it may not need composting and can be applied directly to the fields from the farm (Prabu, 2009). Out of the poultry species, chickens and turkey are amenable to production under intensive management systems and generate large amounts of droppings daily which create waste disposal problems. Omolayo *et al* (2011) reported that poultry dungs from different sources at different levels significantly (P=0.05) increased plant height, leaf number, stem girth and yield and that application of poultry manure especially from broilers at 30 MT/ha improved vegetative growth and yield of *Amaranthus*. They therefore recommended broiler droppings at 30 MT/ha to farmers for improving the growth and yield of amaranthus.

The aim of this study, therefore, is to assess the main and residual effects of broiler manure on some physical and chemical properties of the soils from the experimental sites and the effects of this organic waste at different levels on the growth and yield of leaf amaranth (*A. cruentus ssp (hybridus)*) and hence make recommendations on its use to farmers.

MATERIALS AND METHODS

The study was carried out at the Teaching and Research farm of Ekiti State University, Ado-Ekiti, Nigeria in the rainy seasons of 2009 and 2010 (April to July of each year). The study area is located at latitude 7^{o}31'N longitude 5^{o}13'E and covers an area of about 20 hectares in the rain forest zone of southwestern Nigeria. The area experiences a tropical climate with distinct wet and dry seasons. The dry season spans from November to early March and raining season from late March or early April to October with a dry spell in August. The geology is dominated by crystalline rocks, which form part of the basement complex of southwestern Nigeria. They are mostly granitic rock materials (Fasina *et al*, 2005). Surface (0-15cm) soil samples were randomly taken, air-dried and passed through 2mm sieve. The soils were analysed using the procedures described in IITA (1979) for pH in 1:2 soil-KCl medium, particle size distribution by the hydrometer method, organic carbon by the wet dichromate oxidation, total N by macro- Kjeldhal method, available P by the Bray P-1 extraction while exchangeable cations were extracted with 1N NH_4OAc and determined with atomic absorption spectrophotometer.The exchangeable acidity (EA) was determined by the titration method. The effective cation exchange capacity (ECEC) was the sum of the exchangeable bases (K+Na+Ca+Mg) and EA and percent base saturation calculated as the sum of the exchangeable bases expressed as a percentage of ECEC.

The droppings were collected at Top Feed Farm Adebayo Area, Ado-Ekiti. The farm has a permanent disposal point where the droppings are normally burnt when nobody has made request for them. Sample of the broiler droppings was collected and analysed for pH, organic carbon, total N, P, Ca, Mg and K.

There were five treatments, consisting of 10, 20, 30 and 50 MT/ha application rates of the organic material and a control (without manure application). The treatments were arranged as randomized complete block design with four replicates, making a total of 20 (twenty) beds in the first planting season. The site (Site 1) was cleared manually and the residues packed. Beds 3m long and 2m wide were made with 1m paths in between the blocks and plots.The manure was broadcast and incorporated into surface of the beds two weeks before sowing. Seeds of leaf amaranth (NHAc 23) were mixed with dry sand and broadcast uniformly on the bed at the rate of 2 kg/ha. From 5 weeks after sowing (WAS), seedlings which were 15cm and above tall were harvested by uprooting. Soil particles were removed from the root portion as much as possible and plants weighed. Sample seedlings were taken for measurement of growth parameters: plant height, leaf area, stem girth number of leaves and yield. The harvest was repeated at 6 and 7 weeks after sowing.

In the second planting season, a new site was prepared beside the site 1 referred to as site 2 for comparism. Soil samples were taken from sites 1 and 2 to the laboratory for analysis. All the steps taken in the first planting season were also followed in the second planting season both on sites 1 and 2. The total beds in the second planting season were 40 (fourty).

DATA ANALYSIS

Data collected were subjected to Analysis of Variance (ANOVA) and the means separated using LSD at P =0.05 level.

RESULTS

The chemical composition of the poultry droppings is shown in Table 1. There was a slight variation in the nutrient content of the poultry droppings used in the two planting seasons. C, N, P, K, Mg and Na contents were higher in the manure used in the first planting season than in the second planting season. Only the C/N ratio and Ca were higher in the droppings sampled at the second planting season.

