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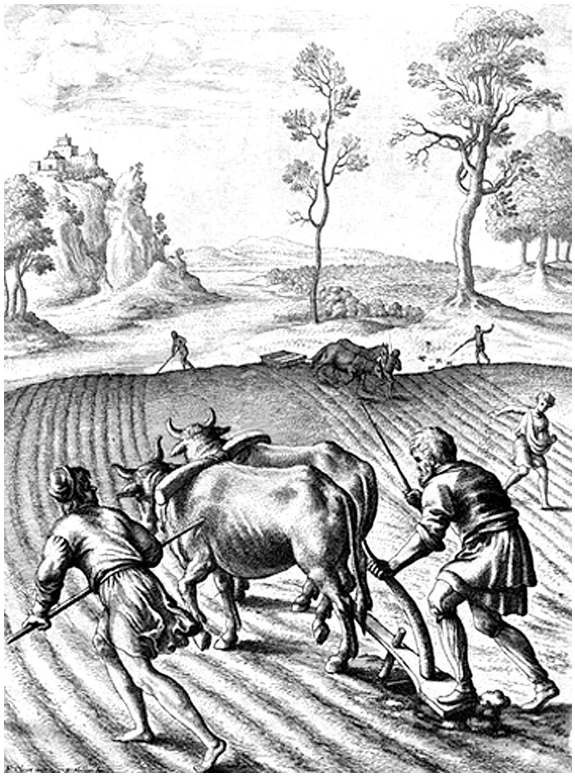

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A Survey of Cassava (*Manihot esculenta* Crantz) Planting Materials in Storage: A Case Study in Two Communities in the Ejisu District of Ashanti Region, Ghana

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Abstract: This study was conducted in two cassava growing communities in the Ejisu District of Ashanti region to assess the problems associated with cassava planting material in storage. The study showed that most farmers (90%) obtained their source planting materials from other farmers or their own farms. Majority of the farmers (68%) also undertook the upright or vertical storage of their planting materials. Fifty two percent of respondents also reported that the initial quality of the planting material affects its quality after storage with 32% saying the weather conditions affects the quality after storage. The survey confirmed that cassava stem cuttings (planting material) do not store properly after 8 weeks under farmers conditions irrespective of the storage method used. Long-term storage under farmers' conditions was also observed to be affected by pest and disease attack, dehydration and the quality of planting material.

Key words: Stems, cuttings, dehydration, storage, quality

INTRODUCTION

In Ghana root and tuber crops contribute more than 60% of the daily intake of majority of Ghanaians and are a major source of energy for the working population (Ofori, 1991). Among those which are economically important are cassava (*Manihot esculenta)*, yam (*Dioscoria* sp.), cocoyam (*colocasia* and *xantosoma* sp.) and sweet potato (*Ipomea batatas*).

Cassava is an important root and tuber crop grown in Ghana and occupies an important socioeconomic niche with an annual national output of over 5 million tones (Doku, 1969). The production of the crop has however, increased to 7.11 million tones in 1996 forming 22% Agricultural Gross Development Product (AGDP) of the nation (Dapaah, 1996). It is relatively drought resistant and produces exceptionally high carbohydrate yields much higher than maize or rice and second only to yams (IITA, 1990). It is an important staple crop for many Ghanaians. It is grown especially in the Southern and Middle zones which include the Brong Ahafo, Ashanti and Eastern regions. Common planting time of cassava is at the beginning of the rainy season (Ezuma and Okigbo, 1980). Tetteh and Taah (1989) contend that cassava be planted when the rains are well established to avoid loosing the plants. Apart from purposes of research and breeding where seeds are used, propagation is exclusively vegetative (Kay and Gooding, 1987; Doku, 1969). Cassava is propagated by stem cuttings. Stems are cut from matured plants after harvest. The most common sources of the cassava cuttings are farmers own farms. Extension agents may however provide high yielding and disease tolerant planting material for their contact farmers. The cassava propagation material is vulnerable to adverse climatic conditions as well as to pest and diseases (IITA, 1990). When exposed to the sun after cutting, it loses viability quickly through dehydration. On the other hand, excessive moisture may cause buds to sprout in storage (Doku, 1969). Bieler *et al.* (1995) also reported that extended storage of cassava stems could lead to significant reductions in the moisture content of stem (dehydration) causing deterioration in the quality of the stakes hence affecting sprouting of planting materials. For best results in any cassava production enterprise, fresh stem cuttings from matured plants are ideal for planting (IITA, 1990). The increased demand for carbohydrate source resulting from increased population and consumption especially in most sub-Saharan African countries calls for the use of high yielding, disease resistant, consumer acceptable and good planting materials that would sprout. However, for most of the time these are not available at the time of planting because of prolonged drought between the harvesting and planting times. This results in poor plant establishment and final crop yield.

