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The Importance of Computerized Analysis on Spoilage of Plantain (Musa paradisiacal), Before Harvest and Carriage to Market, in Nigeria

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Abstract: This research work, was carried out, to find the importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Osun State, Nigeria. 3,600 open questionnaires were distributed to the 4 Local Governments, namely: (Ife East, Ife South, Ife Central, and Ife North), local government areas in Osun State, Nigeria. Out of which 900 was used for farmers, in each local government. A total of 36 locations were sampled in all the four local governments, out of which 100 questionnaires were used in each location. It was gathered that above 70% of the farmers supported, the importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Osun State, Nigeria, while less than 30% of the people could not even understand whether there was the needy, on the importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Osun State, Nigeria, or not. The results from the questionnaires when using Pearson one-tailed correlation coefficient, however revealed that there was no significant difference from all the farmers visited and sampled, ($p < 0.05$), table 5. This shows a strong positive correlation, which implying that, the importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Osun State, Nigeria, was strongly influenced and enhanced farmer's support, and had therefore, made this research work to become a reality, ($p < 0.05$), table 5. The reasons may be due to the fact that in Nigeria, as one of the major staple food, plantain products is not only commonly used for making DODO (fried ripe pulp), IPEKERE well known as chip (fried un-ripped pulp), and as plantain flour but there is a great potential for the processing of plantain. It could however be processed to food / foodstuffs, such as breakfast cereals, baby food (soy-musa), flour, chips and snacks food. Also, industrial product of plantain processing includes: wine / beer, syrups, vinegar, biscuit, among others. Pie Chart was used to depict the summary data of each of the local government areas sampled.

Keywords: Plantain (Musa Paradisiacal), 4 Local Governments, Spoilage, Pearson One-Tailed Correlation, Harvest and Carriage

1. Introduction

Plantain (Musa paradisiacal), plant of the banana (qv) family (Musaceae), closely related to the common banana (M. Sapientum). It is one of the most staple foods mostly grown in the tropical regions of Nigeria, and West Arica. It is one of the food crops grown in Nigeria, and among the foremost sources of carbohydrates in humid tropical that contained 35% CHO, 0.2 to 0.5% fats, 1.2% protein and 0.8% ash. In terms of gross value of production, plantain is one of the most important fruit in developing world, [1].

As one of the major staple food in Nigeria, plantain products is commonly used for making DODO (fried ripe pulp), IPEKERE well known as chip (fried un-ripped pulp), and as plantain flour. Plantain flour has advantage over other starchy foods, since it contains protein, mineral, and vitamins, and medically plantain can be used to cure a lot of ailments including sore throat, tongilolitis, diarrhea vomiting, and it is said to be a major diet in the production of soy-musa, which can be used in the treatment of kwashiorkor. There is a great potential for the processing of plantain. It could be processed to food / foodstuffs, such as breakfast

cereals, baby food (soy-musa), flour, chip sand snacks food. Industrial product of plantain processing includes: wine / beer, syrups, vinegar, biscuit, among others. The plantain is at all plant (3-10meters), (10-33feet)), with a conical false "trunk" formed by the leaf sheath so fits spirally arranged leaves, which are 1. 5 to 3 m long, and about 0.5m wide, the fruit which is green, is typically larger than the common banana. The botanical classification of plantains, and bananas is so complicated that plantain is variously viewed as a subspecies of the banana, and the banana as a subspecies of plantain. In Nigeria, plantain is a special delicacy prepared by frying, boiling, steaming or made in to plantain chips. It can be processed into flour which is gradually substituting the use of wheat flour due to its superior nutritional value. Plantain is also exported from Nigeria to other countries of the world. The edible fruit of the plantain has more starch than the banana and is not eaten raw. Since plantain has a maximum of starch before it ripens, it is usually cooked green, either boiled or fried, often with coconut juice or sugar as a flavouring.

Figure 1. The most important fruit in developing world.