Table 2 shows that the soils in the experimental sites (1 and 2) are slightly acid sandy loams with moderate organic matter content. The sand and clay contents of the soils at site 2 were better than those of site 1 in the first planting season. There was also reduction in soil acidity and hence exchangeable acidity, slightly higher N content, higher exchangeable bases and organic matter content. Generally speaking, analysis of soil samples taken from sites 1 and 2 before each sowing indicated that site 2 was more fertile than site 1. In the second planting season, there was generally an average improvement in the physical, chemical and textural characteristics of soils taken from the experimental site1 before planting at season 2 compared to the values obtained at the onset of the study. Application of broiler dungs improved the nutrient status of the soil and also gave high residual effects on soil fertility.

Table 3 shows the effects of the different levels of broiler manure on the plant height of leaf amaranth. In both planting seasons, plant height increased significantly (P = 0.05) with the increase in levels of broiler droppings. In the two seasons, broiler manure applied at 50 MT/ha produced the tallest plants while the control plots had the shortest plants. In the first planting season, at the 3 weeks of data collection, the tallest plants were obtained from 50 MT/ha and was significantly different from all other levels except 30 MT/ha at 6WAS.

Table1. *Chemical composition of the broiler droppings*

Parameters(% chemical composition)	Values	
	Season 1	Season 2
pH	8.00	7.50
Organic carbon	18.3	18.1
N	2.35	2.20
C/N ratio	7.79	8.23
P	0.52	0.51
K	1.23	1.20
Ca	1.10	1.12
Mg	0.64	0.60
Na	0.07	0.06

Table2. *Some physical and chemical properties of the soils of the experimental sites for the two planting seasons*

Parameters	2009	2010	
		Site 1	Site 2
pH (H_2O)	6.70	7.20	6.72
Sand, %	79.9	70.9	78.20
Silt, %	13.2	18.9	13.2
Clay, %	6.90	10.2	7.10
Textural class	Sandy loam	Sandy loam	Sandy loam
Organic matter (g/kg)	1.46	1.53	1.48
Total Nitrogen(g/kg)	0.08	0.13	0.09
Available P(mg/kg)	8.70	9.00	8.73
Exchangeable cations (cmol/kg)			
Calcium	2.81	2.81	2.82
Magnesium	1.75	1.77	1.77
Sodium	0.09	0.09	0.08
Potassium	0.39	0.40	0.39
Exchangeable Acidity	0.27	0.28	0.26

Table3. *Effects of broiler droppings on the plant height (cm) of Amaranthus in the first and second planting seasons*

Treatment		Plant height 2009 Site 1			Plant height 2010 Site 1			Plant height 2010 Site 2	
	5WAS	6 WAS	7WAS	5WAS	6WAS	7WAS	5WAS	6WAS	7WAS
50 MT/ha	20.90	16.70	29.40	22.00	17.50	31.40	17.20	18.50	30.10
30MT/ha	17.60	14.30	18.10	18.60	14.50	18.20	17.20	14.70	28.50
20MT/ha	15.50	10.20	15.90	16.00	10.50	16.30	17.00	14.30	20.60
10MT/ha	14.60	9.50	14.80	15.70	10.50	16.00	16.70	11.50	18.00
Control	14.10	8.90	11.90	13.40	10.00	9.00	16.30	10.50	14.80
LSD	**3.06**	**3.80**	**7.59**	**3.67**	**3.63**	**8.98**	**0.57**	**3.46**	**7.31**
Sd	**2.56**	**3.18**	**6.34**	**3.07**	**3.03**	**7.51**	**0.47**	**2.89**	**6.11**
Se	**0.57**	**0.71**	**1.42**	**0.69**	**0.68**	**1.68**	**0.11**	**0.65**	**1.37**

Means within the same column followed by the same letters are not significantly different at P=0.05

Vegetables from sites 1 and 2 in the second planting season performed better in the height of vegetables than those from site 1 in the first planting season while in the second planting season, vegetables from site 1 performed better than those from site 2, though the better performance was noticeable at 50 MT/ha level of manure application. Control gave the shortest vegetables.

