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IDENTIFICATION OF INDIGENOUS RIPENING TECHNOLOGIES OF BANANA AND PLANTAIN FRUITS AMONG WOMEN – MARKETERS IN SOUTHEASTERN NIGERIA

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ABSTRACT

The study identified and documented the indigenous ripening technologies of banana and plantain used by the women in Southeastern Nigeria. Data for the study were collected from 120 banana and plantain women marketers, using structured interview schedule. Percentage and mean statistic were used in the analysis of the data. The findings indicated that the mean age of the banana and plantain women marketers was 30.8 years and majority (69.2%) of them were married with a mean family-size of five. A greater percentage (60.8%) of the respondents had primary school leaving certificates, while 27.5% had no formal education. The wives played prominent role than their husbands and children in banana and plantain ripening and marketing activities. Different indigenous ripening technologies were being used. The most commonly used ones in combination with some suitable ripening containers (such as drums, wooden-boxes, pots, baskets, polyethylene/jute bags, sacks, clothes, tarpaulin etc, placed in a cool-dry place) were: the African bush mango fruits (Irvingia smithii and Irvingia gabonesis); spraying of cold and warm water; and heating in the sun for a short period of time. The implications of the findings for banana and plantain indigenous ripening technologies extension education were drawn.

Keywords: Identification, indigenous ripening technologies, banana and plantain fruits, Women-marketers, south-eastern.

INTRODUCTION

In Nigeria, banana and plantain fruits have always been important traditional staple food for both rural and urban populace. They serve as a source of revenue to small holders who produce and market them (Baiyeri, 1996). Some of the rural women in the Southeastern Nigeria depend solely on the sales of banana plantain fruits for their livelihood.

Ineffective post harvest handling of banana and plantain fruits constitutes a major source of loss to the rural and urban women who are engaged in their purchasing, ripening and marketing. The bulk of the unripe bunches of banana and plantain fruits purchased at the farm – gate by the rural women in southeastern Nigeria is made to ripen fast for immediate disposal to consumers with little or no economic loss despite their inability to build ripening rooms and/or purchase ethylene as a ripening agent for banana and plantain fruits in the developed countries.

It has also been observed (by the consumers of banana and plantain fruits and the researchers) that there are differential ripening quality of banana and plantain in different parts of Nigeria (Ajayi, 1998). In southeastern Nigeria, high quality banana and plantain fruits are sold by the rural women not only at the collecting centres, but everywhere (including motor parks, market centres and campuses of higher institutions) and this could be associated with the types of indigenous ripening technology being used in the area. Unlike in other parts of the country, the banana and plantain fruits women-marketers from southeastern Nigeria might not have been sustaining great economic losses (Ajayi, 1998).

According to Olorunda and Aworth (1996), up to 40% of the harvested banana and plantain fruits

in Nigeria can be lost in the form of fruit-damage and out right discard due to poor handling and quality deterioration. In southern (comprises southeast and southwest) Nigeria, an estimated economic loss (as a result of poor post harvest handling) of about 17% was reported (Akalumbe et al, 1996). An estimated 3% loss in the economic value of banana and plantain fruits traded in southeastern Nigeria was also reported (Akalumbe et al, 1996). This implies that the remaining 14% loss in the economic value of banana and plantain fruits occurred in the southwestern Nigeria. This sharp difference could be associated with the prevailing indigenous ripening technologies in the study area. The harmonization of any identified indigenous ripening technologies will help in curbing the unnecessary economic losses of banana and plantain fruits in other parts of the country

The pertinent questions to ask at this juncture are, (1) what are the various indigenous ripening technologies being used by the banana and plantain fruits women-marketers in southeastern Nigeria? (2) what is the ripening induced period for each of the technologies?. In order to provide answers to the questions posed above, the study was designed to identify the various indigenous ripening technologies and their individual ripening induced period among banana and plantain fruits women-marketers in southeastern Nigeria. Specifically, the study was design to:

1 describe the personal characteristics of banana and plantain fruits women-marketers in southeastern Nigeria;

2 determine the purchasing and storage patterns of banana and plantain fruits by the women-marketers in southern Nigeria;

3 identify the various indigenous ripening technologies and their ripening induced periods; and

4 determine the household decision-making role in banana and plantain fruits ripening activities in southeastern Nigeria .