Plantain occupies a strategy position for rapid food production in Nigeria, among the starchy staple food, it is ranked third. The output of plantain in Nigeria had doubled in the last 29 years, despite having a production system concentrated in the hands of small scale farmers, [2]. The plantain meal can be further refined to a flour, or dried for later use in cooking or ground for use as a meal. In some parts of East Africa, the plantain is as table food and beer making crop, notably in central and eastern Uganda and Tanzania (formerly Tanganyika) particularly in the area inhabited by the Chagga people. Plantain (Musa paradisiacal), atriploid (2n=3x=33) grant perennial herb, is a natural inter-specific hybrid between the two wild spies M. Acuminata, which contributed genome B., [3]. The plantain subgroup of cultivars is supposedly homogeneous group, i. e., it was widely derived from a very limited number of botanically different parent source. Despite botanical homogeneity, the crop greatly diversified by accumulated somatic mutations to give a complex spectrum of morphological variability, [4].

Plantain History/Origin:

Figure 2. PlantainHistory/Origin.

The plant is believed to have originated in Southern Asia. Two groups of plantains are thought to have a common origin: the horn plantain and the French plantain. Both types grow in India, Africa, Egypt, and tropical America. The French plantains also occur in Indonesia and the Islands of the Pacific. Plantain is also a common name for plant soft hegenus plant ago (qv) of the order Scrophulariales. It is a native to Europe and parts of Asia, but was said to have been in traduced to North America when the settlers came from Europe. It's scientific name is Plantago Major. The widow array of plantain cultivars observed today, particularly in Africa, reflects along history of cultivation. Plantain cultivars were selected and cultivated by man or their edible starchy fruits.

Years of Maturity of Plantain (Musa paradisiacal), in Nigeria:

Figure 3. Plantain years of maturity.

Plantain matures very fast. In Nigeria. It is better to plant plantains in the time of raining season, around the first week in Mach. The plant should grow without stress and vigorously during the first 3 to 4 months after planting. To produce fruits, this tree needs 10 to 15 months without freezing temperatures, to produce flowers; and another 4 to 8 months for the plantain to grow. Growing a plantain tree takes special care to produce fruit, but even without fruit, this tree is very ornamental. After well grown, it became a seasonal and perishable fruits and goods for consumption both for the buyers and the people.

Plantain   (Musa   paradisiacal), SPOILAGEBEFOREHARVESTANDCARRIAGE:

Figure 4. *Plantain (Musa paradisiacal), spoilage before harvest and carriage.*

To maintain high quality of plantain, for both short term and long term harvest and carriage, there are some risks involved concerning spoilage before harvesting and carrying them. This is because, in Nigeria, plantain sustainable production is threatened by increasing disease and pest pressure. One of the most critical constraints to plantain is a leaf spot disease, called black sigatoka, which is caused by the fungus my cosphaerella fijiensismorelet. All plantains germ plasm, currently maintained, and collected from west, central and East Africa, central America and the Philippines, is equally susceptible to the black sigotoka disease, [5]. The crop however, is now among the most important staple foods in the tropical humid forest ecology of Africa and America.

Figure 5. *Plantain (Musa paradisiacal), Disease.*

The disease is of rather recent introduction in Africa, where it spread rapidly through all plantain and banana producing areas during the past two decades. It results in yield losses of 30-50%, [6]. Plantain has long been considered as intractable to genetic improvement due to high levels of female sterility and the triploid nature of the crop, [7]. Few cultivars were known to set seed at rates not exceeding an average of one seed at rates not exceeding an average of one seed per bunch after hand pollination, [8].

Figure 6. *Plantain (Musa paradisiacal), harvest and carriage to market.*

Plantain (Musa paradisiacal), Carriage to Market:

Plantains often take as long as three or four weeks to become completely ripe, while bananas go from green to ripe in 7 to 11 days, depending on temperature and other factors. The plantains market is young and not crowded. A plantain plantation farm should have the right type of soil and located in an area with favourable weather condition or the growth of plantation. In Nigeria, the major markets for this fruit are basically made up of two categories: the fresh fruits Market, (since the fresh fruits are majorly perishable and not durable). And the processed fruits Market, (where electro-mechanical devices / machines is used for changing such raw materials into finished goods for the consumers).

Figure 7. *Plantain chip.*

A growing industry mainly plantain chip, is believed to be responsible for the high demand be in experienced now in Nigeria. Today, the number of farms producing plantain in Nigeria is very few and this makes the demand for it high and profitable. The major producing States for Plantains are: Oyo, Ogun, Osun, Kogi, Bennue, Ebonyi, Kaduna, Ekiti, Imo, Edo, Delta and other states in the tropics.