Table 4 shows the effects of the manure levels on the leaf number of leaf vegetables. In the first planting season, a similar trend as in the plant height was observed on the effects of manure on number of leaves per plant of *amaranthus*, with 50 MT/ha giving the highest value at 5WAS which was significantly different from only the control. At 6 WAS, the highest number of leaves was obtained from broiler manure at 50 MT/ha which was significantly different from all other levels except 30 MT/ha that followed it closely. The leaf number at 7 WAS followed thesame trend as in 6 WAS but 50 MT/ha which produced the highest number of leaves was significantly different from all other levels at 7 WAS. In the second planting season, a similar trend was observed on the effects of manure on number of leaves per plant of amaranth, with 50 MT/ha giving the highest value which was significantly different from all other treatment levels at 5 WAS, significantly different from all other treatment levels except 30 MT/ha at 6 WAS and not significantly different from only 20 MT/ha and the control at 7 WAS. The values obtained for the leaf number at site 1 in the second planting season were higher than in the first planting season whereas the values obtained for site 2 were higher than the ones for site 1 in the first planting season but lower than site 1 in the second planting season. The least number of leaves were recorded from the control plots.

Table4. *Effects of broiler droppings on the number of leaves of Amaranthus in the first and second planting seasons*

Treatments		Number of leaves			Number of leaves			Number of leaves	
	5WAS	6WAS	7WAS	5WAS	6WAS	7WAS	5WAS	6WAS	7WAS
50 MT/ha	12.40	13.40	17.10	15.90	14.50	18.40	14.80	15.80	16.00
30 MT/ha	10.90	12.00	14.20	11.20	12.80	14.50	11.50	13.30	14.10
20 MT/ha	10.90	11.40	13.60	11.10	11.50	12.50	10.00	11.50	12.00
10 MT/ha	10.10	11.40	14.10	9.80	11.80	14.30	10.80	11.30	11.20
Control	8.50	9.70	12.10	6.90	8.90	7.60	8.20	10.00	11.10
LSD	**1.62**	**1.57**	**2.03**	**3.60**	**2.29**	**4.36**	**2.69**	**2.51**	**2.35**
Sd	**1.36**	**1.31**	**1.70**	**3.01**	**1.91**	**3.65**	**2.25**	**2.10**	**1.97**
Se	**0.30**	**0.29**	**0.38**	**0.67**	**0.43**	**0.82**	**0.50**	**0.47**	**0.44**

Means within the same column followed by the same letters are not significantly different at P=0.05

From table 5, it could be seen that the stemgirth also varied with different levels of broiler manure. Broiler manure at 50 MT/ha still produced the thickest vegetables with significant differences across the different weeks of data collection. The difference in values across the seasons could also still be noticed. The thickest amaranth vegetables were from site 1 in the second planting season while the thinnest vegetables were from the control plots.

Table 6 shows the effect of broiler droppings at different levels on the leaf area of the leaf amaranth. The leaf area also varied with the different levels of the manure. 50 MT/ha still remained the best by producing the biggest leaves which were significantly different from all other treatment levels across all the weeks and seasons of sowing and data collection. The biggest leaves were recorded from the site 1 of the second planting season. Control plots produced the smallest leaves all through.

The effect of broiler droppings on the yield of *Amaranthus hybridus* is as shown in table 7. Vegetable yield was significantly increased in both planting seasons. The trend observed for all the previously treated parameters was also followed by the yield. There were significant differences (P=0.05) in the yield among the different levels of manure. In the first planting season, at 5 and 6 WAS, 50 MT/ha gave the best yield values that did not differ significantly from 30 MT/ha but were significantly different from all other treatment levels. At 7 WAS, 50 MT/ha also gave the best yield but was significantly different from all treatment levels. Yield values in the second planting season followed thesame trend as in the first planting season with broiler manure at 50 MT/ha giving the best yield values. Yield values from the two sites in the second planting season were higher than the values recorded from site 1 in the first planting season while the values from site 1 in the second planting season were higher than the values recorded from site 2 in the same season. The highest yield value for the study was recorded from the site 1 in the second planting season.

Table5. *Effects of broiler droppings on the stem girth (cm) of Amaranthus in the first and second planting seasons*

Treatments		Stem girth 2009 Site 1			Stem girth 2010 Site 1			Stem girth 2010 Site 2	
	5 WAS	6 WAS	7WAS	5 WAS	6 WAS	7WAS	5 WAS	6 WAS	7 WAS
50 MT/ha	0.90	1.90	2.20	1.30	2.10	2.30	0.80	2.00	2.00
30 MT/ha	0.90	1.40	2.10	1.20	1.80	1.90	0.70	1.60	1.70
20 MT/ha	0.70	1.20	1.20	1.20	1.40	1.60	0.90	1.20	1.40
10 MT/ha	0.40	0.90	1.10	0.40	0.90	1.10	0.40	1.00	1.00
Control	0.30	0.80	0.90	0.20	0.20	0.30	0.40	0.70	0.80
LSD	**0.39**	**0.60**	**0.77**	**0.65**	**0.89**	**0.91**	**0.34**	**0.69**	**0.18**
Sd	**0.33**	**0.50**	**0.64**	**0.54**	**0.75**	**0.76**	**0.33**	**0.58**	**0.52**
Se	**0.07**	**0.11**	**0.14**	**0.12**	**0.17**	**0.17**	**0.07**	**0.13**	**0.12**

