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RESEARCH ARTICLE

Effect of Storage of Fresh Cassava in Sawdust on Gari Processing

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ABSTRACT

Fresh cassava was harvested and stored for twelve weeks in sawdust with careful handling and processing method. Gari was produced from the stored cassava every two weeks throughout the period of storage. Effect of storage on gari yield, ease of peeling and peel pulp ratio was also evaluated. The result of the analysis shows that gari yield decrease as the storage time increase but peel pulp ratio relatively increase with increase storage time and there was no difference in the ease of peeling. The cassava stored well in the sawdust with relative humidity range of 70-80% and temperature range of 28-33 °C.

Keywords: Cost, benefit, packaging liners, plastic and wooden crates, postharvest losses quality

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INTRODUCTION

Cassava roots, *Manihot esculenta* Crantz*,* have been reported (Ayoade and Adeola, 2009) as the most important of root and tuber crops in the tropics, This is because of it is a good source of calorie, serving as food for man and livestock (FAO, 2000). The use of cassava by human has been estimated to be 65% of cassava products (gari, fufu, attieke), while 25% is for industrial use, mostly as starch (6%) or animal feed (19%) and 10% lost as waste (Oluwole et al*.,* 2004; Maxiya-Dixon et al*.,* 2007).

Gari as described by Sanni et al*.,* (2008) is a creamy-white, partially gelatinized roasted free flowing granular flour, which has wide consumption due to its long shelf life compared to other food products from cassava, as well as its ease of preparation for eating (Sanni et al., 2005). Gari processing steps consists of washing, peeling and grating the cassava roots, and then fermenting the mash anaerobically for two to five days, pressing to remove the water which exudes during the fermentation stage, to give a moisture content of about 50%. The mash is then usually sieved before it is finally roasted and dried. Cassava is different from other major root crops in that its roots are not organs of dormancy, hence, it does not have natural function of preservation, thus making it unsuitable for storage. The root deteriorates rapidly (between24-48 hours) due to this factor (Hillocks, 2002; Westby, 2002).

To extend shelf-life, factors that will reduce water loss and maintain a high Relative humidity are to be employed. According to Osunde and Fadeyibi (2011) period of cassava storage can be affected by factors which includes condition of the crop at harvest, type of wound, season, storage temperature and relative humidity. Cassava for example cures between 30-

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40°C temperatures, 90-100% relative humidity in just 4 days. Hence, the aim of this work is to study the optimum conditions for cassava storage and evaluate the effect of storage time on gari yield.

MATERIALS AND METHODS

Cassava roots

12-months-old TME 7 (Oko Iyawo), a high cynanide cultivar, was carefully harvested by gently lifting of the roots from Lasuju farm settlement in Asa LGA of Kwara State, Nigeria. The harvesting was done very early in a morning preceding a heavy rainfall, this was to ensure the wetness and softness of the soil so as to minimize damage. Harvesting of the roots was done with part of the stem (2 – 5cm) still attached to limit ingress of any decay into the roots (Olaleye et al*.,* 2013).

Storage of cassava roots

The storage was done using the storage method described by NSPRI (1995) Weighed uninjured cassava roots were stored in a wooden box, which conveniently contained about 8kg of cassava. The root were arranged in layers and surrounded with moist sawdust so that no two tubers touched one another. The saw dust used were from freshly sawn Mahogany woods from Irewolede Saw Mill, this was moistened by mixing it with clean tap water at ratio 3:1 as reported by Olaleye et. al., (2013). The wooden box of dimension 30cm X 26cm X 24cm was perforated to allow draining of excessive water during rewetting.

Gari production

Gari was produced by the process described by IITA (2003). All the gari samples were prepared by only one experienced commercial gari processor in order to eliminate or reduce variability due to different processing methods. It should be noted that only relatively sound cassava pulp was used in the production of gari, which reduced the differences due to storage observed in the physical, chemical and sensory parameter. The cassava root of was peeled manually using a stainless steel kitchen knife. The peeled roots were washed and grated in a 5Horze Power diesel powered grater. The grated meal was dewatered using a hydraulic press and was allowed to ferment for 72 hours. The pressed cake was broken into pieces with hand and sieved with a wire mesh screen. The sieved pulp was garified traditionally i.e. using a wide shallow cast iron pot and stirred constantly over a low fire until well dried. It was then cooled, packaged, labeled and sealed.

Gari yield

Gari yield was determined by the method of Akingbala et al*.,* (2005) with modification. Yield of gari was calculated as a percentage of weight of obtained gari sample to the weight of the unpeeled fresh root.

Peel pulp ratio

This was determined by the method of Akingbala et al., (2005), Roots were peeled manually using a stainless steel kitchen knife. Peel and pulp were weighed separately to compute the ratio.

Ease of peeling

Ease of peeling of roots was rated on a scale of 1 to 5, where 1 was easy to peel and 5 was difficult to peel.

Monitoring of temperature and relative humidity

The internal temperature and relative humidity were monitored every three days during storage of cassava roots using Thermo-hygrometer, model No JB913R by Oregon Scientific. The Thermo-hygrometers has a probe which was inserted into the sawdust to obtain the readings.