1.1. Material and Methods

The responses of the people in different locations of the four local government areas can be seen from the decision table as below:

Table 1. *The Decision Table.*

Sub	Above70%	Below30%	Open headed Questionnaires
The importance of computerised analysis on spoilage of plantain, before harvest and carriage to market in Osun State, Nigeria.	X		
I do not know		X	
State open questionnaires			X

The below are the points ticked by the majority of the people (above 70% table 1), from the questionnaires who understood and supported, the importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Nigeria.

Figure 8. Plantain Importance.

[a]. Plantain is used for bladder infections, bronchitis, cold and irritated or bleeding hermorrhoids. [b]. Plantain is beneficial for over weight and obese people. [c]. It is used to kill germs and reduces welling for eye irritation. [d]. Plantain is used as a treatment for hyperlipidemia, for anticancer effects and for respiratory treatment in human. [e]. Plantain has been effective for chronic bronchitis, and cough. [f]. It cures respiratory track disorder. [g]. It aids in quicker healing of wounds: (the ingredient present in plantain leave herbs has germicidal and antibacterial properties, thus when applied to the wound, the herb helps in killing the germs). [h]. It aids treatment for acneandrosacea (from the extraction of herbal leaf). [i]. It cures blood poisoning: (the leaves can be drank as a tea). [j]. It prevents bleeding (either chew the leaves or make a paste of it to be applied typically on the bleeding zone. [k]. Plantain safeguard scardio vascular health (the herbs derived from plantain has the potential, to lower triglycerides level and keep the under required amount). [l]. Plantain is good for health. [m]. As a remedy for tuberculosis and syphilis. [n]. Plantain is good for digestive system. [o]. Plantain helps in easing dandruff: (the antiseptic and antibacterial properties of plantain herb scan shield your scalp from infections and offer relief from dandruff. [p]. It curbs insect bites. [q]. Plantain is a natural relief of sun burnt. [r]. Plantain is good for your hair. [s]. It helps in coping with post partum issues: (the herbs can be used for faster post partum recovery). [t]. It is known for potential anti-cancer properties.

1.2. Study Area

The study has been conducted in Osun [pronounced; "O'shoon]. Osun State is an inland State in South-Western Nigeria. Its capital is Osogbo. It has a population of 3. 4 million and of 9,251 km^2 in Area. It is bounded in the North by Ekiti State and partly by Ondo State, in the South by Ogun State and in the West by Oyo State. Osun is home to several of Nigeria's most famous landmarks, including the campus of Obafemi Awolowo University; Nigeria's pre-eminent institution of higher learning. The university also located in the ancient town of Ile-Ife, an important early centre of political and religious development for Yoruba culture. Other important cities and towns include the ancient Kingdom-capitals of Oke-Ila Orangun, Ila-Orangun, Ijebu-Jesa, Ede, Iwo, Ejigbo, Modakeke, Ibokun, Ode-Omu, Ifetedo, Esa-Oke, Ilesa and Igbajo.
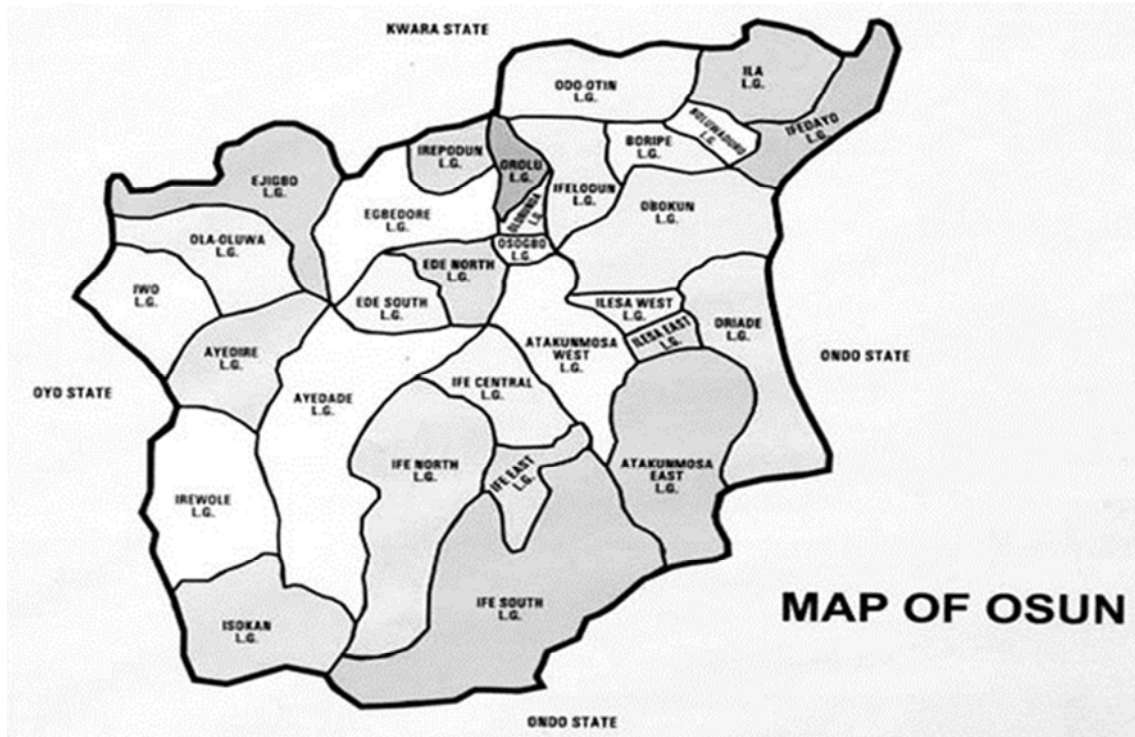

