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African Oil Bean (*Pentaclethra Macrophylla Benth*): Unsung Hero of Tropical Africa

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ABSTRACT

This review gives an insight into the African oil bean (*Pentaclethra macrophylla Benth*), a crop native to the tropical regions of Africa. Fundamentally, this article reviewed the African oil seed as a plant, production of its seed derivative (ugba), health benefits of the seed, diverse uses of the seed, nutritional and anti-nutritional properties of ugba as well as phytochemicals, and food safety issues. It alluded to the versatile usefulness of the African oil bean while emphasizing that its seeds have great prospect for improving the economy of households; any value addition on the African oil bean seeds could possibly create wealth and jobs for the teeming youth population of this region. Essentially, the review asserts that improved postharvest management practices, modern processing techniques as well as storage of fermented seeds (which are notorious for its very short shelf life) would increase its shelf life. Furthermore, considering the nutrient attribute of African oil bean seed, the crop could be regarded as a great complementary food for household nourishment and an essential raw material for food and pharmaceutical industries. Conclusively, the paper recommended that to ensure food security in tropical African region, research into other neglected but nutritious crops that grow and flourish with little or no special care in the region, just like the African oil bean plant, should be encouraged.

1. Introduction

The neglected tropical tree crop known as African oil bean (*Pentaclethra macrophylla Benth*) is prized for its many uses, including as a seed, pod, lumber, bark, root, and leaf. According to Orwa et al. (2009), it is indigenous to tropical Africa and can be found throughout the rain forest zones of Cameroon, Cote d'Ivoire, Democratic Republic of Congo, Ghana, Niger, Nigeria, and Togo. The African oil bean seed, after fermentation, is called several names in Nigeria, such as "Apara" by the Yoruba, "Ugba" or "Ukpaka" by the Igbo, and "ukana" by the Efik tribes (Enujiugha & Akanbi, 2005). It is consumed voraciously in the Eastern states of Nigeria as a local delicacy popularly known as "African salad," which is rich in protein and other essential nutrients and serves a distinctive economic, social, and cultural role among the consumers (Ogueke et al. 2010). African oil beans are mostly eaten as a snack or as a condiment for making African salad, soup, porridge yam, cocoyam, and meat (nkwobi), among other delicious dishes. They are a member of the Leguminosae (Mimosoideae) family and produce green dicotyledon pods that

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turn brown when they mature (Orwa et al., 2009; Achinewhu, 1996; Aremu, 2014). African oil bean seeds are flat in shape, hard but smooth in texture, with an average length of 56.18 mm and width of 37.89 mm. Each pod contains up to ten (10) large brown glossy seeds. At maturity, the pod splits open explosively, scattering its seeds up to a distance of 20 m from the tree, and after the explosion, the pods curl up (Achinewhu, 1996). African oil bean seeds are typically used to make ugba, which is processed naturally by fermenting the seeds in an alkaline environment. This is why Nigeria is still relying on small-scale industrial processes that involve production at the household level with little to no attention to good manufacturing practices (GMP) and sanitation (Olasupo et al., 2002; Gadaga et al., 2004). Ugba has a short shelf life. The process entails natural fermentation, which results in microbiological and biochemical alterations brought on by the breakdown of proteins and the release of ammonia and amino acids, which give the food its distinct flavour and strong aroma (Steinkraus, 1983). Bacillus species have been found to be the main cause of ugba fermentation (Odunfa, 1981; Obeta, 1983; Isu & Ofuya, 2000; Okorie & Olasupo, 2013a; Eze et al., 2014). Additional bacterial species, such as those belonging to the Escherichia, Proteus, Micrococcus, Staphylococcus, Streptococcus, Alcaligenes, Pseudomonas, Corynebacterium, and Enterococcus groups, have also been linked to the fermentation process of this product. On the other hand, no yeast or fungal species have been found during the ugba fermentation process. (Oyeyiola, 1981; Sanni et al., 2002; Odunfa, 1986; Okorie & Olasupo, 2013a). It is quite concerning that organisms important to public health are growing and occurring in the ugba. Fermentation organisms lead to the reduction of complex molecules (oligosaccharides and proteins) and enhancement of flavour. However, they also shorten the seeds' shelf life and expose the product to post-fermentation contamination. For this reason, unfermented seeds have a longer shelf life than fermented products (Mbajunwa et al., 1998; Oguntoyinbo et al., 2007). However, it is impossible to completely rule out the possibility that pathogenic and spoilage microbes were involved in the production process, particularly if fermentation occurs in unsanitary and extremely unhygienic conditions—a situation that is all too typical in West Africa. However, when ugba is processed correctly, these help to manage the Micrococcus species that prevent the synthesis of the enzymes that cause spoiling (Oyedeji, & Ijigbade, 2016). The purpose of this article is to evaluate the benefits, processing, derivatives, and storage methods of African oil bean seeds. In addition, the nutritional and biochemical alterations that occur throughout manufacture are analysed, along with the current concerns with condiment food safety.

