Effect of Different Organic Fertilizers on Yield and Quality of Amaranthus *(Amaranthushybridus)*

Adedeji J. A[1]; Idowu-Agida, O.O.[2*]; Awogbade, A.L[1]; Oni, O. O[1].; Oladejo L.F[1], and Oladosu, B.O.[2]

[1]*Federal College of Agriculture, Moor Plantation Ibadan*
[2]*National Horticultural Research Institute P.M.B.5432 Dugbe, Ibadan*
**Corresponding author*

***Abstract*:- *Amaranthushybridus* is a vegetable with great nutritional value in human diet. Effects of different organic fertilizer rates was studied on plant height, number of leaves, leaf area, fresh and dry shoot weight, fresh and dry root weight, and proximate analysis were carried out using standard methods. The treatments consist of poultry manure (PM) at 100, 75, and 50%;cow dung used at 100, 75 and 50while control treatment contained no manure. The treatments were replicated 3 times and arranged in Completely Randomize Design (CRD). Data were collected on growth and yield parameters were analyzed with Analysis of variance and means were separated with Duncan Multiple Range Test. Results showed that different organic fertilizer rates had significant effect ($p \leq 0.05$) on plant height, number of leaves, and leaf area with PM 100% had the tallest, more number of leaves and broadest leaf area (76.67cm, 12.33, and 1.572cm^3), respectively, while the shortest height, least number of leaves, and leaf area were obtained in the control. PM 100% had a significantly ($p \leq 0.05$) higher amount of crude protein, crude fat, ash, vitamin A, Vitamin B_1, Calcium Ca, Potassium K, and Iron Fe, but control had the least. There was no significant effect($p \geq 0.05$) of different organic fertilizer rate on chlorophyll content among the treatments except with control. PM 50% had the highest fresh and dry matter weight of (165195.87 and 20226.2 kg/ha), respectively, while PM 75% had the highest fresh and dry root weight of (99090.85 and 53651.9 kg/ha). In conclusion, different organic manure and their rate of application had a significant effect ($p \leq 0.05$) on growth, yield and chemical composition of *Amaranthushybridus*.**

***Keywords:* *Amaranthushybridus*, cow dung, organic manure, poultry manure, vitamins and minrealsanalyses**

I. INTRODUCTION

Amaranth (*Amaranth hybridus*) belongs to the family *Amaranthacea* which consists of about 60 species (Anjali *et al*., 2013). It is an important leafy vegetable of high dietary value and widely consumed in Nigeria (NIHORT, 1987). The cultivated forms are useful for producing nutritious grain and foliage and as colorful ornamentals (Brenner *et al*., 2000). Amaranths are heat and drought tolerant plants with most of the species monoecious, while some are dioecious. Amaranths received considerable attention in many countries because of the rich nutritional value of the species with important source of food, as vegetable or grain (Srivastava, 2011). Its leaves constitutes a cheaper and rich source of protein, carotinoids (Shukla*et al*., 2010) and also very rich in minerals and vitamins (Muyonga*et al*., 2008).

There has been an increase in demand for mineral fertilizers in the developing countries to boost crop yield due to an increase in population as a result of farmers yearning to meet the risen demand for agricultural products.The rising global population and changing eating habits are giving new prominence to agricultural challenges, such as the need to maintain and boost yields (Johannes, 2015). This made mineral fertilizers an important input in crop production inaccessible and expensive for farmers in the rural areas where major agricultural activities are carried out.

The use of organic fertilizers in crop production has been on an increase rate in recent times as substitute for costly and scarce mineral fertilizers. Organic fertilizers such as poultry manure, cow dung, compost, agro industrial wastes etc. have been recommended by researchers for use as substitute for mineral plant nutrient sources because they are less expensive, available and improve soil physical and chemical properties. Ogedegbe*et al.* (2015) recommended that amendment of top soil with animal fertilizers in a 1:1 ratio positively influenced growth and yield including some proximate components of amaranth varieties.This fact was in line with the conclusion of Oyedeji (2014) which stated that amaranthus species grown with NPK had higher protein, while those grown with poultry manure had higher ash content. Considering the impact of organic fertilizers on crop quality, it is also important to examine the extent of this effect amongdifferent organic fertilizers, due to their differences in quality (nutrients composition) (Moyin-Jesu, 2008) which depend greatly on types of animal and the quality of feed they feed on.The objectives of this study are: to determine and compare the effect of different rates of organic fertilizers on growth and yield of *Amaranthushybrisdus* and to determine and compare the effect of the different rates of organic **fertilizers on the quality of *Amaranthushybridus*.**

