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## The Shelf Life Study on African Pear (*DacryodesEdulis*)

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### **Abstract:**

*The shelf life of an African pear is the length of time during which it will be stable and retain its desired quality. The analyses carried out showed that the native pear dried using electric oven has a shelf life of three months (90 days) while the one dried by frying was rancid after two months (60 days) of storage. The experiment shows low percentage by moisture content of 29.30%. The low moisture content of the African pear pulp indicates a high dry matter content and hence a high nutrient dense pulp. Since a small percentage of moisture is contained in the pulp, it will take less time and energy to dry. Drying is essential since it remove the water in which bacteria and yeast need to grow. Thus, drying method by electric oven is preferred for making the pear shelf life stable.*

**Keywords:** Shelf life, African pear, *DacryodesEdulis*, Drying time, Moisture content

### **1. Introduction**

The African pear also known as *DacryodesEdulis* or native pear is found in various parts of West, Central African and Gulf of Guinea countries. The generic name '*Dacryodes*' was derived from the Greek word '*Dakruon*' meaning 'tear' which refers to resin droplets on the bark surface of its member, while '*Edulis*' means '*edible*' emphasizing the importance of the nutrients fruits in the plant's cultivation (Okafor, 1983). The fruit matures within the months of April to September with a colour change from pink to bluish black indicating that it is ripened and can be harvested (Emebiri and Nwufo, 1990; Kengue and Nyagatchou, 1990).

African pear oil is one of the most important rated versatile vegetable oil and its oil is rich in amino acids and triglycerides. Bayi (2005) reports that the pear pulp is made up of 48% of oil and a plantation can produce 7.8 tons of oil per hectare. Fruits are ellipsoidal and their size varies approximately from 4 – 9 cm long and from 2 – 5 cm wide (Omoti and Okiy, 1987). It belongs to the family of Burseraceae whose members are characterised by an ovary of 2 to 5 cells. It is an evergreen tree, and has a relatively short trunk and a deep, dense crown. The bark is pale gray and rough with droplets of resin. The skin of the fruit is dark blue or violet, whereas the flesh is pale to light green (Kappel, 1997).

In Nigeria, the African pear is either eaten roasted, boiled or raw, preferably with roasted or cooked maize. It can also serve as butter in bread and are used as raw materials for many small industries. They are good sources of pulp oil, seed oil and even whole fruit oil (Awono et al., 2002). The pear oil can be used in pharmaceutical and the cosmetics industry to make soaps, perfumes, and creams as well as in other branches of industry where fat raw materials are needed. The cake remaining after the production of pulp oil may be useful in the food industry (bakery, baby foods) (Nwosuagwu et al., 2009). It is also used for medicinal purposes to cure ringworms, skin diseases, gastric ulcer, diabetes, leprosy, etc (Redgwell et al., 2002). Although, the consumption and importance of the fruit is quite high, one of the major setbacks is its low preservative measures. For instance, each year a large amount of the African pear is lost because it deteriorates easily as a result of weather condition (rainy season), microbial action and no storage facilities.

Hence, the aim of the paper is to determine the shelf life of the African pear pulp, its moisture content and to compare two drying methods and packaging materials suitable for a longer shelf life.

### **2. Materials and Methods**

Fully ripened African pears (about 40) were bought from Choba market, Port Harcourt, Nigeria and are used to carry out shelf life test. Other materials include: thermometer, knives, electric oven, kitchen stove, packaging materials (aluminium foil, and polyethylene), drying board, stop watch and weighing balance.

### 2.1. Sample Preparation

The African pears were washed with tap water and cut open with a sharp knife to remove the seed and pericarp scrapped out, the fruit were cut into pieces and the fresh weight of the sample is determined before drying.

### 2.2 Shelf Life Analysis

#### 2.2.1 Drying Method by Frying of the Pulp

A kitchen stove is put on and the frying pan placed on it for some minute. About 10 of the prepared samples were sliced into pieces and spread on an Aluminium foil into the pan and the pear is dried and monitored for about 20 minutes until it is hardened.

#### 2.2.2 Drying by Electric Oven

About 20 of the native pear were sliced into pieces were placed on the drying board. The oven was switched on and was set at 70°C. The samples were inserted into the oven and monitored until it is hardened for every 10 minutes. After drying, the samples were then cooled at ambient temperature and are packaged in the packaging material (polyethylene) provided. During the drying processes, appropriate care was taken to prevent the oil from attaining its melting point.

### 2.3 Moisture Content Test

The empty crucible was weighed and the weight noted. The remaining samples were placed on the crucible and the weight noted as the initial weight ( $W_1$ ). The oven was set at 70°C and the crucible placed on was dried at every 10 minutes and the weight was recorded until a constant weight was achieved. This is the final weight ( $W_2$ ).

