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# PARTICIPATORY APPROACH: FARMERS' COMPETENCE STATUS IN THE USE OF IMPROVED CASSAVA STEM MULTIPLICATION TECHNOLOGY IN NIGERIA

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**ABSTRACT**

This paper examined the competence status of farmers in the use of cassava stem multiplication technology in Imo State. The three agricultural zones of the Imo State Agricultural Development Programme namely Okigwe, Orlu and Owerri were all selected for the study. From the zones twenty five ADP contact farmers were selected from each zone totaling a sample size of seventy five respondents for the entire study area. Using structured questionnaire, data on farmers' socio economic characteristics as well as extent of knowledge of the cassava stem multiplication technology were collected from the respondents. Data collected were analyzed with descriptive statistics and Chi square statistics. Result of Chi square analysis performed at 5% significance level shows significant variation ($P<0.5$) in farmers' competence status in 9 out of 11 practices that comprise the cassava stem multiplication technology. They include land preparations methods , selection and handling of stems, length/size of cassava stakes (1, 2, 3 and 5 nodes), type of chemicals required in technology, chemical treatment of the stakes , soil nutrient management, essential farm tools/ equipment, pre sprouting of the cassava stakes and hardening process for the pre-sprouted stakes. Moreover, there was generally only a fair knowledge of the various practices in the cassava stem multiplication technology. Thus, it is recommended that the technology be given accelerated promotion and dissemination through extensive training of farmers in various locations in the study area. Also, multi-locational method demonstration field days should also be organized for farmers. To achieve a wider diffusion of the technology, training of farmers' cooperative societies in the study is very imperative.

**Keywords:** cassava stem multiplication technology, Nigerian growers, farmers response, competence, stakes, agro chemicals.

## 1. INTRODUCTION

Cassava has unique characteristics that help subsistence farmers to deal with extremely high economic, political, and environmental uncertainty. It is efficient in carbohydrate production, adapted to a wide range of environments, and tolerant to drought and acidic soils. An estimated 70 million people obtain more than 500 Kcal per day from cassava; more than 500 million people consume 100 Kcal per day (Kawano, 2003). Even though cassava faces serious challenges as a vegetative propagated crop that is prone to genetic erosion as well as pest and virus infestation, it generally responds well to irrigation or favourable rainfall conditions, and the use of fertilizers. Its ability to grow on poor soils and under difficult climatic conditions, as well as the advantage of flexible root harvesting whenever there is a need, make it the crop of last resort for farmer families and their domestic animals in the tropics (Hillocks *et al.*, 2001).

Cassava is less drought-prone than corn. In addition, cassava has also a big potential to be a profitable cash crop in Africa. The case of Thailand proved that cassava can become a profitable export crop if, a national commitment to the crop's improvement, production and marketing are combined. In other countries (such as Costa Rica and Brazil), where the commercialization of cassava has reached an advanced stage, technologies have been developed in recent years that make planting, harvesting, and post harvest processing more efficient and less time-consuming. Cassava is important for poor people around the world, and is among the most important starchy staples in Africa. The crop's year-round growth makes it well adapted to the tropics, and its tolerance of low fertility and mid-season droughts makes it particularly important where soil quality is low and moisture is variable. Cassava's unusual plant architecture makes it attractive for farmers to intercrop with cereals, legumes, or vegetables, and also to plant alongside perennial tree crops such as cocoa and coffee during their early growth stages. In addition, traditional varieties take more than a year to mature, and their roots can then be stored in the ground for piecemeal harvest over several months. The value of the harvest depends on its timing as well as its quantity (Aerni. 2006).

In Nigeria, the development and spread of new early-maturing, pest tolerant varieties have been promoted partly by demand for cassava products such as *gari, fufu etc.* But, the rapid diffusion of the varieties in Nigeria has also been due to the efforts of IITA in collaboration with other relevant national stakeholders, which contributed not only in development of new varieties but also multiplication and dissemination of the new varieties, in addition to government policy changes and investments in extension. Some spontaneous, farmer-to-farmer spread of improved varieties might be expected to occur even over long distances, but relatively slowly as the number of viable cuttings from a stand of cassava is a small fraction of the number of viable seeds from a stand of cereal crops (IITA, 1990, Sanni, 1995).