II. MATERIALS AND METHOD

The experiment was carried out at Bore Farm of the Federal College of Agriculture, Moor Plantation, Ibadan, Oyo State, Nigeria between March and May 2018. Moor Plantation, Ibadan is situated onLatitude 7^0 23' N and Longitude 3^0 50' E. The pre cropping soil analysis presented in Table 1 showed

that the soil is loamy soil in texture. The pH of the soil (5.6) was slightly acidic. The total Nitrogen (1.2g/kg) and organic carbon (15.5g/kg), Phosphorus (10 mg/kg) and Potassium (0.2cmol/kg) in the soil were low. Obviously, the soil used is deficient in some essential nutrients and requires fertilizer amendment. This implies that the soil is having low fertility status, thus the soil is good for a fertilizer trial.Nursery bed was preparedand seed was sown at 1:3 ratio of seed mixed with soil. Wetting was done twice a day until seedlings were transplanted into perforated polythene bags filled with 2kg topsoil, premixed with poultry manure and cow dung at different rates of 50%, 75%, and 100% 2weeks before sowing to allow mineralization of the organic materials. The experiment consist of sixtreatments and a control (poultry manure 100%, poultry manure 75%, poultry manure 50%, cow dung 100%, cow dung 75%, cow dung 50%, and control) replicatedthree times andarranged in completely randomize design (CRD).The treatment were arranged as follows: Poultry manure 100% (T_1), Poultry manure 75% (T_2), Poultry manure 50% (T_3), Cow dung 100% (T_4), Cow dung 75% (T_5), Cow dung 50% (T_6), and Control (T_7). Transplanting of seedlings was done 2 weeks after sowing (WAS), hand weeding and watering at regular intervals. Data were taken on the growth parameters of the plant such as plant height, leaf area, and stem girth at 2weeks interval, while fresh and dry shoot weight and root weight were taken at harvest period. Destructive samples were harvested at 100% flowering and taken to the laboratory for nutrient analysis. Other inflorescences was harvested when the inflorescence have matured in each plot, threshed and winnowed manually to recover the grains. Grains collected were weighed per plot using electric weighing balance (model BP 210S).Data collected were subjected to analysis of variance (ANOVA) while treatment means were compared using Duncan Multiple Range Test (DMRT) at 5% probability level.

III. RESULTS AND DISCUSSION

Effect of Different Organic Manureon Plant Height (cm): Different organic manurerates had a significant effect ($P \leq 0.05$) on the plant height at 2 weeks after sowing(Table 2). Treatment consisting of Poultry Manure (100%) had the tallest plant height (23.67cm), while treatment consisting of Cow Dung at 50% had shortest plant height of (18.00cm) which is not significantly ($P \geq 0.05$) different from treatment T_5 and T_7. There was also a significant effect ($P \leq 0.05$) of different organic manure on plant height at 4 weeks after sowing with Poultry Manure (100%)having the tallest plant height (36.67cm), while the shortest height (20.33cm) was obtained in control. Similarly, at 6 weeks after sowing, the different organic manure effect had significant ($P \leq 0.05$) on plant height. The tallest plant height (76.67cm) was obtained with Poultry Manure (100%), though, not significantly different ($P \geq 0.05$) from Poultry Manure used at75%, while the shortest plant height was recorded in control.

Effect of Different Organic Manure on Number of Leaves: Effect of different organic manureon number of leaves of amaranth was significant ($P \leq 0.05$) at 2 weeks, 4 weeks and 6 weeks after sowing as shown in Table 3. Plants in Poultry Manure (100%) had more numbers of leaves of (7.33, 9.00 and 12.33) at 2, 4 and 6 weeks after sowing, respectively, while Control recorded the fewest numbers of leaves (3.67) at 2 weeks after sowing although, this was not significantlydifferent ($P \geq 0.05$) from what was obtained in Cow Dung 100%, 75% and 50%. Control treatment also recorded the fewest number of (5.67 and 6.00) leaves at 4 and 6 weeks after sowing, respectively, though, number of leaves recorded in control treatment at week 4 was not significantly different ($P \geq 0.05$) from other treatments except Poultry Manure (100%) but significantly different ($P \leq 0.05$) at week 6 from Poultry Manure 100%, 75% and 50%.