METHODOLOGY

The study was conducted in southeastern Nigeria. It consists of nine out of the 36 states in Nigeria. The nine states are Abia, Anambra, Akwa Ibom, Bayelsa, Ebonyi, Enugu, Imo and Rivers States. The study area represents the southeastern agricultural zone of Nigeria. It is an important zone where banana and plantain fruits are being produced.

The population estimate of each of the nine states according to the National Population Commission Census News (1992) was as follows: Abia State = 2.3 million; Imo state = 2.5 million; Enugu state (including Ebonyi state then) = 3.2 million; Anambra state 2.8 million; Cross-Rivers state = 1.9 million; Akwa Ibom state = 2.4 million and Rivers state (including Bayelsa state then) = 4.0 million. The total population of the study area was put at 18.1 million.

Three (Enugu, Ebonyi and Anambra states) out of nine states were purposively selected and covered by the study. These three states were purposively chosen because of presence of a large number of women who are actively involved in the purchasing, ripening and marketing of banana and plantain fruits for daily income generation. From each of the three selected states, two local government areas (LGAs) (where there are highest concentration of banana and plantain fruits women-marketers due to the availability of daily functional market centres) were also purposively selected. From each of the two LGAs selected per state, two communities where ripe banana and plantain fruits were largely marketed were also purposively selected and included in the study.

All the women who were actively involved in the purchasing, ripening and marketing of banana and plantain fruits in the study area constituted the target population for the study. From each of the twelve communities, a list of 20 banana and plantain fruits women-marketers was obtained and from such a list, ten women were selected through simple random sampling technique. In all., a sample size of 120 women were interviewed. Data were analysed through the use of percentage and mean statistic.

RESULTS AND DISCUSSION

Personal characteristics of respondents

Entries in Table 1 show that a majority (53.4%) of the respondents fell within an age range of 30 – 34 years, while 31.8% of them were within 25 – 29 years. Those who were within 35 – 39 years and 40 – 44 years old accounted for 5.8% and 5.7%, respectively. Their mean age was 30.8 years. The implication of the finding is that relatively young women who are physically and more mentally alert and those that would be able to learn new concepts about better and improved indigenous ripening technologies of banana and plantain fruits are more involved in the ripening and marketing activities of banana and plantain fruits in the study area (Igben, 1988; Ajayi, 2000).

Table 1 further indicates that majority (69.2%) of the respondents were married, while 30.8% were single. This implies that it could be possible for a greater proportion of the married women to have access to extra financial, moral and physical supports from their husbands and this could go a long way in improving their ripening and marketing activities in near future (Ajayi, 2000).

Table 1: Personal characteristics of the respondents (n = 120)

Personal characteristic	(%)	($\overline{X}$)
Age (years)		
20 – 24	3.3	
25 – 29	31.8	30.8
30 – 34	53.4	
35 – 39	5.8	
40 – 44	5.7	
Marital Status		
Married	69.2	
Single	30.8	
Level of education		
No formal education		
Primary school	27.5	
education	60.8	
Secondary school	11.7	
Education		
Family size		
1-5	65.0	
6-10	31.0	5
11-15	4.0	

Data in Table 1 also show that a majority (60.0%) of the respondents had primary school leaving certificates and 27.5% had no formal education. The remaining 11.3% had West African School Certificates. The role of education in increased adoption, farm production, post harvest handling and marketing can not be over-emphasized (Igben, 1988).

The table further indicates that majority (65.0%) of the respondents had a family-size of 1-5, while 31.0% of them had a family-size of 6-10 with a mean family-size of 5. The implication of the finding is that the larger the family-size, the more the labour force available. The farm and household labour required by the married marketers could be supplied by themselves, their wives, children and close relations (Igben, 1988).

Banana and plantain fruits purchasing and storage patterns

Number of banana and plantain bunches purchased per trip to the depots/farm gates

Entries in Table 2 indicate that a majority (34.0%) of the respondents purchased 5 – 9 bunches of banana and plantain per trip (to the banana and plantain depots / farm gate), while 27.0% of them purchased 20 – 24 bunches. Those who purchased 10 – 14 bunches and 15 – 19 bunches accounted for 26.0% and 13.0%, respectively. Their mean bunches of banana and plantain purchased per trip was 14. According to the respondents, plantain bunches were always more expensive than those of bananas and therefore, the overall number of bunches purchased per trip was a function of individual's income and market price per bunch (Mbah, 2003).