Cassava suffers from several pest and diseases that reduce yield by nearly 48 million tons yearly in Africa, about 50% of its current production, valued at

US$1.4 billion (FAO 2003). The most important disease of this crop is the cassava mosaic disease (CMD). Cassava is mostly often (traditionally) grown on marginal soils in Nigeria which robs the plant of important growth enhancing nutrients and exposes the crop to additional stresses making it more susceptible to pest attack leading to more severe crop losses. The most realistic approach to reducing losses to pests and diseases is the use of host plant resistance through development of improved varieties especially as there is a growing interest by the industry in cassava due to its relatively good adaptation to drought and poor soils.

The National Root Crops Research Institute (NRCRI) has the national mandate for cassava research and development in Nigeria. The institute through its breeding programme has been addressing farmers' needs in the development of disease resistant cassava varieties with high yield potential and acceptable culinary qualities. NRCRI has contributed substantially to the development of the crop through release of improved varieties towards increased productivity in Nigeria. For the dry marginal lands of the northern part of the country, initiatives are underway to breed for drought tolerant varieties. However the outbreak of CMD pandemic in East Africa with various strains of the virus recently posed a great threat to the crop wiping out the gains made in the past decades in Africa. The need to take a pre-emptive measure to combat the disease and stimulate increased productivity resulted in the development of a new generation of cassava varieties through collaborative efforts between the NRCRI and IITA under a presidential initiative of the Federal Government of Nigeria. The Nigerian government also launched the initiative to promote cassava as a foreign exchange earner in Nigeria in addition to its key role as the number one staple in the country. Since the initiative was launched, the Nigerian government has consistently pursued policies in the last couple of years to increase the productivity of agriculture, increase the utilization of industrial capacity, and diversify export earnings to enhance rapid economic growth (CEDP, 2010).

Scarcity of planting materials for the elite (improved) cassava varieties gave rise to the development of a technology for rapid multiplication of cassava stem. This technology has advantage of rapidly multiplying cassava stems within short time period thereby enabling farmers to have access to the improved varieties. Nevertheless, farmers still visit the Institutes to procure stems of improved cassava varieties even though the technology has been disseminated to them through the Agricultural Development Programmes (ADPs). This observation necessitated organization of training workshop for cassava farmers in southeastern Nigeria by IITA Ibadan in collaboration with NRCRI Umudike. The specific objectives of the workshop were to examine farmers' competences in the use of the technique for cassava stem multiplication and to impart the requisite skills and knowledge for efficient application of the technique for cassava stem multiplication

## 2. MATERIALS AND METHODS

The study was carried out in the three agricultural zones of Imo State Agricultural Development Programme (ADPs). In each zone, 3 ADP blocks were randomly selected from where 25 farmers were also purposively sampled on the basis of their prominence in cassava production. This sampling method gave rise to a sample size of 75 farmers from the three zones. Structured questionnaires were therefore distributed to be completed by the farmers before the commencement of the training. Afterwards, 74 farmers returned their questionnaires. Data were analyzed with descriptive statistics especially the 5 point Likert measurement scale as well as Chi square statistics.

In scoring the farmers' responses on the extent of knowledge of the cassava stem multiplication technology, the Likert scale stipulated that Nil scored 0; very little scored 1, little was weighted 2; fair was scored 3, much scored 4 while very much scored 5. Afterwards, the responses were further categorized into three (Little, Fair and Much) by dividing the four spaces in the 0 to 5 ranges which gave a product of 1.33. Then the product 1.33 was deducted successively from the maximum point 5 to obtain the lower class mark for each category (Ekwe, 2006). Thus the categories could be classified as follows: 5 - 3.67 = Much; 3.66 - 2.34 = Fair; 2.33 - 0 = little

The Chi square statistics is expressed as:

$$Xi^2 = \frac{\sum (Fo - Fe)^2}{Fe}$$

Where

$Xi^2$ = Chi square for *i* practice of the cassava stem multiplication technology
Fo = Observed frequency of farmers' response in *i* practice of the technology
Fe = Expected frequency of farmers' response in *i* practice of the technology
*i* = the individual practices that comprise the cassava stem multiplication technology identified as follows:

X1 = Land preparations methods for cassava stem multiplication
X2 = Selection and handling of stems
X3 = Length/size of cassava stakes (2 and 3 nodes)
X4 = Type of chemicals required in technology
X5 = Chemical treatment of the stakes
X6 = Soil nutrient management of the multiplication plot
X7 = Weed management of the plot
X8 = Essential farm tools/ equipment
X9 = Pre sprouting of the cassava stakes
X10 = Hardening process for the Pre-sprouted stakes
X11= Harvesting of mature cassava stems

## 3. RESULTS AND DISCUSSIONS

Mean age of the farmers was 45 years with majority (36%) within the age group of 31-40 years. Males were in the majority (65%) while those who were fully engaged in farming were also in the majority. The results

also showed that majority of the farmers (66%) were in regular contact with Extension Agents. Majority (45%) of farmers engaged in cassava root production whereas only few were involved in cassava stem production (12%) and cassava root processing (11%) as business enterprise.

