



Sensory Assessment of Homemade Drink and Stiff Porridge Produced from Underutilized Jackfruit In Rural Areas of Abia State of Nigeria

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ABSTRACT

This study was undertaken to find out if processing the bulb of underutilized Jackfruit into homemade drinks and the seeds for stiff porridge can boost its consumption and utilization through the sensory assessment that was conducted in the course of this research. Experimental research design was employed in this study. Twenty semi-trained panellist, students and staff of the department of home economics was used for the sensory assessment. The attributes was rated on a nine point hedonic scale where 9 was the highest score (like extremely) and 1 the lowest score (dislike extremely). The result of this study showed that the sensory properties of the stiff porridges produced revealed that acceptable stiff porridges were produced from both wheat and jackfruit seed flours. The stiff porridges produced were similar in all organoleptic properties; however wheat stiff porridge scored higher in appearance, aroma, taste and general acceptability. The result also showed that the jackfruit juice with lemon had the highest score for most organoleptic properties except for taste as the jackfruit juice scored higher.

Keywords: Jackfruit, Stiff porridge and homemade drinks.

INTRODUCTION

Jackfruit is a dicotyledonous compound fruit of the jack tree (*Artocarpus heterophyllus* L.) which belongs to the family Moraceae grown in many of the tropical countries of Southeast Asia but is particularly abundant in India and Bangladesh (Mondal *et al.*, 2013).

Jack fruit is believed to have originated in the mountainous region of Western Ghats of Indian peninsula (Reddy *et al.*, 2004). It is supposed to have spread from India to the other tropical countries of the world (Prathima, 2008). Jack fruit (*Artocarpus heterophyllus*) is one of the important underutilized fruits belonging to the family Moraceae and to the genus *Artocarpus* which includes evergreen or deciduous trees producing more yield than any other fruit tree species and bears the largest edible fruit (Alagiapilla *et al.*, 1996). But it is regarded as a minor fruit and is seldom found in regular plantations. The seed is firm and waxy, oval, oblong or oblong ellipsoid in shape. Jackfruit is composed of several berries having yellow pulp and brown seeds encased in a hard shell. Such fruits are oblong-cylindrical in shape and typically 30–40 cm in length but can sometimes be up to 90 cm long.

The fruit usually weighs 3.5–10kg, although a weight of 25kg has been reported. The residues after processing of jackfruit can constitute up to 70% of the total weight of the fruit. A portion of such residues is the seeds, which may constitute from 8% to 15% of the total weight of the fruit (Swami *et al.*, 2012).

Carbohydrates are the main component of the seed in the form of starch for human consumption (Prathima, 2008).

Although seeds have been reported to be nutritious, containing protein, carbohydrate, fiber, vitamin and minerals and also provide about 135 Kcal/100g of energy, they are not being exploited commercially by the processing industry since it is reported to contain a powerful trypsin inhibitor. Jack fruit seed protein has a low biological value due to the occurrence of lectin components (Berry and Kalra, 1988). Mondal *et al* (2013) reported that jackfruit is rich in dietary fiber, which makes it a good bulk laxative. The fiber content helps to protect the colon mucous membrane by decreasing exposure time and as well as binding to cancer-causing chemicals in the colon. Fresh fruit has small amounts of vitamin-A, and flavonoid pigments such as carotene- β , xanthin, lutein and cryptoxanthin- β . Together, these compounds play vital roles in antioxidant and vision functions. Jackfruit pulp is eaten fresh and used in fruit salads. But jackfruit seeds are less popular as vegetable and are eaten when boiled or roasted.

Jackfruit grows in a wide range of tropical to subtropical environments. Hot and humid regions of Asia are suitable for the growth of jackfruit tree. Although jackfruit is essentially a tree of the tropical lowlands, it is adapted to a wider range of conditions. It cannot tolerate higher altitudes and cold. It does not tolerate frost and drought. Jackfruit tree grow well in low land forests up to the height 250m (859 feet) but decreases in abundance at height of about 1000m above sea level. It thrives best in moist tropical environment below 1000m (3300 feet). Jackfruit can be grown on a variety of soils as long as they are well drained, but does best in deep alluvia soils of open texture. The tree can grow in light and medium textured soils (sands, sandy loams, loams and sandy clay loams). The tree tolerates moderately acid to neutral

soils (pH 5.0-7.5). The most common method of jackfruit propagation is by sowing seeds, which is easy and cost effective suitable method of cultivation.

A number of products have been developed from raw, tender and ripe fruits and seeds in many parts of some Asian countries. The ripe fruit bulbs (excluding seed) and the rind of the ripe fruit (including perianth and unfertilised flowers) have been used for processing in a number of products. Ripe jackfruit bulbs are canned in syrup, made into jams either pure or mixed with dehydrated bulbs, chutney, preserves, candy, and concentrate and powder. Rinds of ripe fruit are made into jelly Mondal *et al.* (2013). According to Mondal *et al.* (2013) the ripe fruit bulbs (excluding seed) and the rind of the ripe fruit (including perianth and unfertilised flowers) have been used for processing in a number of products. Ripe jackfruit bulbs are canned in syrup, made into jams either pure or mixed with dehydrated bulbs, chutney, preserves, candy, and concentrate and powder. Rinds of ripe fruit are made into jelly.