Table 2: Banana and plantain purchasing rates and storage forms (n = 120)

	(%)	$(\bar{X})$
Number of bunches purchased per trip		
5 – 9	34.0	
10 – 14	26.0	
15 – 19	13.0	14
20 – 24	27.0	
Number of times per month that banana and plantain bunches were purchased		
3 – 4		
5 – 6	41.0	5
	59.0	
Storage formingers		
Bunches		
	13.3	
	66.7	

Table 3: Indigenous ripening technologies commonly used by the women and their induced ripening periods

Indigenous ripening technology	Length of Ripening (Days)						
	1	2	3	4	5	6	7
Containers such as drums/pots/wooden-boxes only (air tight), put in a cool-dry place					√		
African bush mango fruits in a container		√					
African bush mango fruits in a container		√					
Palm nuts in a container					√		
Heating in the sun for a short period of time then put in a container		√					
Spray with cold and warm water and then put in a container (jute bag and/or cloth)				√			
Banana leaves in a container (such as a polyethylene bag)				√			
Cassia leaves in a container				√			
Hairy bush in a container					√		
African bush mango leaves in a container					√		
Yellow paw-paw leaves in a container					√		
Avocado pear in a container					√		
Ripe banana fruits in a container				√			
Torch battery in a container			√				
Carbide in a container	√						
Potash in a container					√		
Ash in a container							√

Number of times per month that banana and plantain bunches are purchased from the depots / farm – gate

Table 2 also shows that a greater proportion (59.0%) of the respondents purchased banana and plantain bunches from the depots / farm gates 5 –to 6 times per month, while the remaining 41.0% did purchase banana and plantain bunches from the depots / farm-gates 3 to 4 times per month. The mean number of times that the respondents purchased banana and plantain bunches from the depots / farm – gates per month was 5. Apart from the factors already high-lighted above, the interval of market days could also determine the number of times per month, that a woman can go to the depots / farm – gates to purchase banana and plantain bunches. For instance, in Anambra State, the market interval is 7 days, while in Enugu and Ebonyi States, it could be 4 days or fort-nightly (Mbah, 2003).

Banana and plantain storage forms

According to Table 2, majority (66.7%) of the respondents stored their banana/plantain fruits in bunches, while the remaining 33.3% stored in fingers-form. Storing in bunches was predominantly practiced in Ebonyi and Anambra States, while storing in fingers-form was common in Enugu State. This diversity in storage form could be associated with such factors like the knowledge level of the women about the various storage methods, indigenous ripening techniques and convenience (Mbah, 2003).

Indigenous ripening technologies and their induced ripening periods

According to Table 3, many of the respondents asserted that, keeping banana and plantain fruits in any of the following containers; wooden boxes; pots; baskets; drums; polyethylene bags; jute-bags/sacks; tarpaulin and clothes etc., under natural cool-dry environment, induced ripening within 5 days.

Table 3 also indicates that when carbide is enclosed in a small plastic material and placed in any of the containers mentioned above with appropriate cover, ripening was induced within 24 hours (1 day). Entries in Table 3 also reveal that the inclusion of *Irvingia smithii* and *Irvingia gabonensis*. (African bush mango fruits) in a container in which banana and plantain fruits were set; induced ripening within 2 days. According to the respondents, careful placement of used torch batteries in a container containing banana and plantain fruits; induced ripening within 3 days. It is also evident from the table that when old banana/ plantain leaves and cassia leaves were used as covers, ripening of banana and plantain fruits was induced within 4 days.

The respondents also asserted that the inclusion of over-ripe banana / plantain fruits in a container containing banana and plantain fruits induced ripening within 4 days. Besides, spraying of cold water (during dry season) and warm water (during wet season) on banana and plantain fruits and then storing in jute bags, drums and cloth/tarpaulin bags induced ripening within 4 days.

According to the respondents, a great deal of precautionary measures and efforts were always taken to make sure that carbide, torchlight batteries and potash did not get in contact with banana and plantain fruits while using them for ripening. They were only meant to generate heat. They were therefore always well wrapped in polyethylene sheet before inserting them into the containers.