Statistical analysis

Descriptive test was used to analyse the results, analysis was done using SPSS 17.

RESULTS AND DISCUSSION

Condition of Cassava

The roots in this study stored well in the sawdust for the 12 weeks of experiment. The cassava root remained in excellent conditions at ambient temperatures without the development of discoloration or decay. The only case of rotten was due to the cassava that had mechanical damage before storage in which stem was not attached to the root. It was also noticed, that sprouting of a new plant occurred after one week, new plant sprouted from the stem attached to the cassava, this was due to sawdust providing a favourable condition for propagation, hence pruning was done at a regular intervals. Some cassavas were left to sprout (for observation) and was noticed that such cassava showed sign of decaying due to the loss of nutrient to the growing plants.

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Figure 2. Rewetting of Sawdust

Monitoring of temperature and relative humidity

The relative humidity was maintained between 70-80% RH. This was an indicator of how moist the sawdust was. When the relative humidity was lesser than 70% the sawdust was re-wetted with water, this was used in maintaining the relative humidity (Figure 1). Cassava is stored at a high RH in order to minimize weight loss and root shriveling. The internal ambient temperature for the period of experiment was between 27-33 °C. At higher relative humidity a lower temperature was observed (Figure 2). This is in line with FAO (1998) recommendation that the temperature should not exceed 35°C (95 °F) nor should the RH be so high (i.e. 100%).

Figure 2. Thermo-hygrometers indicating the RH and Temperature

Gari Yield

The yield of gari from fresh and stored cassava roots is shown in Figure 3. It appears that the yield reduced with the increase in storage period. The highest value of 14.37% was obtained for the fresh cassava while the lowest was that of Week 10 and Week 12 with value of 10.87 % and 11.03 respectively. There were clear differences between the yields in the fresh cassava compared to the stored ones. Gari yield was significantly close between Week 2, Week 4, and Week 6 and between Week 8, Week 10 and Week 12 respectively. The reduction might be caused by decreasing quality of the Gari and losses due to fiber, which was removed during sieving.

Peel: Pulp ratio

The peel pulp ratio relatively increase with increase storage time , this was because storing cassava root is in a

moist and porous material, such as sawdust, that allows aeration of the root but reduces moisture loss from the tuber to the atmosphere (Fig. 3). Hence, the increase pulp may be due to decreasing difficulty in the removal of the peel, which was due to soften of the skin during storage.

Ease of Peeling

The ease of peeling was not significantly affected by the length of storage period because difficulty in peeling is caused by loss of moisture in the pulp caused by shrinkage of the root and a strong adherence of the peel to the pulp. Difficulty is also caused when the cassava roots it kept for long under the sun, this make peeling difficult, this was thereby avoided by immediately processing the cassava roots after harvesting from the storage box.

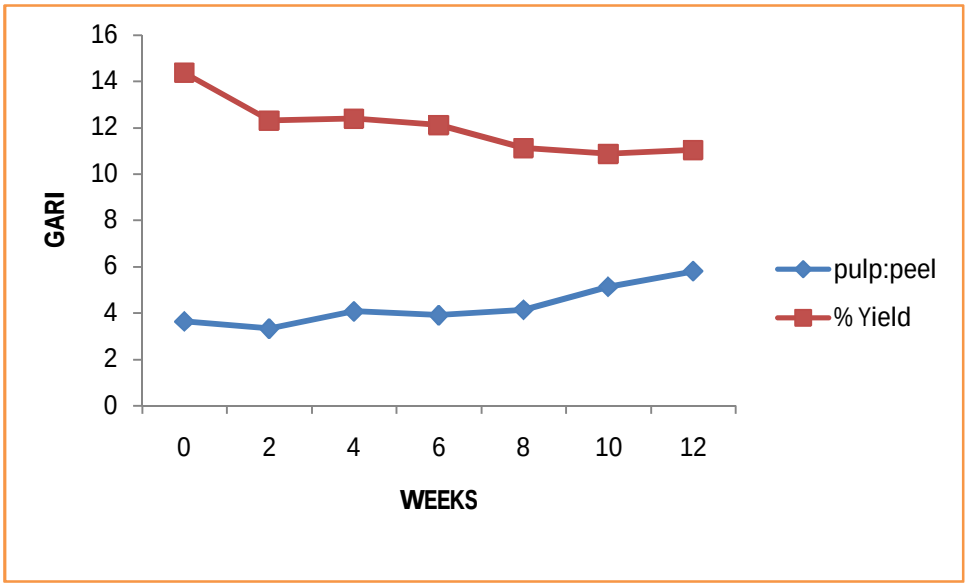

Figure 3: Yield and pulp:peel ratio of gari from cassava roots

CONCLUSION

The study has shown that the cassava root can be stored successfully for at least 12 weeks with no or minimal deterioration. The cassava should be stored in temperature below 35 °C and a relative humidity above 70% but not up to 95%. The cassava root to be stored should be without mechanical defect and the stem should be attached to the root. Pruning to remove sprouting leaves should be done at regular interval.

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