Figure 9. The Map of Osun State.

2. Results and Discussion

Questionnaires were distributed to 4 Local government areas that is, (Ife East, Ife South, Ife Central and Ife North). The results from the questionnaires however revealed that, the importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Osun State, Nigeria are manifold:

There was no significant difference on the people in all the local government areas visited, ($p < 0.05$).

***Table 2.** People's response.*

Wards	Ife East		Ife South	
People's Response	The importance of computerized analysis on spoil age of plantain, before harvest and carriage to market in Nigeria. 624,69.3%	I do not know 276,30.7%	The importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Nigeria. 636,70.7%	I do not know 264,29.3%

Wards	Ife Central		Ife North	
People's Response	The importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Nigeria. 633,70.3%	I do not know 267,29.7%	The importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Nigeria. 629,69.9%	I do not know 27130.1%

From the above table 2, in Ife East, there are 624 people's response with 69.3%, Ife South, 636 with 70.7%, Ife Central, 633 with 70.3%, and Ife North, 629 with 69.9%, were those People who supported, the importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Osun State, Nigeria, while in Ife East, 276 with 30.7%, Ife South, 264 with 29.3%, Ife Central, 267 with 29.7%, and Ife North, 271 with 30.1% respectively, could not even know whether computerized analysis on spoilage of plantain, before harvest and carriage to market in Osun State, Nigeria was important or not.

***Table 3.** The different locations as (A, B, C, D, E, F, G, H and I) and the local government areas as (IFE EAST IFE SOUTH, IFECENTRAL, AND IFE NORTH respectively). Also the summary data collected, from the4 Local Governments sampled, out of which 900 were used in each local government.*

Local government	Location	Ife East		Ife South		Ife Central		Ife North	
	A	71	29	68	32	75	25	68	32
	B	72	28	72	28	73	27	79	21
	C	63	37	70	30	69	31	70	30
	D	63	37	64	36	64	36	63	37
Peoples Respondent	E	64	36	76	24	75	25	72	28
	F	69	31	79	21	78	22	74	26
	G	74	26	70	30	68	32	67	33
	H	76	24	72	28	64	36	68	32
	I	72	28	65	35	67	33	68	32
TOTAL=	9	624	276	636	264	633	267	629	271
Grand Total=	9	900		900		900		900	

***Table 4.** The descriptive statistics.*

Descriptive Statistics			
	Mean	Std. Deviation	N
IFEEAST	69.3333	4.89898	9
IFESOUTH	70.6667	4.82183	9
IFECENTRAL	70.3333	5.09902	9
IFENORTH	69.8889	4.62181	9