It has been reported in previous studies that the application of carbide in concentration between 0.2 and 0.5 grams per kilogram of fruits within 24 hours, induced banana and plantain fruits ripening MUSARAMA, 1998). INFOMUSA (2000) also reported that banana and plantain fruits could be ripened, using varieties of traditional ripening techniques such as the use of *Irvingia smittii* or *Irvingia gabonensis* placed inside plastic bags altogether and kept sealed for a period between 24 and 72 hours, depending on the outside temperature. According to IITA (1996), banana and plantain fingers were placed either in containers or platforms and covered with old banana leaves or cassia leaves to hasten-up ripening and after 2-3 days, they were ready for marketing.

The other indigenous ways of inducing ripening in the study area included the inclusion of palm-nuts or avocado pear or hairy-bush or African bush mango leaves or yellow paw-paw leaves or potash in a container containing banana and plantain fruits. For each of these methods, ripening was induced within 5 days. On the other hand, spreading of ashes on banana and plantain fruits in a container induced ripening within a period of 7 days.

Household Decision-Making Roles in the Purchasing, Ripening and Marketing of Banana and Plantain Fruits

Table 4 indicates that the role of providing the take-off fund for banana and plantain ripening and marketing business was played mainly by husbands (64.2%). Husbands are noted for their leadership roles within the family, which include establishment of businesses for their wives, children and relations. It is assumed that if such businesses are properly managed, they can go a long way in ameliorating the poor financial standing of the farm-families.

The role of purchasing the unripe bunches of banana and plantain from the depots/farm-gates rested on the women (100.0%), while the children (74.2%) were responsible for the porterage or head-loading of banana and plantain bunches from the bus stops to their parents' homes. Entries in Table 4 further reveal that the women played a larger decision-making role than their husbands and children in tasks such as the removal of banana and plantain fingers from the bunches (85.8%); cleaning/washing of the banana and plantain fingers (fruits) before being transferred into the ripening containers (80.0%); preparation of the ripening containers (media) in readiness for the banana and plantain fingers (80.0%); setting of the unripe banana and plantain fingers in the ripening containers (80.0%); constant checking of the fruits to know the stage/state of ripening (75.8%);

removal of the ripe banana and plantain fingers from the ripening media (81.7%); washing/cleaning of the ripe banana and plantain fingers in readiness for marketing (80.0%). According to the respondents, the initiation of banana and plantain ripening and marketing business is solely the responsibility of the wives. This finding confirms the great affinity, which the women from the study area have for banana, and plantain marketing since it is perceived to be a reasonable and quicker means of income generation to the households (Ajayi, 2000).

Table 4: Households' decision-making role in banana and plantain ripening activities in Southeastern Nigeria (n=120)

Household Decision-Making Role	Husband (%)*	Women (%)*	Children (%)*
Provision of capital for the banana/plantain business	64.2	35.8	0.0
Purchasing of unripe banana/plantain bunches from the depot	0.0	100.0	0.0
Transfer of banana/plantain bunches from bus stop to the home	2.5	23.3	74.2
Removal of banana/plantain fingers from the bunches	2.5	85.8	11.7
Washing/cleaning of banana/plantain fingers before transferring to the ripening media	2.5	80.0	17.5
Preparation of the ripening media in readiness for banana/plantain fingers	4.2	80.0	15.8
Setting of the unripe banana/plantain in ripening media.	3.3	80.0	16.7
Constant checking of the fingers to know the state of ripening	5.0	75.8	19.2.
Removal of the ripe banana/plantain fingers from the ripening media	5.8	81.7	12.5
Washing/cleaning of the ripe banana/plantain fingers in readiness for marketing	1.7	80.0	18.3

***More than one role was performed by a member of the household.**

Implications for Banana and Plantain Indigenous Ripening Technology Extension Education

i The use of indigenous ripening technologies of banana and plantain should be encouraged and intensified since it helps in reasonable quick income generation and hence, improvement in the standard of living of the women.

ii Since not all the women used the same banana and plantain indigenous ripening technologies, there is need for training where by there will be interaction, exchange of knowledge, skill and experience on the subject matter.

iii There is need to carryout laboratory analyses on the chemical composition of some of the indigenous ripening technologies being used and their effects on the ripened banana and plantain fruits for the purpose of eliminating the seemly dangerous ones. This becomes critical in the use of used batteries and other products known to contain heavy metals.

