Development of Gocing Storage Method for Cocoyam

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Abstract

Lack of good storage reduces the shelf life of harvested cocoyam (*Colocasia* spp and *Xanthosoma* spp) corms and cormels. This is a major challenge facing cocoyam farmers, processors, and marketers in Nigeria. The National Root Crops Research Institute (NRCRI), Umudike, Nigeria, which has a national mandate to research into root and tubers crops of economic importance, has developed the 'Gocing Storage' for improved storage of cocoyam. The paper highlights this improved method of storing cocoyam as an advancement in cocoyam research, to reduce loss of cocoyam in storage, and make highly quality cocoyam available to consumers, processors and marketers throughout the year.

Key words: Gocing storage; cocoyam; NRCRI and Nigeria.

Introduction

Nigeria is the largest producer of cocoyam in world with an annual production of 5.489 million metric tonnes in 2007 (FAO, 2006). This represents 72, 2, 57.7 and 45.9% of total production in West Africa, Africa and World, respectively. Edible cocoyam [*Colocasia antiquorium* (L) Scoth and *Xanthosoma* species] is a major stable carbohydrate food in sub-Saharan Africa. Cocoyam is nutritionally superior to other roots and tubers, in terms of digestible crude protein and minerals (Ca, Mg and P) contents Chukwu *et al*., 2008a; Green, 2003 and Gooding 1987). Cocoyam possesses the smallest starch grain size relative to other roots and tubers (FAO, 1990). This makes cocoyam suitable for several food products, especially as food for potentially allergic infants, persons with gastro intestine disorders (FAO, 1990), as well as diabetic patients, because of its higher digestibility. Increasing awareness and concern for environmental quality makes cocoyam starch granules superior to many other sources of starch as agro-industrial raw material for the production of biodegradable plastics (FAO, 1990). It is quite revealing to note that cocoyam commands higher price per tonne than most root and tuber crops. Data from FAO (1990) showed that the price of one tonne of cocoyam was 32.5% lower than one tonne of yam but it was higher than one tonne of cassava by 75.7% and one tonne of sweetpotato by 38.2%. This is a very big advantage for cocoyam growers.

Cocoyam Storage

Chukwu *et al*., (2008b) noted that lack of good storage method limits the availability of cocoyam all through the year. This could limit the versatility of uses for which cocoyam is suitable. Conventional storage methods such as traditional cocoyam barn-heaping the cocoyam under shade and storing inside pits have been tried and found ineffective due to high percentage losses. Losses as high as 40-60% are ascribed to pathogens like *Botryodiplodia theobromae*, *Phythophthora infestans*, *Sclerotium rolfssi* and *Pythium myriotyium*, *Fusarium oxysporum* and *Fusarium solani* (Ubalua and Chukwu, 2008; Anaele and Nwawusi, 2008). The losses represent a cost to all the stakeholders in cocoyam production, processing and marketing. This can be translated to mean a decrease in their revenue and a threat to reliance on cocoyam as a food security crop in the present economic meltdown. Efforts to reduce loss of cocoyam in storage at the NRCRI, Umudike, led to the practice of burying cocoyam in the swamp. This is workable but it has many disadvantages. The stored cocoyam usually sprouted and started normal growth within four (4) weeks. Sprouting is one of the avenues of high physiological losses. In a review of post-harvest losses of cocoyam (Nwufo and Atu, 1987), reported 50% losses after two months and about 95 % after five months as a result of sprouting. Most farmers practice in-situ storage and harvest piece-meal to meet consumption or market demands as the case may be. Again, this system ties up the land and restricts its use for other purposes (Mbanaso *et al*., 2008). As a consequence, the eating quality of sprouted cocoyam is reduced and most of them unavailable for consumption, processing and marketing. Such cocoyam seedlings are also of poor quality planting materials because their vigour is reduced at the time of planting. The consequence is a reduction in total yield. Nwufo and Atu (1987) noted that the enormous loss of cocoyam in storage could be reduced if a comprehensive, rational and scientific storage method is developed. The gocing storage method was recently developed at the NRCRI, Umudike, Nigeria.

The Gocing Storage Method

The gocing storage method for cocoyam or gocing cocoyam barn is an improved and sustainable method of storing cocoyam, developed at the NRCRI, Umudike, Nigeria. 'Gocing' is a gerund derived from 'goc' an eponym conferred on Dr Godwin Ogbonnaya Chukwu, for his contribution to the developement of improved storage technology for cocoyam. Synonyms of gocing storage method include: gocing barn, gocing store, goc store and goc method.

The gocing cocoyam barn is a structure (Figure 1) constructed from mud, brick or cement. The structure consists of a dwarf wall of about 1-1.5 m high, made up with a wire mesh to the roof. The dwarf wall and the wire mesh guarantee adequate ventilation. The wall could be of cement or brick with asbestos roofing and cemented floor (medium technology) or mud wall with thatch or mat roofing and rammed earthen floor (low technology). There is no direct rain or sunlight into the store. The floor is spread (mulched) with wood shavings to a depth of 10 cm thick and watered adequately to about 50-70% moisture content. Consequently, a humidity of 60-80 % and temperature of about 20-28 ^{o}C is maintained in the store. The cocoyam corms and cormels are spread on the mulched floor as in Figure 2. Water is sprinkled lightly on the stored cocoyam corms and cormels two to three times a week, to maintain the mulch in a moistened state, as well as the humid condition and the environmental temperature.

Efficiency of Gocing Storage

If the appropriate environmental conditions and cultural management in the gocing barn are maintained, percentage loss could range from 10-25 % in gocing barn compared to 33-85 % losses due to rot in local barn with three to six months of storage (Table 1). Some varieties like NCe 002, and NCe 003 could be stored up to six months without appreciable loss. There is need for further research on storage to include other cultivars.

Table 1. Shelf-life of Cocoyam in Gocing and Local Barns

Cultivar	Quantity stored (kg)	Percentage rot months after storage (MAP)			
		3		6	
		Gocing	Local	Gocing	Local
NCe 001	100	20.0	40.0	25.0	85.0
NCe 002	100	14.0	33.0	23.0	76.0
NCe 003	100	10.0	35.0	20.0	80.0

Problems Encountered and Solution.

When the mulch becomes dry and brittle, rapid drying, decay and rot of the corms and cormels occur. This can be mitigated by sprinkling with water to moisten the mulch. There is the tendency of early maturing varieties like NCe 001, to start sprouting within four weeks in storage. When sprouting is observed, lift the affected corms and cormels and turn them upside down to expose the roots. Within one week, the exposed roots would shrivel and the sprouts die-back. Through this method, growth of sprouted corms and cormels is terminated and subsequent loss of vigour is prevented. This is in contrast to the traditional barn where sprouting is a major source of loss in storage, sprouted corms and cormels lose their sprouts within one week and remain healthy.

Conclusion

The gocing storage is a panacea to the endemic problem of storability of cocoyam. It is adaptable to low and medium input technologies. This increases its potential for adoptability by resource-poor and commercial cocoyam producers, processors and marketers. There is need to popularize the technology to enhance its diffusion and adoption.

Figure 1. Half-walled Gocing Cocoyam Barn.

Figure 2. Cocoyam Corms and Cormel Spread on Mulch in the Gocing Cocoyam Barn.

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