Results in Table-2 revealed only fair knowledge in most practices in the technology such as Land preparation (2,79), Selection and handling of stem (2,58), Knowledge in types and lengths of the stakes (2.05), Chemical treatment of the stakes (1.91), Soil nutrient management of the plots (2.16), Essential farm tools/equipment (2.68), Pre-sprouting of the cassava stakes (2.10), Hardening of the pre-sprouted stakes (1.97), Transplanting of the pre-sprouted stakes (2.04) and Harvesting of mature cassava stems (2.44). There was however, a little knowledge of the types of chemical used for the technology (1.63).

From the foregoing, it is evident that there was indeed a notable level of incompetence among farmers in the use of the cassava stem multiplication technology hence the frequent and high demand for cassava stems from the Institutes (IITA and NRCRI) by farmers in the study area. The major sources of improved cassava varieties were NRCRI Umudike (51.4%), followed by the ADPs (17.6%) and fellow farmers/friends (13.5%).

Nearness to the Institute and its extension activities might have contributed immensely to the greater role played by the Institute in creating awareness and as source of improved cassava varieties. All these most likely accounted for the high level of adoption (Table-1). In South-eastern Nigeria, about 87% of lands allotted to cassava farms ranges from 0.1 - 5 hectares, indicating that most of the farmers/respondents are resource poor farmers. This is in agreement with Olayide (1980), who stated that a greater percentage of Nigerian farmers cultivate less than 5 hectares annually.

Furthermore, a chi square analysis revealed significant differences ($P<0.5$) in farmers' competencies in 9 out of 11 practices in cassava stem multiplication technologies. They include land preparations methods, selection and handling of stems, length/size of cassava stakes (1, 2 and 3 nodes), type of chemicals required in technology, chemical treatment of the stakes, soil nutrient management, essential farm tools/ equipment, pre sprouting of the cassava stakes , hardening process for the pre-sprouted stakes. This implies that though there was generally a "fair knowledge" of the stem multiplication technology among the farmers, there was also a significant knowledge gap in the use of the technology created by the varying levels of knowledge in the individual practices that constitute the technology.

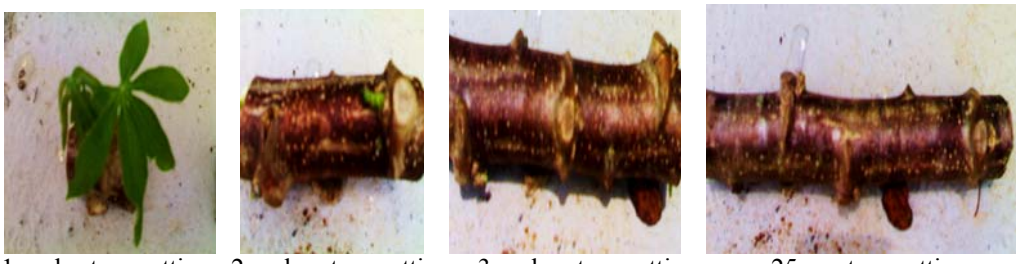


**Figure-1.** Rapid multiplication techniques of cassava planting materials available to Nigeria farmers.

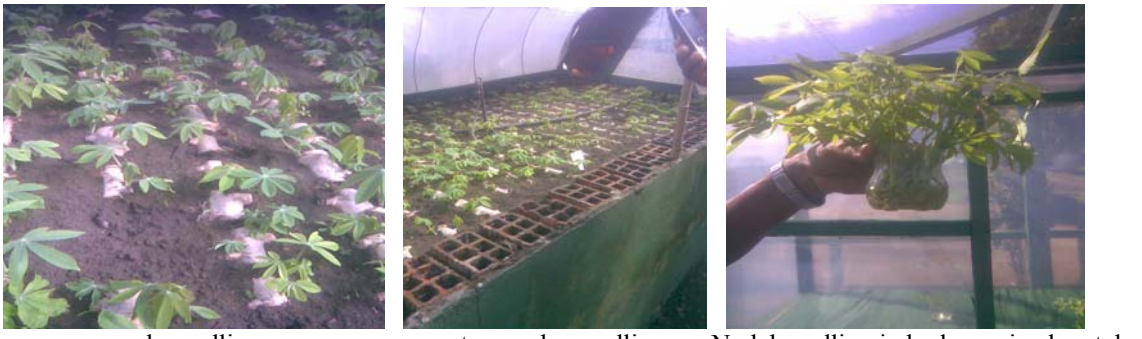


**Figure-2.** Cassava nodal segments (seedlings) in different arrangements for rapid multiplication techniques for Nigeria farmers.