iv Both the children and husbands were found to be directly or indirectly involved in banana and plantain ripening activities. This implies that, any banana and plantain ripening technology programme developed by the Extension should be comprehensive enough to accommodate the entire household members.

v To prevent pest attack and deterioration of banana and plantain fruit quality, the state ADP should organize workshop on safety and appropriate storage of ripe fruits in order to avoid consumption of poisonous/contaminated fruits.

vi Since the availability and effectiveness of some ripening materials were a function of such factors like the season of the year and the atmospheric temperature, specialists are required to train the banana and plantain marketers on how to ripen banana and plantain fruits under controlled ripening conditions whereby ethylene is supplied from compressed gas cylinders, ethylene generators or ethylene generating chemicals such as ethephon which allows fruits to be ripened on a specific schedule with a very good bright yellow colour at any time of the year.

vii The bulk of unripe bunches of plantain and bananas purchased from farmers by the women in southern Nigeria are made to ripen fast for immediate disposal to the consumers with little or no economic loss despite their inability to build ripening rooms and/or purchase ethylene as a ripening agent for banana and plantain as obtained in developed countries. It implies therefore, that specialists' attention should be attracted to this area of innovative idea (introduction of the use of ethylene as a ripening agent and establishment of ripening rooms in Nigeria especially in southeastern Nigeria and other States of the Federation where bulk of unripe bunches of banana and plantain are produced by the farmers) to reduce the inconveniences, risks and losses involved in the use of some traditional methods of ripening banana and plantain fruits.

REFERENCES

Ajayi, A.R. (1998). The potential role of agricultural extension services in removing banana and plantain production constraints in Nigeria. A paper presented at the International Symposium on Banana and Food Security, Douala Cameroon, 10-14 November, 1998.

Ajayi, A.R. (2000). Banana and plantain marketing activities among women in Nsukka urban of Enugu State, Nigeria. A paper presented at the 6th Annual National Conference of Agricultural Extension Society of Nigeria AESON, held at University of Ibadan, Ibadan, Oyo State, Nigeria. pp 31-40.

Akalumbe, Y.O.S., Ferris, D., Vuylsteke, R., Ortiz, and F.Y., Okunmadewa (1996), Socio-economic analysis of farm retail prices and post-harvest losses of plantain in southern Nigeria. *Musa Research MUSAFRICA*, No. **3**, pp. 12-13.

Baiyeri, K.P. (1996). Characterization, correlation, path-analysis and selection indices of Musa genotypes under different environments. A Ph.D. research Proposal.

Igben, M.S. (1988). Farmer's capacity/profile in the Nigerian farmer and agricultural institutions: An assessment: M.S. Igben (ed.) NISER, Ibadan, Nigeria; pp. 67 – 92.

INFOMUSA (2000). The international magazine on banana and plantain. INBAP. France, Vol. 9. No. 1, p.35.

IITA, (1996). Plantain and banana production and research in West and central Africa Proceedings of a regional workshop sponsored by the International Institute of Tropical Agriculture, High Rainfall Station Onne, Rivers State, Nigeria 23-27 Sept. 1995. Rodomiro Ortiz and M.O. Akoroda Editors p 97.

Mbah, G. O. (2003). Identification and documentation of indigenous ripening technologies of banana and plantain among women in SouthEastern Nigeria. M.Sc. Research Project. Department of Agricultural Extension, University of Nigeria, Nsukka.

Madukwe, M.C. (1995). Obstacles to the adoption of yam minisett technology by small-scale farmers of south-eastern Nigeria. *AGROSEARCH,* Vol. 1, No. 1. pp .1-5.

MUSARAMA (1998). The international bibliographic abstracts *Journal on Banana and Plantain INIBAP France* Vol. 11 No. 1 pp26-27

Okoye, A.A. (1989).Factors affecting adoption process by farmers in selected LGAs of Anambra State, Nigeria. *Niger. Agric. J.* 24, 9-20.

Olorunda, A.O. and Aworth, O.C. (1996). Overview of *Musa* research in postharvest technology at the department of food technology, University of Ibadan, Ibadan, Oyo State, In: Plantain and Banana Production and Research in West and Central Africa. Proceedings of a Regional Workshop IITA. Edited by R Qrtiz, and M.O. Akoroda, pp. 75-76.