Effect of Different Organic Manure on Leaf Area: Different organic manure had a significant effect ($P \leq 0.05$) on amaranths leaf area as revealed in Table 4. The widest leaf area of ($16.42cm^2$) was obtained in Cow Dung (50%) which was not significantly different ($P \geq 0.05$) from other treatments except that of control and the least ($8.97cm^2$) recorded in control at 2WAS.There was also a significant effect ($P \leq 0.05$) of different organic manure on the leaf area of amaranths at 4WAS with plant in treatment consisting of Cow Dung (100%) recorded the broadest leaf area ($45.26\ cm^2$) and the least ($13.67cm^2$) obtained in control. At 6WAS, different organic manure had a significant effect ($P \leq 0.05$) on the amaranths leaf area, the widest leaf areaof ($157.20cm^2$)was recorded in Poultry Manure (100%) which was significantly different ($P \leq 0.05$)vis-à-vis other treatments except Poultry Manure (75%)while the least ($30.15cm^2$) was obtained in controlwhich was not significantly different from treatment with Cow Dung (50%).

Proximate Analysis of Amaranthushybridus: The effect of different organic manure on nutritional and mineral composition of amaranths in Table 5 showed a significant effect ($P \leq 0.05$) in the chlorophyll content with the highest chlorophyll content recorded in treatment consist of Poultry Manure (75%), though not significantly different ($P \leq 0.05$) form other treatments except control (no treatment) which gave the least chlorophyll content of (27.85). Different organic manure had a significant effect ($P \leq 0.05$) on crude protein content of amaranths showed in Table 5.The highest crud protein content (12.82) was recorded in treatment containing Poultry Manure (100%) which is significantly different ($P \leq 0.05$) from other treatments except treatment consist of Cow Dung (75%), however, the least crud protein content (4.13) was recorded in control (no treatment).Effect of different organic manure was significant ($P \leq 0.05$) on crude fiber as recorded in Table 5. The fiber content was highest (7.86) in treatment containing Cow Dung (75%) which is significantly differentfrom other treatments while the least fiber content (4.15) was obtained in control (no treatment). Significant differences ($P \leq 0.05$) were noticed on fat content

among the treatments showed in Table 5. The highest fat content (0.40) was recorded in Poultry Manure (100%) which is significantly different (P≤0.05) from other treatments except treatment which contain Poultry Manure (75%), while the least fat content (0.28) obtained in control though not significantly different from what was obtained in Cow Dung (50%) as showed in Table 5.

Influence of difference organic manure on ash content of amaranths was significant (P≤0.05)(Table 5)The highest ash content (3.8) was recorded in treatment containing poultry Manure (100%) and this was significantly different (P≤0.05) from what was obtained in other treatments, however, the least ash content (2.41) was obtained in control.Different organic manure effect on amaranths moisture content was significant (P≤0.05) among the various treatments as showed in Table 5. The highest moisturecontent of (86.97) was obtained in treatment containing Poultry Manure (100%) though not significantly different from results obtained in Poultry Manure (75%) and Cow Dung (100%) however, the least moisture content(83.31) was obtained in control which is not significantly different from Cow Dung (75% and 50%).

Different organic manure showed a significant effect on mineral content of amaranths as showed in Table 5. The highest calcium (Ca) content (227.74) was recorded in Poultry Manure (100%)while the least calcium (Ca) content of (183.78) was recorded in control. The case was the same with potassium (K) on which the effect of different organic manure was significant (P≤0.05), the highest potassium (K) content (624.37) was recorded in Poultry Manure (100%) while the least (440.43) recorded in control. On phosphorus content, effect of different organic manure was significant (P≤0.05), the highest phosphorus (P) content (50.80) was recorded in Poultry Manure (100%) which is significantly different from other treatments while the least phosphorus (P) content (38.14) was obtained in control. The iron (Fe) content was also affected by different organic manure, the highest iron (Fe) content (2.09) was obtained in Poultry Manure (100%) and this is significantly different from other treatments however, the least iron (Fe) content (1.47) was recorded in control.