3. Correlations

***Table 5.** The Pearson Correlation for the 4 local governments.*

Correlations		IFE EAST	IFE SOUTH	IFE CENTRAL	IFE NORTH
Ife East	Pearson Correlation	1	.026	-.130	.112
	Sig. (1-tailed)		.473	.369	.387
	Sum of Squares and Cross-products	192.000	5.000	-26.000	20.333
	Covariance	24.000	.625	-3.250	2.542

Correlations		IFE EAST	IFE SOUTH	IFE CENTRAL	IFE NORTH
	N	9	9	9	9
	Pearson Correlation	.026	1	.686[*]	.666[*]
	Sig. (1-tailed)	.473		.021	.025
Ife South	Sum of Squares and Cross-products	5.000	186.000	135.000	118.667
	Covariance	.625	23.250	16.875	14.833
	N	9	9	9	9
	Pearson Correlation	-.130	.686[*]	1	.665[*]
	Sig. (1-tailed)	.369	.021		.025
Ife Central	Sum of Squares and Cross-products	-26.000	135.000	208.000	125.333
	Covariance	-3.250	16.875	26.000	15.667
	N	9	9	9	9
	Pearson Correlation	.112	.666[*]	.665[*]	1
	Sig. (1-tailed)	.387	.025	.025	
Ife North	Sum of Squares and Cross-products	20.333	118.667	125.333	170.889
	Covariance	2.542	14.833	15.667	21.361
	N	9	9	9	9

*. Correlationissignificantatthe0. 05level (1-tailed).
FREQUENCIES VARIABLES=IFEEAST IFESOUTHIFECENTRALIFENORTH.
/NTILES=4.
/NTILES=10.
/STATISTICS=STDDEVVARIANCERANGEMINIMUMMAXIMUMSEMEANMEANMEDIANMODESUMSKEWNESSSESKEW.
KURTOSISSEKURT.
/GROUPED=IFEEASTIFESOUTHIFECENTRALIFENORTH.
/ORDER=ANALYSIS.

Table 6. *The mean, mode, std. deviationofthe4localgovernmentareas.*

Statistics		Ife East	Ife South	Ife Central	Ife North
N	Valid	9	9	9	9
	Missing	0	0	0	0
Mean		69. 3333	70.6667	70.3333	69.8889
Std. Error of Mean		1. 63299	1.60728	1.69967	1.54060
Median		71. 0000[a]	70.5000[a]	69.0000[a]	69.0000[a]
Mode		63. 00[b]	70.00[b]	64.00[b]	68.00
Std. Deviation		4. 89898	4.82183	5.09902	4.62181
Variance		24. 000	23.250	26.000	21.361
Skewness		-. 300	.340	137	755
Std. Error of Skewness		717	717	717	717
Kurtosis		-1. 509	-.263	-1.470	1.038
Std. Error of Kurtosis		1. 400	1.400	1.400	1.400
Range		13. 00	15.00	14.00	16.00
Minimum		63. 00	64.00	64.00	63.00
Maximum		76. 00	79.00	78.00	79.00
Sum		624. 00	636.00	633.00	629.00
	10	c, d	64.4000[d]	c, d	64.6000[d]
	20	63.5333	65.9000	65.6000	67.1500
	25	63.8333	67.2500	66.5000	67.3750
	30	65.0000	68.2667	67.2000	67.6000
	40	69.2000	69.4667	68.1000	68.1000
Percentiles	50	71.0000	70.5000	69.0000	69.0000
	60	71.6000	71.4000	72.6000	69.9000
	70	72.4000	72.8000	74.0667	71.6000
	75	73.0000	74.0000	74.6667	72.5000
	80	73.6000	75.2000	75.4000	73.4000
	90	75.2000	77.8000	77.2000	77.0000

a. Calculated from grouped data.
b. Multiple modes exist. The smallest value is shown.
c. Thelowerboundofthefirstintervalortheupperboundofthelastintervalisnotknown. Some percentiles are undefined.
d. Percentiles are calculated from grouped data.

Frequency Table

Tables (7, 8, 9, and 10). The frequency Tables for (Ife East, Ife South, Ife Central and Ife North).

