

*Full Length Research Paper*

# Age of stem cuttings and its effect on the growth of *Manihot spp*

Onofejire Ogaga Anderson

Department of Agricultural Science, Federal University Otuoke, Bayelsa, Nigeria.

Accepted 9 May 2015

Preliminary studies involving the age of stem on the growth of *Manihot esculentus* was carried out at the teaching and Research farm of Ignatius Ajuru University of Education, Port Harcourt during the 2010 and 2011 farming season. The experiment consisted of full length cuttings of *M. esculentus* obtained from two locations within along precipitation gradients in the state-Ndoni in Ogbia/ Egbema/ Ndoni Local Government Area and Abara in Etche Local Government all in Rivers State. The cuttings were divided into three pieces of distal, media and apical. The experiment was carried out in a randomized complete blocks design (RCBD) with three replicate per treatment. Cutting position (source) did not show significant ( $P < 0.05$ ) effect on the parameters tested (girth, height and branches of *M. esculentus*). Cutting at the distal position recorded the highest values for the parameters evaluated. Percentage sprouting was high plants planted at poultry site ranging from 17.5-30.7% compared to 12-34.5% in plants planted at the back of the laboratory. The study suggests that propagation of *M. esculentus* by cutting at the distal position be encouraged for enhanced growth performance.

**Key words:** Growth, stem cuttings, productivity and age.

## INTRODUCTION

In Nigeria today, two species of cassava exist *Manihot utilissima* and *Manihot esculentus* with different varieties existing all over. The most commonly available varieties distributed by the international institute for typical Agriculture (IITA) includes older types – TMS 60500, 60444 and 60447 while the newer types - TMS 30555, 30572, 50395 etc abound. However special interest is on the newest types because of its abilities in disease resistant, higher yielding and better starch quality.

*Manihot spp* contains a cyanogenicglucoside which hydrolysis to hydrocyanic acid, a potent poison. This acid

gives the cassava tuberits bitter taste with its degree of bitterness depending on the content of the alkaloid. The crop requires warm temperature, high rainfall and deep fertile well drained light to medium textured soils for best yields. It tolerates drought but is extremely susceptible to excessivewetness or flooding. The cuttings of most recently released cutovers store rather poorly and should not be stored long before planting.

Both *M. utilissima* and *M. esculentus* which is economically viable has existed in Nigeria for over 200 years with a little scientific work on its basic growth parameters especially in the tropical rain forest zones. Considering the economic and environmental potentials of this crop and its ecological adaptability to this zone. There is need to carryout investigation on its vegetative

\*Corresponding author. E-mail: ogaga\_andre12@yahoo.com

**Table 1.** Effect of cutting position and sources of cutting on growth parameters of *Manihot esculentus*.

Source of cutting	Cutting position	Poultry site			Laboratory site		No. of branches
		Girth (cm)	Height (cm)	No. of Branches	Girth (cm)	Height	
Etche	Distal	8.01±0.9	67.7±6.4	60.31±9.10	3.71 ± 0.14	66.1±7.81	48.28±6.5
	Medical	2.24±0.8	65.6±5.8	60.12±9.0	3.41±0.15	55.06±5.26	40.1±4.92
	Apical	6.41±0.72	60.2±5.9	60.4±9.35	3.33±0.15	56.01±4.98	40.7±4.88
	SEM	0.85	8.41	9.01	0.17	8.60	7.76
Ndoni	Distal	8.00±0.9	69.3±8.96	60.71±9.1	3.76±0.14	67.2±7.81	47.22±6.20
	Media	7.10±0.80	67.1±8.85	60.33±9.0	3.46±0.6	55.40±5.15	41.67±4.05
	Apical	6.50±0.75	65.4±8.83	61.56±9.0	3.3±0.16	56.20±5.3	41.51±4.80
	SAMS	0.84	8.65	9.50	0.14	8.70	7.50

Values are made + standard error of three replicates ( $P<0.05$ ).

growth potentials which is based on sound scientific information hence, this effort to generate baseline data on *Manihot specie* found in the Niger Delta region of this country. This paper aimed at evaluating the effect of physiological age of stem cutting and sources of *Manihot* spp into geographical region in Rivers State.

## MATERIALS AND METHODS

Field experiment was carried out at the research farm of Ignatius Ajuru University of Education, Port Harcourt. Full length cutting of *M. esculentus* was obtained from two locations in the State-Ndoni in Ogbia/Egbema/Ndoni Local Government Area and Abara in Etche Local Government Area, all in Rivers State. The cuttings were divided into smaller sizes along the vertical axis from the base to the apex each cuttings consisted of four lateral buds. The full length cuttings were divided into three pieces of distal Medial and apical. The experiment was carried in a Random complete block design. (RCBD) with three replicates per treatment in two separate sites within the school- (1) Close to the poultry and piggery farm and at the back of the laboratory adjacent the fish pond. The plants were allowed under the influence of the natural weather. Measurement of shoot height stem girth and number of branches were taken at 4 weeks after planting. Initially and at 12 weeks intervals subsequently. Data collected were analyzed using descriptive statistics and analysis of various significant means was separated using Duncan multiple Range test.