Influence of different organic manure on the amount of vitamin present in amaranths was significant (P≤0.05) among the treatments. The largest Vitamin A content (0.32) was recorded in Poultry Manure (100% and 75%) and are significantly different (P≤0.05) from other treatments while the least Vitamin A content (0.27) was recorded in control. For Vitamin B_1, the highest value of (0.04) was recorded in Poultry Manure (100%, 75%, 50% and Cow dung 100%) which are significantly different (P≤0.05) from other treatments while the least Vitamin B_1 content (0.02) was obtained in control. There was also a significant effect (P≤0.05) on Vitamin B_2 content with the highest amount (0.16) recorded in Poultry Manure (100%) which is significantly different (P≤0.05) from other treatments, while the least was Vitamin B_2 content (0.14) recorded in (Cow Dung 50% and control). Poultry Manure (100%) gave the highest amount of Vitamin B_3 which is not significantly different (P≤0.05) from other treatments except Cow Dung (50%) and control while the least Vitamin B_3 content (0.08) obtained in control.Similarly, the effect was also significant on Vitamin C with the highest Vitamin C content (48.07) obtained in Poultry Manure (100%)which is significantly different from other treatments while the least of (37.11) recorded in control.

Effect of Different Organic Wet and Dry Shoot and Root Weight Content: The effect of different organic manure on fresh and dry weight of Amaranth shoot and root was significant (P≤0.05) among the treatments as shown in Table 6. The highest fresh and dry shoot weight was obtained in Poultry Manure 100% while the lowest weight was recorded in control treatment. Similarly the highest fresh and dry root weight was obtained in Poultry Manure 100% while least was obtained in Cow Dung 50% although, not significantly different (P≥0.05) from treatments with Poultry Manure 50%, Cow Dung 75%, and control.

Different organic manure had a significant (P≤0.05) effect on fresh and dry weight of shoot and root of *Amaranthushybridus*. Quantitatively, the highest fresh shoot weight (123.90kg/ha) was obtained in Poultry Manure (100%) which was significantly different (P≤0.05) from other treatments, while the lowest weight (9.20kg/ha) was recorded in control. Similarly, Poultry Manure (100%) recorded the highest dry shoot content (15.17kg/ha)which was significantly different (P≤0.05) from what was obtained in other treatments while the least (1.9kg/ha) was obtained in the control. There were significant differences (P≤0.05) among the treatments on the effect of different organic manure on fresh and dry root weight. The highest fresh root weight (74.32kg/ha) was recorded in Poultry manure (100%) and this was significantly different (P≤0.05) from other treatments while the least was recorded in Cow Dung (50%). The trendwas the same for dry root weight, the highest (40.24kg/ha) was recorded in Poultry Manure and was significantly different from other treatments and the least obtained in Cow Dung (50%).

Discussion

The results of the study showed that different organic manure rates are capable of improving the quality and yield of *Amaranthushybridus.* The differences were not significant among the rates of each of the manure but significant among the different manure used in most of the parameters considered. The observed differences in values obtained in all the growth parameters assessed could be attributed to differences in nutrient contained in each of the manure which depend majorly on type of animal and the quality of feed on which they feed. This agreed with the report of Ewulo (2005) which stated that varied chemical concentration were observed in soil amendment when manure from different source were used, the report confirmed an increased in soil