Means within the same column followed by the same letters are not significantly different at P=0.05

Table6. *Effects of broiler droppings on the leaf area (cm2) of Amaranthus in the first and second planting seasons*

Treatments		**Leaf area 2009 Site 1**			**Leaf area 2010 Site 1**			**Leaf area 2010 Site 2**	
	5 WAS	**6 WAS**	**7WAS**	**5 WAS**	**6 WAS**	**7WAS**	**5 WAS**	**6 WAS**	**7 WAS**
50 MT/ha	2.50	6.50	8.00	3.10	7.00	15.40	2.90	4.90	7.70
30 MT/ha	1.60	4.20	4.80	1.90	4.40	11.60	1.90	3.20	7.20
20 MT/ha	1.40	3.60	3.80	1.60	3.10	7.90	2.10	3.00	6.60
10 MT/ha	1.50	3.60	3.50	1.20	3.10	7.90	1.40	2.20	4.20
Control	0.90	2.20	1.40	0.90	1.20	4.90	1.90	2.20	3.20
LSD	**0.70**	**1.77**	**2.67**	**1.00**	**2.39**	**4.46**	**0.72**	**1.32**	**2.22**
Sd	**0.59**	**1.48**	**2.23**	**0.84**	**2.00**	**3.73**	**0.60**	**1.11**	**1.86**
Se	**0.13**	**0.33**	**0.50**	**0.19**	**0.45**	**0.83**	**0.13**	**0.25**	**0.42**

Means within the same column followed by the same letters are not significantly different at P=0.05

Table7. *Effects of broiler droppings on the yield (MT/ha) of Amaranthus in the first and second planting seasons*

Treatments		**Yield 2009 Site 1**			**Yield 2010 Site 1**			**Yield 2010 Site 2**	
	5 WAS	**6 WAS**	**7WAS**	**5 WAS**	**6 WAS**	**7WAS**	**5 WAS**	**6 WAS**	**7 WAS**
50 MT/ha	41.00	24.00	18.00	44.00	31.00	19.00	36.00	35.00	18.00
30 MT/ha	34.00	18.00	12.00	42.00	31.00	14.00	34.00	20.00	10.00
20 MT/ha	26.00	15.00	10.80	28.00	25.00	7.00	32.00	28.00	10.00
10 MT/ha	19.00	13.00	10.80	21.00	18.00	7.00	25.00	28.00	10.10
Control	12.00	9.00	10.40	7.00	9.00	7.00	20.00	21.00	12.00
LSD	**14.68**	**7.24**	**5.15**	**17.38**	**11.11**	**6.79**	**8.66**	**8.79**	**5.76**
Sd	**12.28**	**6.06**	**4.31**	**14.54**	**9.29**	**5.68**	**7.24**	**7.35**	**4.81**
Se	**2.75**	**1.36**	**0.96**	**3.25**	**2.08**	**1.27**	**1.62**	**1.64**	**1.08**

Means within the same column followed by the same letters are not significantly different at P=0.05

DISCUSSION

The use of organic fertilizers as a means of maintaining and improving soil fertility has long existed but has been somehow neglected since the inception of inorganic fertilizer. In recent years, food production has suffered a serious set back due to a general shortage and unaffordable cost of chemical fertilizers, much attention is therefore directed towards the search for alternative fertilizer sources to boost crop production (Adediran *et al*,1999). Recently, farmers are becoming interested in the use of organic matter to get rid of wastes generated from animal industries which is gradually becoming a source of environmental hazard and maintain soil fertility (Alasiri and Ogunkeyede, 1999).

There was a slight variation in the nutrient content of the poultry droppings used in the two planting seasons. This slight variation might be from the composition of the feeds given to the birds (Soilfacts, 2012).