## RESULTS AND DISCUSSION

The effect of cutting position and source on the growth of *M. esculentus* is presented in Table 1. From the result, cutting position and source had no significant ( $P<0.05$ ) effect on the girth of the plant and cutting at the distal

position gave the highest girth values ranging from 8.01 cm for *M. esculentus* from Etch to 8.00 cm for *M. esculentus* from Ndoni. For *M. esculentus* planted within the poultry house areas, cutting position significantly effected the girth ( $P<0.05$ ) of the plant collected from Ndoni. For plants collected from Etche, cutting at the distal position,procured the highest mean girth (8.01 cm) which was significantly higher ( $P<0.05$ ) than those at the media and apical positions with 7.24 and 6.41 cm respectively. The height of *M. esculentus* collected from the different cutting sources in Etche and Ndoni was not significant ( $P<0.05$ ). In the poultry and laboratory axis, for all sources of cuttings, cutting at the distal position had the highest mean values for height. The number of leaf branches ranges from 60 - 48 for plants planted within the poultry farm axis.The highest number of leaf branches was 48. Although cutting position had no significance effect ( $P<0.05$ ) on the number of branches in poultry and laboratory site, cutting at the medical position gave significant number of branches for *M. esculentus* collected from Ndoni areas. Cutting from the distal position gave the highest number of leaf branches for plants collected from Etche Local Government Area.

It is well documented that propagation of *M. esculentus* is associated with the problems of reduced vigor, Transport of disease and a deep root rooting system of the propagated plants. From old times, vegetative propagation by stem cuttings has been widely used for establishment of clonal plantations. This attribute has aided in production of disease free plants and reduce variability in seeds to be procured (Nanda and Kochhas, 1987).

The variation in the growth of *M. esculentus* taken from Etche and Ndoni could be attributed to Soil differences with varying nutrient. Bija1wan and Thakur (2010) reported that soil types and seasonal variation play important role in plants growth. Similarly cutting size and position plays a role in growth response of shoot cutting. Documenting evidence (Offor and Answer, 2010) has

shown that soil and seasonal variation are known to increase growth response in the shoot cutting of some forest species (Nanda et al 1968). With *Manihot* spp, the tendency for increased potential for carbon sequestration rates is possible as stable microaggregates can offer protection to organic carbon. It is a known fact that *Manihot* spp cultivation will not only serve as source of income generation to poor famers but will also improve the quality of their soil in the long run. However, sporting percentage ranging from 18.5 - 40.70 in crop planted at the poultry site was observed as against 15.5 - 35% in plants along the laboratory site. The variation could be attributed to soil properties and addition of nutrients from poultry droppings. Nada et al (1968) has reported variation in percentage sprouting some forest species with variation in soil properties. Based on the findings of this study, It can be concluded that cutting at the distal produce the greatest growth followed by the media and apical cuttings and growth of *Manihot* spp in area within the poultry site were higher than the laboratory site. Cultivation of *Manihot* spp by cutting at the distal should be encouraged for greater growth performance.

## REFERENCES

- Achinewhu SC, Owuamanam CI (2001). Garification of five improved cassava cultivars in Nigeria and physico chemical and sensory properties of gari yield. Afri. J. Root and Tuber Crops 4 (2): 18-21.
- Aerni P (2006). Mobilizing science and technology for development: the case of the Cassava Biotechnology Network. *AgBioForum* 9 (1): 1-14.
- Anekwe HO (1990). Cassava rapid multiplication Techniques. Presented at Cassava Production Training Course FDA Station Ugwuoba.
- Awah ET, Tumanteh A (2001). Cassava based cropping systems and use of inputs in different ecological zones of central Africa. Afri. J. Root and Tuber Crops 4 (2): 20-27.
- Bailey LH, Bailey EZ, Bailey Hortatorium LH (1976) *Hortus Third: A concise dictionary of plants cultivated in the United States and Canada*. New York: Macmillan.
- Bijalwan A, Thakur T (2010). Effect of IBA & Age of Cuttings on rooting behavior .J. Curcas in different seasons in western Hinalaya India. Afri. J. Plant Sci., (4) 10: 387.390
- CEDP (2010). Impact Assessment Evaluation of Cassava Enterprise Development Project (CEDP) Implemented in Akwa Ibom, Cross River and River States, Nigeria. Technical Report submitted to IITA Ibadan, Nigeria, May 2010.
- Eke-okoro ON, Ekwe KC, Nwosu KI (2005). Cassava Stem and Root Production: A Practical Manual. National Root Crops Research Institute (NRCRI) Press, Umudike, Nigeria. p. 54.
- FAOSTAT (2012). FAOSTAT 2012. Searchable online database from Food and Agriculture Division of the United Nations.
- Nandi KK, Purshit AN, Bala A, Anand KK (2010) Season rooting response of stem cuttings of some forest tree species to auxin Indian forest. 94(2):154 – 162
- Ndaeyo N, Umoh UGS, Ekpe EO (2001) Family Systems in Southern Nigeria Implications for Sustainable Agricultures Production. J. Sustain. Agric. 17(4) 75-89.
- Nweke FI, Spencer DS, Lynam JK (2001). The Cassava Transformation: Africa's Best Kept Secret. Michigan State University Press, East Lansing, USA.
- Sadik S (1988). Root and tuber crops, plantains and bananas in developing countries: challenges and opportunities. Rome: Food and Agriculture Organization of the United Nations. 83 p. Seasons rooting response of stem cuttings of some forest tree species to auxin Indian forest 94(2): 154 – 162
- Sandra A BL. Aliero & L.G Hassai (2012). Effect of Physiological Age of Stem Cutting and its growth on *Jatropha curcas*. Unpublished paper presented at second International Jatropha conference, University of Ilorin.
- Wikipedia (2012). "Cassava." Wikipedia, the Free Encyclopedia. 13 Dec 2011, 03:13 UTC. 1 Jan 2012.