pH, O, C, N, P, K, Ca, Mg, Mg, Na and CEC with rate of manure in soil amended with poultry and cattle manure and poultry manure gave quick response and higher concentration of soil chemical properties. The observed improvement in all the parameters assessed could be attributed to the ability of poultry manure to increase soil organic matter content the store of plant nutrients, stimulate the activities of soil organism, which aid the release of nutrient needed by the crop plant; these might have contributed to the improvement of the parameters considered (Okoli and Nweke, 2015).The study also revealed that poultry manureproduced higher effects on proximate, mineral, vitamin A, B, and C composition of *Amaranthushybridus*than cow dung in all the parameters investigated. The results of the study are in agreement with Arisha*et al.*(2003), Makinde*et al.* (2010), Shaheen*et al.*(2007) whose reports confirmed an improvement on some proximate and mineral contents of crop in organic manures than inorganic fertilizers, attributing the factors influencing the disparities to leaching through which nutrients in mineral fertilizers are lost while in organic manures are not readily available but have to undergo decomposition and mineralization (Makinde*et al.,* 2010). Organic manures activate many species of living organisms which release phytohormones and may stimulate plant growth and nutrients (Arisha*et al.,* 2003). The results also validate (Katherine *et al.*, 2007) which showed that organic is more nutritious than non-organic food and may lengthen people's lifespan. The report also confirmed that such food contains higher level of antioxidants and flavonoid as well as iron and zincwhich protect the heart and protect against diseases andcancer.

A sharp increase in demand for vegetables witnessed globally is attributed not only to preference but also for nutritional benefits derived from them. Higher amount of nutrients recorded in poultry manure in this study gives preference to the use of poultry manure than cow dung. The results therefore, encourage the use of poultry manure in growing *Amaranthushybridus*for better nutritional quality.In conclusion: Although, there were some significant differences among all the treatment in terms of amaranths leaf area, plant height and number of leaves, poultry manure is better than cow dung and control. Also in terms of shelf life, poultry manure has better storage life than that of cow dung. Poultry manure also contributed to the fertility of the soil because it added to the nutrient property of the soil while plant also took some nutrient in the soil.

IV. RECOMMENDATION

It was shown that both 100% and 75% of poultry manure gave the highest yield. In terms of shelf life, poultry manure also performed well in terms of nutritional value of *Amaranthushybridus* that the body will require. *Amaranthushybridus* production should be encouraged among the farmers because of its chemical composition and nutritional status. The use of organic fertilizer should not be discouraged among the farmers because according to researchers it was confirmed these poultry manure have side effect to our body. It was observed that 100% and 75% of poultry manure should be used by the farmers for polythene bag plant as it increased the yield of the vegetable, had a high nutritional and also increase soil physical and chemical properties. However, further studies will be required by widening the range of the level of poultry manure used in other to investigate a possible significant difference among the different levels of application.

REFERENCES

[1]. Anjali, R. N. (2013). The health aspect of amaranth. Roc2n. P2H,53,2,141-147.

[2]. Arisha, A. M. E., Gad, A. A. and Younes, S. E. (2003). Response of some pepper cultivars to organic and mineral nitrogen fertilizer under sandy soil conditions. *Zagazig Journal of Agricultural research*, 30: 1875-1899.

[3]. Breneer, S. H. (2000). A strategy to solve environmental concern by poultry production. *World Poultry Science Journal*,56:379-388.

[4]. Ewulo, B. S. (2005). Effect of poultry dung and cattle manure on chemical properties of clay and sandy clay loam soil. *Journal of Animal and Veterinary Advances 4(10).*

[5]. Johannes kotschi, (2015).Adverse impact of mineral fertilizer in tropical agriculture.

[6]. Katherine, O. (2007). Organic food more nutritious than conventional foods.Organic consumers association, November 18, 2007.*http://www.organic consumer.org/articles/article_*8470.cfm.

[7]. Makinde E.A., Ayeni, L. S. Ojeniyi, S. O. and Odedina, J. N. (2010). Effect of organic, organomineral and NPK fertilizer on nutritional quality of Amaranthus in Lagos, Nigeria. *Science Publication Researchers,http://www.sciencepub.net/researcher. ISSN:1553-9865.*

[8]. Makinde, E.A., L.S.Ayeni, S.O.Ojeniyi and J.N.Odedina (2010).Effect of organic, organomineral and NPK fertilizer on nutritional quality of amaranthus in Lagos, Nigeria Researcher, 2:91-96.

[9]. Moyinjesu, E. L. (2008). Comparative evaluation of different organic fertilizer on the soil fertility, leaf minerals composition and growth performance of dikanut seedlings (*Irvingiagabonnesis*L.).*Journal of food* agriculture, 20(2):10-09.