Table 7. *Valid and cumulative percentages of Ife East.*

Ife East					
		Frequency	Percent	Valid Percent	Cumulative Percent
	63.00	2	22.2	22.2	22.2
	64.00	1	11.1	11.1	33.3
	69.00	1	11.1	11.1	44.4
	71.00	1	11.1	11.1	55.6
Valid	72.00	2	22.2	22.2	77.8
	74.00	1	11.1	11.1	88.9
	76.00	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Table 8. *Valid and cumulative percentages of Ife South.*

Ife South					
		Frequency	Percent	Valid Percent	Cumulative Percent
	64.00	1	11.1	11.1	11.1
	65.00	1	11.1	11.1	22.2
	68.00	1	11.1	11.1	33.3
	70.00	2	22.2	22.2	55.6
Valid	72.00	2	22.2	22.2	77.8
	76.00	1	11.1	11.1	88.9
	79.00	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Table 9. *Valid and cumulative percentages of Ife Central.*

Ife Central					
		Frequency	Percent	Valid Percent	Cumulative Percent
	64.00	2	22.2	22.2	22.2
	67.00	1	11.1	11.1	33.3
	68.00	1	11.1	11.1	44.4
	69.00	1	11.1	11.1	55.6
Valid	73.00	1	11.1	11.1	66.7
	75.00	2	22.2	22.2	88.9
	78.00	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Table 10. *Valid and cumulative percentages of Ife North.*

Ife North					
		Frequency	Percent	Valid Percent	Cumulative Percent
	63.00	1	11.1	11.1	11.1
	67.00	1	11.1	11.1	22.2
	68.00	3	33.3	33.3	55.6
	70.00	1	11.1	11.1	66.7
Valid	72.00	1	11.1	11.1	77.8
	74.00	1	11.1	11.1	88.9
	79.00	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Figures (10, 11, 12, and 13). Pie Bar Charts, for (Ife East, Ife South, Ife Central and Ife North).
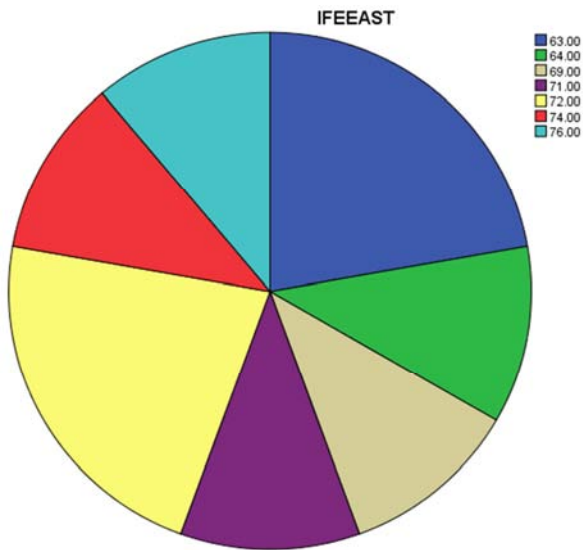
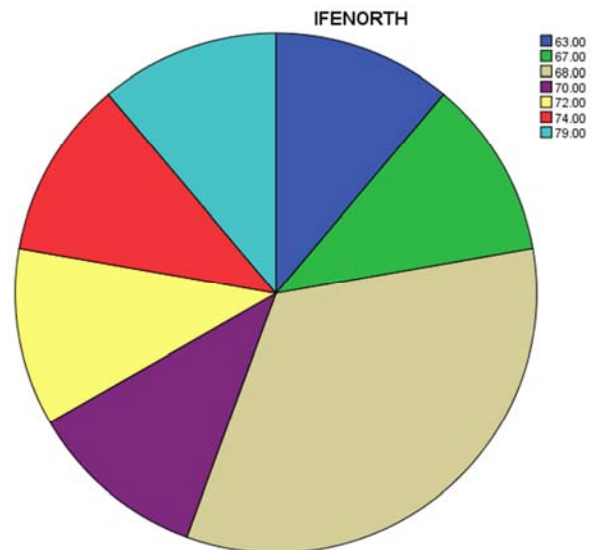*PIE Chart*