For maximum cassava production, farmers or producers have to depend on reliable methods of storing

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cassava planting materials which is a major constraint to cassava production in Ghana. A study aimed at identifying the challenges in cassava planting material production in Ghana to help resolve these challenges is therefore justified. The objectives of the study were to identify farmer's sources of cassava planting materials, find out farmers storage methods, duration of storage and identify factors that affect quality of planting material in storage.

MATERIALS AND METHODS

The study was undertaken in two communities (Atia and Boama Dwumase) of the Ejisu District in 2002. The communities were chosen because they represented typical cassava growing areas in the district. Extension staffs of Ministry of Food and Agriculture (MOFA) also have contact with the two communities. A total of four Agricultural Extension Agents (AEAs), twenty farmers and one Planting Material Specialist were involved in the study. Data were collected by interviewing the Agricultural Extension Agents (AEAs), farmers and a Planting Material Specialist (PMS). Before the main study a pretest was done at Atia to test and design the effectiveness of the questionnaires. Respondents were interviewed individually. However, for those who had difficulty in understanding the English language, they were translated. They were then analyzed by using Statistical Package for Social Sciences (SPSS) software package.

RESULTS

Farm sizes: Table 1 shows that majority of the respondents (55%) had cassava farm sizes ranging from 2-2 ½ acres. Only 5% of respondents had farm sizes above 4 acres.

Sources of planting materials: Table 2 indicates farmers' sources of cassava planting materials. Majority of respondents indicated farmers own farms (45%) and other farmers' farms (45%) as important sources of cassava planting materials.

Storage methods of planting materials: Majority of the respondents (68%) indicated that the vertical or upright storage method is the commonest method used in storing cassava planting materials (Table 3). Sixteen percent of the respondents used the horizontal method. Other storage methods used were the plantable size in bags (12%), individual stakes in the soil (8%) and the *in situ* (4%) methods. Majority of the farmers who used the vertical storage method are able to store their planting material for 7-8 weeks. The farmers who used the horizontal storage method are also able to store them for 2-3 and 5-6 weeks, respectively. The maximum duration for the *in situ* storage as indicated by one farmer was 3-4 weeks. For respondents (AEAs and PMS), who used plantable size in polybags, the maximum duration they could store was also 7-8 weeks. The farmer who stores his planting material by putting the individual stakes in soil could only store up to a maximum duration of 3-4 weeks (Table 3).

Factors affecting quality of planting material in storage: Table 4 shows the effect of weather conditions, pest and diseases, duration of storage and the quality of stem cuttings on the quality of planting material in storage. The quality of cassava stem cuttings used as a planting material was indicated by majority of respondents (52%)

Table 1: Farm sizes cultivated

	Communities (No. of farmers)		
Farm size (acres)	Atia	Boama dwumase	Total
1-1½	3	1	4
2-2½	4	7	11
3-3½	1	3	4
4-4½	-	1	1
Total	8	12	20

Table 2: Source of cassava- planting material to farmers

Community	Farmers' own farm	Other farmers farms	MOFA	Total
Atia	3	5	-	8
Boama dwumase	6	4	2	12
Total	9	9	2	20

Table 3: Methods and storage duration of cassava-planting materials

		Duration (weeks)				
Storage method	Source of information	1-2	3-4	5-6	7-8	No. of respondents
Vertical	Farmers	4	5	-	6	15
Storage•	AEAs	-	-	-	2	2
Horizontal storage❖	Farmers	1	-	1	-	2
In situ storage♣	Farmers	-	1	-	-	1
Plantable	AEAs	-	-	1	1	2
Size in polybag✓	PMS	-	-	-	1	1
Individual stakes in soil†	Farmer	1	1	-	-	2

The various storage methods identified are; •:The stems are tied into bundles and stored in upright/vertical position under a tree/shade with the oldest end inserted in soil. ❖: Stems are stored horizontally under shade or tree. ♣: Some of the tubers are harvested such that the stems continue to be in the soil without uprooting. ✓: Stems are cut into plantable sizes, put in sawdust under a shade and covered by perforated polybag. †: Individual stems are inserted upright into the soil without tying them into bundles

Table 4: Factors that affect the quality of planting material in storage

Source of information	Total exposure to weather	Duration of storage	Pest attack	Quality of the material used	Total
Farmers	5	1	1	12	19
AEAs	3	1	-	-	4
PMS	-	1	-	1	2
Total	8	3	1	13	25

to be the most important factor that affects the quality of the planting material in storage.