## 3. Results and Discussion

In this paper, the shelf life and moisture content were determined after drying and the samples cooled at room temperature and packaged in nylon (polyethylene bag). This was observed at a given interval of 1, 30, 60, and 90 days as shown on Tables 1 and 2.

Days	Drying by Frying			
	Appearance	Texture	Quality	Smell
1	Light Brown	Chewy (not hard)	Good	Mild smell
14	Light Brown	Chewy (not hard)	Good	Mild smell
30	Light Brown	Chewy (not hard)	Good	Mild smell
60	Dark Brown	Stiff	Slightly rancid	Mild smell
90	Dark Brown	Very Stiff and Brittle	Lipid spoilage and completely rancid	Off flavour

Table 1: Results from drying by method of frying on a frying pan

Days	Drying by Oven Drying			
	Appearance	Texture	Quality	Smell
1	Light Brown	Chewy (not hard)	Good	Mild smell
14	Light Brown	Chewy (not hard)	Good	Mild smell
30	Light Brown	Chewy (not hard)	Good	Mild smell
60	Light Brown	Chewy (not hard)	Good	Mild smell
90	Dark Brown	Chewy (not hard)	Slightly rancid	Mild smell

Table 2: Results from drying by oven drying

It was shown that on both methods of drying, after 60 days the property of pear when dried in oven is better than that of frying when packaged in polyethylene bag. The properties after 60 days in the case of frying developed a slight rancidity in nature while that of oven drying still remained good with a mild smell. The taste of the native pear dried using the procedures was considered not rancid (no off-flavor), thirty (30) days after drying, pear dried using the frying procedure and packaged in polyethylene bag were slightly rancid and the rest were not rancid. Sixty (60) days after drying, most of the African pear dried using the frying procedure and packaged in polyethylene bag were rancid while those dried with oven were not rancid. These evaluations showed that African pear dried using the oven procedures have a shelf life of 90 days when packaged on polyethylene nylon.

Drying Time (minutes)	Weight (g)
10	25.17
20	25.12
30	25.05
40	24.99
50	24.95
60	24.95

Table 3: Drying at a given time

Parameter	Percentage (%)
Moisture	29.30

Table 4: Moisture Content

Components	Content
Protein (%)	8.26
Dietary fiber (%)	9.17
Ash (%)	3.15
Fat (%)	32.56
Carbohydrate (%)	32.19
TTA (%)	5.90
pH	5.07

Table 5: Proximate Composition, pH and titrable acidity of African pear pulp

Source: Onuegbu N. et al. (2011)

Following the results obtained above, the first method – frying of the pulp with a frying pan on a stove shows a shelf life of 60 days while the one oven dried, appear to have a shelf life of 90 days which is very close to the result reported by (Atanga, 2008). However, drying by electric oven is most preferred because after drying the fruit, it shows a longer shelf life than the one dried by frying, more so the one dried using drying oven retained the taste and the smell. Also, the African pear shows a low percentage by moisture of 29.30%. The low moisture content of the African pear pulp indicates a high dry matter content and hence a high nutrient dense pulp. This is also advantageous in production of dehydrated fruit. Since a small percentage of moisture is contained in the pulp, it will take less time and energy to dry.

Table 5 shows the proximate analysis on the pH and titrable acidity of the African pear pulp. The moisture content (29.30%) falls within the range of values reported by (Onuegbu, 2011). The low moisture content of the African pear pulp indicates a high dry matter content and hence a high nutrient dense pulp. This is also advantageous in production of dehydrated fruit. In addition, low moisture content means less time and energy to dry the pulp. The mean values for protein, dietary fiber and ash were 8.26%, 9.17% and 3.15% respectively. The fat content of 32.65% suggests that African pear pulp can be used as raw material in commercial oil extraction processes. The value compares well with most oil seeds such as soybean (20%) and groundnuts (27.7%) which are already in use in the vegetable oil industry. The high protein, dietary fiber and ash content suggest that the cake left after oil extraction can be used in food and feed supplementations. The pH of the fruit pulp is 5.07 while the mean value for acidity is 5.90%. This suggests a moderate acidity of the fruit pulp (Onuegbu et al., 2011).

#### 4. Conclusion

The shelf life of the African pear has been found from the study to be 90 days when dried with electric oven and the moisture content to be 29.30%. However, the African pear is a highly perishable fruit which is as a result of bacteria, insects and other pathogens caused by heat (temperature), air, moisture and other factors.

For the two experiments done, the oven drying method is the most preferred because when dried by roasting or frying on a pan, it may be burnt and there were lipid spoilage noticed on the sample dried by frying on a pan after 60 days (2 months).

Therefore, the preferred method of drying is using an oven since it has a longer shelf life of about (90 days) when packaged in a nylon polyethylene bag, and retained its usual appearance and aroma.

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