However, it has been observed that jackfruit is underutilized in Abia State, Nigeria. Its cultivation has not been encouraged, though it is found in some parts of the state where it grows wild or semi-conserved. The consumption of jackfruit bulb in its raw form has been observed to be low in Nigeria probably because the ripe fruit contain excess fructose and sucrose that gives it abnormal sugary taste and the sticking effect of the latex when extracting the bulb. As a result, the bulb is being wasted and underutilized. Apart from the bulb that is wasted in this part of the world, generally the integration of this plant into the food system in Abia state is yet to be experimented in full scale. This could be attributed to little or lack of knowledge of the potentials of this plant in the food system in Abia state, Nigeria. Furthermore, if not for little research work that has been done with this plant for mainly education purpose; nothing would have been known of this plant in this part of the world. It's only useful here for the ripe bulb that is consumed raw and the seeds that are eaten either roasted or boiled, though in low quantity.

This study therefore, investigated if processing the bulb to juice and the seeds for stiff porridge when boiled can boast its consumption.

MATERIALS AND METHODS

Sample Collection

The jackfruits (*A.heterophyllus.L*) was obtained from jackfruit orchard of the Forestry Department, College of Nature Resources and Environmental Management, Michael Okpara University of Agriculture, Umudike.

Sample Preparation

The fruits were properly washed and sorted to remove the damaged ones. The seeds were removed from the pulp and the bulb as well as the white seed coat. Thereafter, seeds with brown coat was sundried, milled to flour using milling machine, sieved and stored in polythene bag at room temperature for further use. Jackfruit seed flour was prepared according to the method of Chowdhury *et al.* (2012).

The flowchart for the preparation of jackfruit seed flour is shown in Figure 1

Preparation of jackfruit juice

Well ripened jackfruits will be collected and washed reasonably with fresh water and bulbs will be separated carefully. Then it will be cut into small pieces and blended in the blender and filtrated through the muslin cloth. The filtrate containing the juice will be pasteurized and bottled for further use. This is according to Modal *et al* (2013).

Sensory evaluation

Sensory evaluation of the taste, texture, appearance, aroma and general acceptability were carried out using 20 semi trained panelists, students and staff of the department of home economics Michael Okpara University of Agriculture, Umudike.

This was done using the 9 point hedonic scale shown below:

9 – liked extremely

8 – liked very much

7 – liked moderately

6 – liked slightly

5 – neither liked nor disliked

4 – slightly disliked

3 – moderately disliked

2 – disliked very much

1 – disliked extremely

Statistical analysis

Data from the study were subjected to independent T-test using IBM (SPSS version 23). Significance was accepted at $p < 0.05$.

RESULTS

Table 1 shows the sensory properties of the stiff porridge produced. The result showed that the wheat stiff porridge (7.95 ± 1.31), (8.00 ± 0.79) and (8.10 ± 0.85) had the highest score for appearance, Aroma and taste respectively. However, the texture (7.90 ± 0.97) of the jackfruit seed stiff porridge was higher than that of the wheat. In terms of acceptability, the wheat stiff porridge (7.98 ± 0.65) was more acceptable than the jackfruit seed porridge

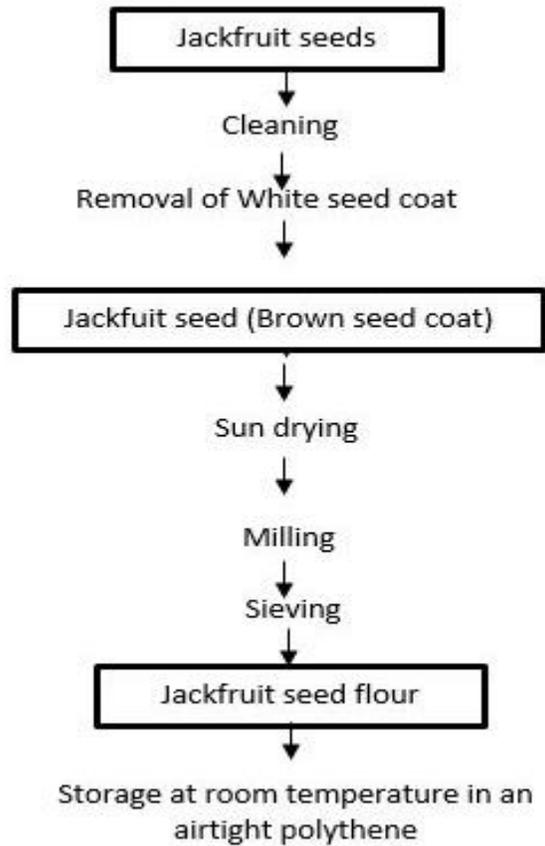


Figure 1: Flow chart for the processing of jackfruit seed flour

The flowchart for the preparation of jackfruit juice is shown in Figure 2



Figure 2: flowchart for the production jackfruit juice

Table 1: Sensory characteristics of the stiff porridge

Samples	Appearance	Aroma	Taste	Texture	General Acceptability
WSP	7.95±1.31	8.00±0.79	8.10±0.85	7.85±1.23	7.98±0.65
JSSP	7.80±1.11	7.75±0.85	7.70±1.08	7.90±0.97	7.79±0.63

Values are means ±standard deviation of the responses of 20 panelists. ^{a-b} means with same superscripts in the same column are not significantly different.