Other respondents indicated that exposure to the weather (32%), duration of storage (12%) and pest attack (4%) affect the quality of the planting material in storage.

DISCUSSION

Farm sizes: It was apparent that majority of the farmer respondents are small scale farmers and resource poor. They had limited access to production resources such as inputs, services and information hence the small farm sizes. This was confirmed by the extension agent respondents working in the communities. They indicated that the farmer-extension agent ratio in the district is high hence the poor delivery of information and services to farmers in the communities.

Source of plant material: Farmer respondents attributed the use of materials from their own farms to the multiple uses of their varieties (i.e., fufu, gari, ampesi) and the fact that the planting materials fitted into their cropping systems. For the few farmers (10%) who indicated that they obtained their planting materials from MOFA, they complained about high cost of the materials and its unavailability during the planting season. Msabaha *et al.* (1988) reported that lack of adequate planting materials is another constraint to expanding cassava land area in Tanzania and there is no institution responsible for multiplication and distribution of improved varieties of the crop for yield and disease resistance. Most of the cultivars grown have low genetic potential. Ntawuruhunga *et al.* (2007) observed that the most important source of planting materials is from neighbors and own farms. This finding agrees with the results of this study. These findings however, have a practical implication for the Ministries of Agriculture of various African countries to make concerted efforts at cassava planting material development if production and productivity of the crop are to increase.

Storage method of planting material: They contended that the vertical method of storage is preferable because they are able to easily inspect the cassava planting material in storage. However, some farmers complained that the vertical method of storage was tedious since, one needed to carry bulk materials from the farm for storage. In the Eastern Equatorial of Southern Sudan, 22% of farmers stored their stem cuttings under shade with 21.1 and 13.3% keeping it in the field and at river banks, respectively. In the Western Equatorial however, 59.2, 13.6 and 10.4% kept the stems in the field, under shade and near swamps, respectively (Ntawuruhunga *et al.*, 2007). For any intervention at method of storage, it is important to take into consideration the predominant mode of storage in a community so that adoption would be quicker and easier.

The AEAs indicated that though the horizontal method is the most popular among small farmers in the communities, the likelihood that some of the nodes may break can be high especially when they are handled roughly. They however, admitted that the method could not support long term storage (8 weeks and over). The AEAs confirmed that the horizontal storage method was not appropriate because stems are easily attacked by pests which lower the sprouting percentage. This mode of storage also results in bruises of the buds resulting in poor sprouting of the material when planted.

A farmer chooses to use *in situ* storage method to store the planting material when time between harvesting and planting is short and/or when the new farm may also be close to the old one. Hence, cutting and carrying bundles away from the farm may not be necessary. The storage methods where stems are cut into plantable sizes and covered by perforated polybag are used by few farmers because it is expensive in terms of obtaining perforated polybag and fungicides. The method is also considered time consuming and requires some skills. It was however confirmed by the PMS and AEAs that the method supported longer storage periods (a little over 8 weeks) than any of the methods discussed. Despite the differences in storage methods by farmers, all respondents indicated the importance of shade for cassava stem planting materials during storage. According to Bieler *et al.* (1995) total exposure to the weather affected the quality of planting material in storage as materials easily get dehydrated.

Factors affecting quality of plant material in storage: Respondents indicated that the health of the cuttings (disease free) and the number of nodes per stem cutting are essential factors for ensuring quality of planting material in storage. When respondents were asked to discuss the effects of pests and diseases on cassava planting material in storage, they indicated the following:

- Reduce the length of the planting material in storage
- Damage the nodes of cassava planting material
- Poor sprouting

CONCLUSION

The survey confirmed that long-term storage methods (over 8 weeks) is not possible under farmers

conditions because of pest and disease attack, dehydration and the quality of planting material used. However, the vertical or upright storage method was found to be the commonest method used in storing cassava planting materials. Improving storage conditions such as avoiding direct sunlight, ensuring that the buds face upwards and the use of long and matured stems under the vertical or upright storage method will go a long way to improve quality of planting materials in storage under farmers' conditions.

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