The sand and clay contents of the soils at site 2 were better than those of site 1 in the first planting season. Generally speaking, analysis of soil samples taken from sites 1 and 2 before each sowing indicated that site 2 was more fertile than site 1. This may be due to the fact that the soils at site 2 were left under fallow throughout the first planting season and fallowing improves soil fertility and nutrient status. (Amiolemen *et al*, 2012; Alfred E. Hartemink, 2004; Nyamadwazo *et a*l, 2012).

The average improvement in the physical, chemical and textural characteristics recorded for soils taken from the experimental site1 before planting at season 2 could be said to be an evidence of the residual effect of the organic material on the soil properties (Mbah and Mbagwu, 2006). Application of organic based fertilizer is said to improve the nutrient status of soil and give high residual effects on soil fertility (Adediran *et al*, 1999). This may be attributed to the fact that varieties of bacteria and fungi break down chemicals, plant matter and animal waste into productive soil nutrients, making soils treated with any form of organic fertilizer higher in nutrients (Ingram, 2007). Previous works have also revealed that animal wastes can be used to ameliorate the physical and chemical properties of soils like the soil's plastic limit, water retention, aggregate stability, total N, soil OM, pH and CEC (Ano and Agwu, 2006; Pacini, 2003; Wood *et al.*, 2005).

Broiler droppings applied at different rates affected the growth parameters and yield of *amaranthus* positively. The growth parameters and yield of *amaranthus* increased with levels of manure applied (Omolayo et al, 2011).

Vegetables from sites 1 and 2 in the second planting season performed better than those from site 1 in the first planting season. These superior performances could be traced to the residual effects of broiler manure on site 1 (Mbah and Mbagwu, 2006) and the effect of fallow on site 2 (Amiolemen *et al*, 2012; Alfred E. Hartemink, 2004; Nyamadwazo *et a*l, 2012). .

The better performance of site 2 in the second planting season over site 1 in the first planting season could be traced to the effect of fallowing as this site 2 was left covered while site 1 was being cultivated during the first planting season. Fallowing can improve crop yields as a result of improved soil fertility and nutrient status (Nyamadwazo *et a*l, 2012).

The best performance overall recorded from site 1 in the second planting season can be linked to the improvements recorded in the physical and chemical parameters of soils of site 1 as influenced by the addition of broiler droppings in the first planting season (Mbah and Mbagwu, 2006). It is also in line with the findings of Omolayo et al (2011) who discovered that addition of poultry dung especially from broiler at 30 MT/ha improved the vegetative growth and yield of *amaranthus* and therefore concluded that degraded soils could be restored and rehabilitated to an optimum level of productivity by proper and regular additions of various wastes including plants and manure.

SUMMARY AND CONCLUSION

The main and residual effects of broiler droppings (manure) were evaluated in two growing seasons on the soil properties of the experimental site, growth parameters and marketable yield of leaf amaranth (*Amaranthus cruentus (hybridus)* L) Amaranthaceae in a field experiment conducted in the rainy seasons of 2009 and 2010 (April to July of each year). In the first planting season, the treatments consisted of 10, 20, 30 and 50 metric tonnes (MT) /ha of broiler manure and a control (0 MT/ha) in four replications making a total of 20 (twenty beds) on site 1. The experiment was repeated in the second planting season on site 1 and on a new site prepared beside site 1 referred to as site 2 bringing the total beds in the second planting season to 40 (fourty). Data were taken on the plant height, leaf length, number of leaves, stem girth and marketable yield were at 5, 6 and 7 weeks after sowing and the data subjected to analysis of variance and mean separation using LSD at 0.05. The findings and conclusion of the study are summarised as follows:

1. The nutrient status of soil from the experimental site 2 in the second planting season was better than the one from site 1 in the first planting season, an indication that soil from site 2 which was left under fallow during the first planting season was more fertile than soil from site 1 that was cultivated in the first planting season.
2. Application of broiler droppings improved the nutrient status of soil of site 1 and give high residual effects on soil fertility.
3. The growth parameters and yield of amaranthus increased with increased levels of broiler manure applied
4. The superiority in the performance of the 3 sites could be arranged as follows: site 1, season 2 (residual) > site 2, season 2 (fallow) > site 1, season 1.
5. The best performance overall in this study was recorded from site 1 in the second planting season.
6. Application of animal wastes especially broiler droppings can be used to ameliorate the physical and chemical properties of soils and the improvements recorded in these parameters resulting from the addition of the broiler manure resulted in higher yield of the vegetable.

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