[10]. Muyonga, J.H. (2008). Effects to promote amaranth production and consumption in Uganda to fight malnutrition.*International union of food science and technology Oakville, Canada.*

[11]. NIHORT (1987). Advance in fruit and Vegetable Researches at NIHORT (1976-1987). National Horticultural Research Training Institute.NIHORT Publication Press, Ibadan.

[12]. Okoli,P.S.O.andI.A.Nweke(2015). Effect of different rates of poultry manure on growth and yield of amaranth cruentus.IOSR.*Journal of agriculture and veterinary science* 8:73-76

[13]. Oyedeji, S. (2014). Effect of NPK and poultry manure on growth, yield and proximate composition of three amaranths. *Journal of botany.77:82.*

[14]. Shukla S.I. (2006).mineral profile and variability in vegetable amaranth (Amaranthustriculus).*Journal of Plant food Human Nutrition. 61:23-28.*

[15]. Srivastava, (2011).*Ethiopian Journal of Environmental Studies andManagement*7(4):379-388.

Table 1: Physical and chemical properties of the experimental soil

Soil parameter	Soil test value
pH	5.6
Total N (g/kg)	1.2
Organic Carbon (g/kg)	15.2
Available phosphorus (mg/kg)	10
Exchangeable Bases (C mol/kg)	
Ca+	0.7
Mg+	0.9
K+	0.1
Na+	0.2
Particle Size Distribution (g/kg)	
Sand	860
Clay	72
Silt	68
Textural class	Loamy Sand

Table 2:Effect of different organic manure on plant height (cm)

Treatments	2 WAS	4 WAS	6 WAS
T1	23.67a	36.67a	76.67ab
T2	22.67ab	32.00ab	73.33ab
T3	21.00bc	30.33ab	62.67bc
T4	21.00bc	30.00ab	60.33c
T5	19.33cd	29.67b	52.67c
T6	18.00d	29.33b	38.33d
T7	19.67cd	20.33c	36.67d

Means with same letter (s) in a column are not significantly different at 5% level of probability by Duncan Multiple Range Test (DMRT).Poultry manure 100% (T1), Poultry manure 75% (T2), Poultry manure 50% (T3), Cow dung 100% (T4), Cow dung 75% (T5), Cow dung 50% (T6), and Control (T7)

WAS: weeks after sowing

Table 3: Effect of different organic fertilizer on number of leaves (cm)

Treatments	2 WAS	4 WAS	6 WAS
T_1	7.33^{c}	9.00^{b}	12.33^{a}
T_2	5.33^{b}	7.00^{b}	9.67^{b}
T_3	5.00^{b}	6.67^{b}	9.33^{b}
T_4	4.67^{bc}	6.33^{b}	8.00^{bc}
T_5	4.33^{bc}	6.33^{b}	7.67^{bc}
T_6	4.33^{bc}	6.00^{b}	6.67^{c}
T_7	3.67^{c}	5.67^{b}	6.00^{c}

Means with same letter (s) in a column are not significantly different at 5% level of probability by Duncan Multiple Range Test (DMRT).Poultry manure 100% (T_1), Poultry manure 75% (T_2), Poultry manure 50% (T_3), Cow dung 100% (T_4), Cow dung 75% (T_5), Cow dung 50% (T_6), and Control (T_7)

WAS: weeks after sowing

Table 4: Effect of different organic manure on leaf area (cm^2)

Treatments	2 WAS	4 WAS	6 WAS
T_1	14.28^{ab}	34.18^{b}	157.20^{a}
T_2	11.33^{ab}	33.93^{b}	121.30^{ab}
T_3	11.87^{ab}	20.58^{c}	83.50^{bc}
T_4	13.68^{ab}	45.26^{a}	85.58^{bc}
T_5	10.09^{ab}	26.91^{c}	85.08^{bc}
T_6	16.42^{a}	33.78^{b}	60.59^{cd}
T_7	8.97^{b}	13.67^{d}	30.15^{d}

Means with same letter (s) in a column are not significantly different at 5% level of probability by Duncan Multiple Range Test (DMRT).WAS: weeks after sowing

Poultry manure 100% (T_1), Poultry manure 75% (T_2), Poultry manure 50% (T_3), Cow dung 100% (T_4), Cow dung 75% (T_5), Cow dung 50% (T_6), and Control (T_7)