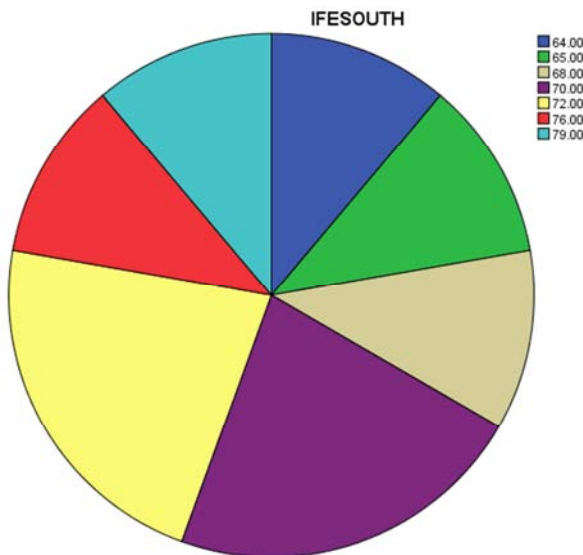*Figure 10. The Bar Chart of Ife East.*

Figure 13. The Bar Chart of Ife North.
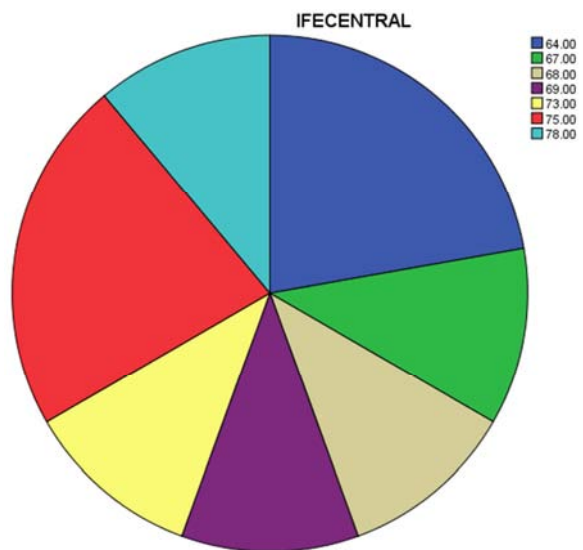

Figure 11. The Bar Chart of Ife South.

Figure 12. The Bar Chart of Ife Central.

4. Recommendations

1. Nigerian Government should encourage plantain plantation, by given funds / loans to prospective investors 2. Some of the rural areas roads in, Nigeria, are bad. Government should provide good motor-able roads to farmers in plantation areas with high concentration of plantain farm. 3. Government should provide electricity in rural areas for Farmers to enable them to stay longer in their farm for maximum increase in their plantain harvest Production. 4. Federal government should support the farmers by given enough assistance in terms of seedlings subsidy, so as to booth their production 5. Workshop at different intervals should be organized to farmers, so as to educate them in the uses of current farmer's equipments, to increase their plantain output production and eradicate plantain spoilage. 6. Government should organized Agricultural extension services to farmers by providing and bringing agricultural equipments closer to them, so as to reduce the cost of plantain harvest to the buyers. 7. For high Productivity and ultimate high investment, The Federal Government of Nigeria should encouraged plantain farmers to make research and seek expert opinion and advice for the latest productivity techniques to maximize profit. 8. Government should erect large storage facilities at intervals for plantain farmers, to avoid losses and spoilage.

5. Conclusion

The following conclusions are made based on the findings of this study. Since plantain, as one of the major staple food in Nigeria, and plantain products is commonly used for making DODO (fried ripped pulp), IPEKERE well known as chip (fried un-ripped pulp), and as plantain flour. And also, it could be processed to food / food stuffs, such as break fast cereals, baby food (soy-musa), flour, chips and snacks food, couple with industrial product of plantain processing that

includes: wine / beer, syrups, vinegar, biscuit, among others, the results of this study provide the empirical evidence that the importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Nigeria, had enhanced people's achievement in our society and in Nigeria at large. The society, therefore should use, the importance of computerized analysis on spoilage of plantain, before harvest and carriage to market in Nigeria's techniques, to argument peoples' maximal output in businesses, in order to attain minimum goal needed for everybody in the society.

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