Key:

WSP = Wheat stiff porridge

JSSP= Jack fruit seed stiff porridge

Table 2 shows the sensory properties of the Zobo drinks produced. The sensory properties of the zobo drinks showed that the zobo drink enriched with pineapple flesh had the highest score for appearance (8.85±0.37), Aroma

(8.40±1.19), Taste (8.65±0.59), mouth feel (8.70±0.59) and acceptability (8.65±0.50).

Table 2: Sensory properties of the Zobo

Samples	Appearance	Aroma	Taste	Mouth feel	General Acceptability
ZPF	8.85±0.37	8.40±1.19	8.65±0.59	8.70±0.59	8.65±0.50
ZJF	7.25±1.16	6.65±1.18	6.30±1.08	6.60±1.23	6.7±0.81

Values are means ±standard deviation of the responses of 20 panelists. ^{a-b} means with same superscripts in the same column are not significantly different.

Key: ZPF = Zobo drink enriched with pineapple flesh, ZJF = Zobo drink enriched with jack fruit flesh

Table 3 shows the sensory properties of the jackfruit juice produced. The jackfruit juice enriched with lemon (7.65±1.42) and (7.15±1.27) had the highest score for appearance and aroma respectively. Jackfruit juice

(6.90±0.97) had the highest score for taste while the mouth feel (7.00±1.45) and acceptability (6.99±0.92) of the jackfruit juice enriched with lemon had the highest score.

Table 3: Sensory properties of the jackfruit juice

Samples	Appearance	Aroma	Taste	Mouth feel	General Acceptability
JFJ	7.50±0.83	6.85±1.18	6.90±0.97	6.65±0.93	6.98±0.63
JFJWL	7.65±1.42	7.15±1.27	6.15 ±1.50	7.00±1.45	6.99±0.92

Values are means ±standard deviation of the responses of 20 panelists. ^{a-b} means with same superscripts in the same column are not significantly different.

Key: JFJ = Jackfruit juice, JFJWL = Jackfruit juice with lemon

DISCUSSION

The sensory properties of the stiff porridge produced showed that acceptable stiff porridge was produced from both wheat and jackfruit seed flours. The stiff porridges produced were similar in all organoleptic properties; however wheat stiff porridge scored higher in appearance, aroma, taste and general acceptability. The texture of the stiff porridge produced from jackfruit seed flour had a highest score. This has a good implication because texture is a major characteristic of a good porridge. Significant changes were also found in color, flavour, texture and taste, and overall acceptability of cakes produced from jackfruit seed flour substituted for wheat as the organoleptic properties were observed with the increase of substitution. However, cake with 10% jackfruit seed flour incorporation got the highest acceptability by the panelists (Khan *et al.*, 2016). The enriched zobo drinks were different in the organoleptic properties, this result was similar to the reports of Adelekan *et al.*, (2014), who reported a significant difference in the organoleptic properties of the zobo drink mixed with some selected fruits. The jackfruit juice with lemon had the highest score for most organoleptic properties except for taste as the jackfruit juice scored higher.

CONCLUSION

Based on the results of the sensory attributes of stiff porridges made from jackfruit seed and wheat flours obtained in this study, which showed minute or scientifically acceptable variations in the attributes assessed (appearance, aroma, taste and texture); it was concluded that an acceptable stiff porridge was produced from Jackfruit seed flour. Again the results obtained from the organoleptic properties of the

homemade drinks made from Jackfruit bulb which included; jackfruit juice, jackfruit juice enriched with lemon, zobo drink enriched with jackfruit bulb and zobo drink fortified with pineapple flesh showed high level of acceptability. This also concludes that acceptable juice and homemade drinks was produced from Jackfruit bulb.

RECOMMENDATIONS

It has been earlier stated that jackfruit is underutilized in rural areas of Abia state due to mainly inadequate knowledge of its potentials in the food system and home menu, it is therefore recommended that the government and relevant agencies should be organizing regular enlightenment programmes on the potentials of jackfruit in the food system for the rural dwellers in these areas captured in this study to enhance its utilization.

Jackfruit farming should also be encouraged through the provision of land and other incentives to the farmers by the government and other relevant bodies to boost its production.

Government should also enact laws that will prohibit cutting down of jack tree for fire wood and other wood works.

It was observed that the juice made from jackfruit bulb was high in viscosity which affected the mouth feel acceptability level adversely; it is also recommended that further research work be conducted in this regard to see how this could be remedied.

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