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Evaluation of Proximate Composition Based on Cutting Heights of Amaranth (*Amaranthus cruentus* L.) in Bagauda, Kano State

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Abstract

A field trial was carried out during the 2022 rainy season at the National Horticultural Research Institute Bagauda substation (NIHORT) situated in the Sudan savannah ecological zone of Nigeria (19^0 4'N, long 12^0 26' E, and 721m above sea level). The trial was done to investigate cutting heights response on the proximate composition analysis of Amaranthus cruentus. The treatments consisted of three cutting heights (10cm, 15cm and 20cm) and laid out in a randomized complete block design with three replications. Fresh samples were oven dried and grounded into powder using blender and passed through 2mm sieve. which were determined using standard procedure by AOAC method and analyzed for proximate composition.There were significant effects in the results obtained on the percentage of fat and crude fibre only.Percentage of protein, moisture, carbohydrate, nitrogen, phosphorous and potassium were found to be non-significant. These findings suggest that cutting amaranth shoots at 20cm above the ground has an increased effect on means of percentage fat (3.062) and crude fibre (3.80) containing nutrients that has great potential for mechanical harvesting that may improve the nutritional components of the crop.

Keywords: Cutting Height, *Amaranthus cruentus*, Nutritional Components and Savannah

INTRODUCTION

The nutrient values of Amaranth per 100% edible portion as water 85ml, calorie 48, protein 5g, fat 0.7g, carbohydrates 5g, fibre 1.5g, calcium 250mg, iron 4mg, Betacarotene equivalent 1800mg, thiamine(vitamin B1) 2.75mg, riboflavin (vitamin B2) 4.24mg, niacin 1.54mg and (ascorbic acid 100mg). According to Alegbejo(2013), it was reported that boiled leaves and

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roots are used as laxative, diuretic, anti diabetic, antipyretic, ant snake venom, antileprotic, anti-gonorrheal. Perhaps the greatest constraint facing amaranth production is knowing how to improve the vegetative part, in this respect the need for plant cutting is very important for rapid vegetative growth and nutritional improvement. Plant cutting heights play a vital role in crop growth, yield and dry matter NIHORT(2017).In Nigeria, there is less work on the repeated cutting of amaranth shoots above the ground on nutrient components of vegetable amaranth. Leafy vegetables can be harvested either by uprooting or repeated cutting back of the shoots until inflorescence appears on the main trunks. In line with the submission of that repeated cutting of shoots produced higher cumulative dry matter than harvesting at once by uprooting. The objective was to determine the effect of cutting heights on nutrient components of vegetable amaranth.

Study area

The research experiment was carried out during the 2022 rainy season at the National Horticultural Research Institute Bagauda, Kano station between longitude (8^0 23′ E and latitude 11^0 23'N). The site was ploughed, harrowed and marked into 36 plots with a gross plot size of 9m2 and a net plot of 3m2 was assigned. The treatments consisted of three levels of cutting heights (10cm, 15cm and 20cm)

Study design

Plants were laid out in a randomized complete block design with 3 replications. Transplanting was done in the middle of August at a depth of 2cm with inter and intra-row spacing of 75 X 25cm.

Fertilizer Application

NPK fertilizer 15:15:15 at a rate of 30kg nitrogen 30kg phosphorous 30kg potassium was applied at 3WAT. The second dose of N was applied as top dressing at 2 weeks after first application using urea 20kgN/ha. Local hoe weeding was done at 2WAS intervals.

Soil samples were collected at random from the experimental site at a depth of 0-30cm and analyzed for physical and chemical properties using standard procedures as described by Black (1965).

Data analysis

Data collected at harvest was analyzed for proximate compositions and their average were recorded on percentage moisture, fat, protein, carbohydrate, crude fibre, nitrogen, phosphorous and potassium.The data collected were subjected to analysis of variance using Genstat 16th edition treatment means and were compared using Student Newman-Keuls (SNK) at 5% level of probability

RESULTS

Physical and chemical properties of the soil (0-30cm) at the experimental sites in the 2022 rainy season

Particle size distribution	
Sand	72
Clay	9.6
Silt	18.4
Texture	Sandy loam
Chemical Composition((g/kg)	
pH (H_2O)	7.24
Organic Carbon	0.37
Total Nitrogen	0.07
Available phosphorus	0.18
Total phosphorus	98.67
Exchangeable Bases (%)	
Ca	3.70
Mg	1.25
K	0.51
Na	0.11

Source: soil science unit, pollution control

Table 2:Effect of cutting height on vegetable amaranth at 12WAT at Bagauda substation during the 2022 rainy season

Treatments	Mstr	Prtn	Fat	Cbhdt	C.f	N	P	K
Cutting Height cm^2								
10	5.06	18.59	2.663b	55.62	3.16	4.09	2.788	1.80
15	4.84	19.50	2.796b	54.36	3.33	2.67	1.852	2.58
20	4.64	20.50	3.062a	52.67	3.80	3.53	2.895	2.13
S.E±	0.180	0.618	0.105	0.905	0.184	0.749	0.055	0.536
Significance	NS	NS	*	NS	*	NS	NS	NS

Means with different letters in the same column are significantly different (P < 0.05%) using SNK = Student Newman-Keuls test and WAT = Weeks after Transplanting

DISCUSSION

Soil sample analysis results indicated sandy loam with a pH of 7.24. The soil available phosphorous of Bagauda appeared very low (0.18). The concentrations of (Ca, and Mg) increased with soil depths except Na and K(Table 1).

The percentage moisture of the shoot was not influenced by cutting height at the study site (Table 2).

Percentage protein

However, cutting height has no significant effect on the protein content of vegetable *Amaranth* at the Bagauda location (Table 2).

Percentage fat

Cutting height was recorded as significant. Cutting plant shoots at 20cm was found to be of higher means when compared with 10cm and 15cm (Table 2).

Percentage carbohydrate

Carbohydrate of *Amaranth* was not significantly influenced by different cutting heights.

Percentage crude fibre
The crude fibre was found significantly influenced by cutting at 20cm and was recorded as the best with a higher increase in fibre than 10 and 15cm respectively. (Table 2

Percentage of nitrogen, phosphorus and potassium
There were no significant effects with cutting at different levels.
Cutting vegetable amaranth shoots for the presence of nitrogen, phosphorus and potassium was not recorded as significant at all the different heights in this study. Similar work by Akanbi *et al;* 2009 reported that repeated cutting of amaranthus shoots improves its productivity and that the higher the amounts of nutrients in the soil for plant uptake the greater the advantage. Cutting shoots at 20cm above the soil surface could be a good agronomic practice for optimum performance of the crop. In most cases, crop growers use synthetic fertilizers as a major supply of nutrients (Dauda and Nor; 2008).

CONCLUSION

The results of the experiments showed that repeated cutting of shoots contains few nutrients reserved which favor nutritional components and can be more beneficial.
The increase in fat and crude fibre might be due to the increase in quality parameters. Farmers should adopt the use of cutting amaranth shoots at 20cm will have a positive impact thereby improving their income, nutrition and employment opportunities.

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Appendices