**Table-1.** Distribution of cassava farmers according to farm size, educational status and sources of improved cassava varieties.

| Variable | No. | % |
|---|---|---|
| **(a) Farm size in hectares** | | |
| 0.1 – 5.0 | 42 | 56.8 |
| 5.1 – 10.0 | 20 | 27.0 |
| 10.1 – 15.0 | 2 | 2.7 |
| > 15 | 10 | 13.5 |
| **Total** | **74** | **100** |
| **(b) Educational status** | | |
| No formal education | 34 | 45.9 |
| Primary school education | 21 | 28.4 |
| Secondary school education | 12 | 16.2 |
| Tertiary education | 7 | 9.5 |
| **Total** | **74** | **100** |
| **(c) Sources of improved cassava varieties** | | |
| Research Institute (NRCRI Umudike) | 38 | 51.4 |
| National seeds services (NSS) | 5 | 6.7 |
| ADP | 13 | 17.6 |
| Fellow farmers/friends | 10 | 13.5 |
| Market | 8 | 10.8 |
| **Total** | **74** | **100** |

**Source:** Train the trainer and questionnaire data 2005.

**Table-2.** Farmers' extent of knowledge in the cassava stem multiplication technology.

| | Nil 0 | V. little 1 | Little 2 | Fair 3 | Much 4 | V. much 5 | Mean max = 5 | Rmk |
|---|---|---|---|---|---|---|---|---|
| Land preparations methods | 4 | 9 | 19 | 13 | 14 | 15 | 2.79 | Fair |
| Selection and handling of stems | 5 | 20 | 13 | 14 | 7 | 15 | 2.58 | Fair |
| Length/size of cassava stakes | 10 | 22 | 15 | 15 | 5 | 7 | 2.05 | Fair |
| Chemicals required in technology | 11 | 30 | 16 | 11 | 4 | 2 | 1.63 | Little |
| Chemical treatment of the stakes | 6 | 31 | 14 | 12 | 8 | 3 | 1.91 | Fair |
| Soil nutrient management t | 10 | 18 | 14 | 19 | 8 | 5 | 2.16 | Fair |
| Weed management of the plot | 5 | 17 | 15 | 11 | 11 | 15 | 2.68 | Fair |
| Essential farm tools/ equipment | 9 | 25 | 11 | 12 | 12 | 5 | 2.10 | Fair |
| Pre-sprouting of the cassava stakes | 11 | 25 | 11 | 14 | 8 | 5 | 1.97 | Fair |
| Hardening of the pre-sprouted stakes | 10 | 20 | 17 | 14 | 10 | 3 | 2.04 | Fair |
| Harvesting of mature cassava stems | 11 | 10 | 15 | 16 | 17 | 5 | 2.44 | Fair |

**Table-3.** Chi-square Analysis of influence farmers' competencies in the use cassava stem multiplication technology.

| Variable | Chi-square calculated | 5 % level of significant |
|---|---|---|
| Land preparations methods for cassava stem multiplication | 10.97 | .052 |
| Selection and handling of stems | 12.27 | .031 |
| Length/size of cassava stakes (2 and 3 nodes) | 15.85 | .007 |
| Type of chemicals required in technology | 40.97 | .000 |
| Chemical treatment of the stakes | 40.32 | .000 |
| Soil nutrient management of the multiplication plot | 12.26 | .026 |
| Weed management of the plot | 7.56 | .182 |
| Essential farm tools/ equipment | 18.43 | .002 |
| Pre sprouting of the cassava stakes | 19.40 | .002 |
| Hardening process for the pre-sprouted stakes | 14.70 | .012 |
| Harvesting of mature cassava stems | 8.37 | .137 |

## 4. CONCLUSIONS

Farmers' competencies in the use of the technology were only fair in most practices in the technology. Again, there were varying levels of knowledge among the farmers in the individual practices that constitute the cassava stem multiplication technology.

It is thus recommended that the technologies should be given accelerated promotion and dissemination through extensive training of farmers in various locations in the State. Also, multi-locational method demonstration field days should also be organized for farmers. To achieve a wider diffusion of the technology, training of farmers' cooperative societies in the study is very imperative.

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