Table 5:Proximate analysis on different organic manure on*Amaranthushybridus*

Treatment	Chlorophyll	Crude Protein	Crude Fiber	Fat	Ash Content	Moisture Content	Ca mg/100g	K m/100g	P m/100g	Fe m/100g	Vitamin A mg/100g	Vitamin B1 mg/100g	Vitamin B2 mg/100g	Vitamin B3 mg/100g	Vitamin C mg/100g
T_1	35.31^{a}	12.82^{a}	7.86^{a}	0.40^{a}	3.80^{a}	86.97^{a}	227.74^{a}	624.37^{a}	50.80^{a}	2.09^{a}	0.32^{a}	0.04^{a}	0.16^{a}	1.19^{ab}	48.07^{a}
T_2	38.29^{a}	12.71^{a}	7.42^{b}	0.38^{a}	3.76^{b}	86.33^{ab}	224.56^{b}	623.16^{a}	49.74^{b}	1.94^{b}	0.32^{a}	0.04^{a}	0.15^{b}	1.15^{ab}	44.84^{b}
T_3	35.98^{a}	11.44^{b}	6.52^{c}	0.36^{b}	3.42^{d}	85.23^{bc}	216.34^{cd}	617.35^{b}	45.96^{d}	1.86^{c}	0.31^{b}	0.04^{a}	0.15^{b}	1.15^{ab}	42.80^{c}
T_4	37.86^{a}	11.42^{b}	6.18^{d}	0.33^{c}	3.48^{c}	86.01^{ab}	217.93^{c}	618.51^{b}	46.76^{c}	1.79^{d}	0.30^{c}	0.04^{a}	0.15^{b}	1.14^{ab}	44.98^{b}
T_5	36.83^{a}	11.24^{b}	6.17^{d}	0.33^{c}	3.25^{e}	83.77^{cd}	214.31^{d}	619.52^{b}	42.67^{e}	1.68^{e}	0.29^{d}	0.03^{b}	0.15^{b}	1.1^{3a}b	44.49^{b}
T_6	39.39^{a}	7.42^{c}	5.85^{e}	0.28^{d}	3.17^{f}	83.83^{cd}	211.04^{e}	593.32^{c}	41.59^{f}	1.63^{e}	0.29^{d}	0.03^{b}	0.14^{c}	1.12^{b}	44.65^{b}
T_7	27.85^{b}	4.13^{d}	4.13^{f}	0.29^{d}	2.41^{g}	83.31^{d}	183.78^{f}	440.43^{d}	38.14^{g}	1.47^{f}	0.27^{f}	0.02^{c}	0.14^{c}	0.81^{c}	37.11^{d}

Means with same letter (s) in a column are not significantly different at 5% level of probability by Duncan Multiple Range Test (DMRT).

Poultry manure 100% (T_1), Poultry manure 75% (T_2), Poultry manure 50% (T_3), Cow dung 100% (T_4), Cow dung 75% (T_5), Cow dung 50% (T_6), and Control (T_7)WAS: weeks after sowing

Table 6:Effect of different organic manure on fresh and dry weight ofshoot and root of *Amaranthushybridus*

Treatments	Wet Shoot Content	Dry Shoot Content	Wet Root Content	Dry Root Content
T_1	123.90^{a}	15.17^{a}	74.32^{a}	40.24^{a}
T_2	68.22^{c}	9.8^{b}	38.2^{b}	22.73^{b}
T_3	60.59^{d}	7.4^{cd}	19.0^{d}	4.75^{d}
T_4	83.28^{b}	4.65^{d}	28.76^{c}	18.9^{c}
T_5	43.31^{e}	4.75^{d}	14.84^{e}	8.78^{cd}
T_6	73.37^{c}	8.4^{c}	10.9^{g}	4.23^{d}
T_7	9.20^{f}	1.9^{e}	11.03^{f}	7.28^{cd}

Means with same letter (s) in a column are not significantly different at 5% level of probability by Duncan Multiple Range Test (DMRT).WAS: weeks after sowing.

Poultry manure 100% (T_1), Poultry manure 75% (T_2), Poultry manure 50% (T_3), Cow dung 100% (T_4), Cow dung 75% (T_5), Cow dung 50% (T_6), and Control (T_7)