2. Literature review

2.1. African Oil Bean Seed as a Plant

The African oil bean seed, scientifically named *Pentaclethra macrophylla*, originated from the tropical parts of Africa and it is a member of the Leguminosae family and the Mimosoideae sub-family. It has been cultivated since 1937. Most of the trees grow in the wild, and until recently, no plantations were known to raise the crop; domestication just began then. l

The wild still accounts for a larger portion of overall production, though. As the seeds are gathered by individuals and sold to ugba producers on the market, there is currently no empirical information available regarding the annual quantity produced or any knowledge of commercial plantations. Furthermore, afforestation, urbanization, and a lack of new tree planting are contributing to a drop in the yield of African oil bean seeds (Osondu et al., 2015). Despite its potential for other goods, the seed is only used in Nigeria as a mono by-product (ugba). The trees are frequently planted as income crops near communities and as shade trees alongside roads. The African oil bean tree reaches a height of 21 meters and a circumference of about 6 meters. The tree has an open crown that lets light pass through its canopy, low, wide buttresses, and a low branching structure. Table 1 illustrates the various uses of African oil beans by humans, including their seeds, leaves, stems, barks, trunks, and roots. The tint of the bark ranges from reddish-brown to grey, with sporadic spots that typically peel off. As observed in figure (1a), the large, angular stalk that extends between 20 and 45 centimetres is a distinguishing feature of African oil bean leaves.

Table 1. Importance and uses of parts of African oil bean plant

Plant part	Uses	Description
Fruit pod	Fuel	Empty dry pods are used as firewood for cooking, and charcoal production
Timber	Woodwork	The wood is used in carving household utensils in Ghana and Nigeria
Pod ash	Tannin or dyestuff	Ashes of burnt pods are used made into mordant dyes
Seed	Food	Seeds are processed into ugba which is eaten as a snack or used as a condiment for soup, salad and many local sauces
	Lipids	The seed is good source of seed oil
	Decoration	Seeds are used for making beads, necklaces and rosaries
Stem	Medicine	For treating diarrhea
Leaves	Soil improver	Improves soil fertility; for herbal medicine in treating wound and diarrhea
Tree	Ornamental	The tree is planted as ornamental plant

Source: Orwa et al. (2009)

The leaves have a globous look and have 10 to 12 pairs of strong pinnae that are evenly covered in rusty hairs. When sliced, the tree trunk leaks a reddish-orange liquid and is similarly twisted and buttressed. The fruit is a woody, hard, black pod that is 5–10 cm broad and 35–36 cm long. (Tsobeng et al., 2013) demonstrated that the crop is propagated by stem cuttings and seeds. When the pods split, the mature seeds naturally disperse to release approximately eight flat, glossy brown seeds that weigh between 15-20g and measure about 5-7cm in diameter. Alternatively, the seeds can be harvested manually, as shown in figure (1b) (Odunfa & Oyewole, 1986a; Achinewhu, 1982; Asoegwu et al., 2006). Typically, the pods coil up after dispersing. Additionally, AOBs can spread by budding or air-layering. While stem-cuttings may yield seeds after four years, budded trees begin to bear fruit after three years (Oboh, 2019). The other parts of the plant are utilised in traditional medicine, as well as in wooden crafts and products, but before the seeds can be consumed, they must be processed and fermented to remove any undesirable toxins.

Figure 1a. African oil bean plant

Figure 1b. Splitting of the pod to release seeds

Source: (Okorie & Olasupo, 2013a).

2.2. Production Process of African Oil Bean Seed to Ugba

The African oil bean tree's seeds are fermented alkalinely to produce ugba, which raises pH to an alkalinity of 8 (Sanni & Oguntoyinbo, 2014; Ikenebomeh et al., 1986; Sanni et al., 2002; Ogueke et al., 2010). Bacillus species predominate because of the alkaline pH. The generation of peptides, amino acids, and ammonia during the hydrolysis of the seeds has continuously been cited as the cause of this. Cleaning is the initial step in the ugba processing process, which removes any damaged seeds. Following cleaning, the conventional processing steps—such as boiling or roasting, dehulling, slicing or shredding, soaking, washing, packing, and fermenting—take place as shown in figure 2. However, according to (Nuredeen et al., 2016), ungba in its natural condition has some anti-nutritional elements such phytate and indigestible oligosaccharides, which makes processing necessary. The procedure used to produce ugba differs according on the community and processor, but the final product is generally the same and has a strong ammonia-like smell (Nwokeleme & Ugwuanyi, 2015). Variations in the quality and consistency of the products are frequently the outcome of non-standardization in the production process. The process used to help dehull the seeds and the length of time it takes to boil them differs. For example, Obeta (1983) reported 16–18 hours, Odunfa & Oyeyiola (1985) and Odunfa (1986) reported an initial 12-hour boiling duration, and Njoku & Okemadu (1989) boiled the seeds for 5–8 hours. To dehull the seeds, Sokari & Wachukwu (1997) employed roasting the bean seeds in hot (about 100°C) sand and retaining them there for an additional 30 minutes at 100°C. The seeds are either diced or boiled for at least 30 minutes after being dehulled. According to Odunfa & Oyeyiola (1985), boil overnight, then soak and slice. Numerous techniques are employed throughout the fermentation process as well. The cotyledons should be combined with salt (sodium chloride, around 1-2 w/w) or without it, according to Odunfa & Oyeyiola (1985). They should then be placed in a clean pot, covered, and allowed to ferment for up to five days at room temperature.

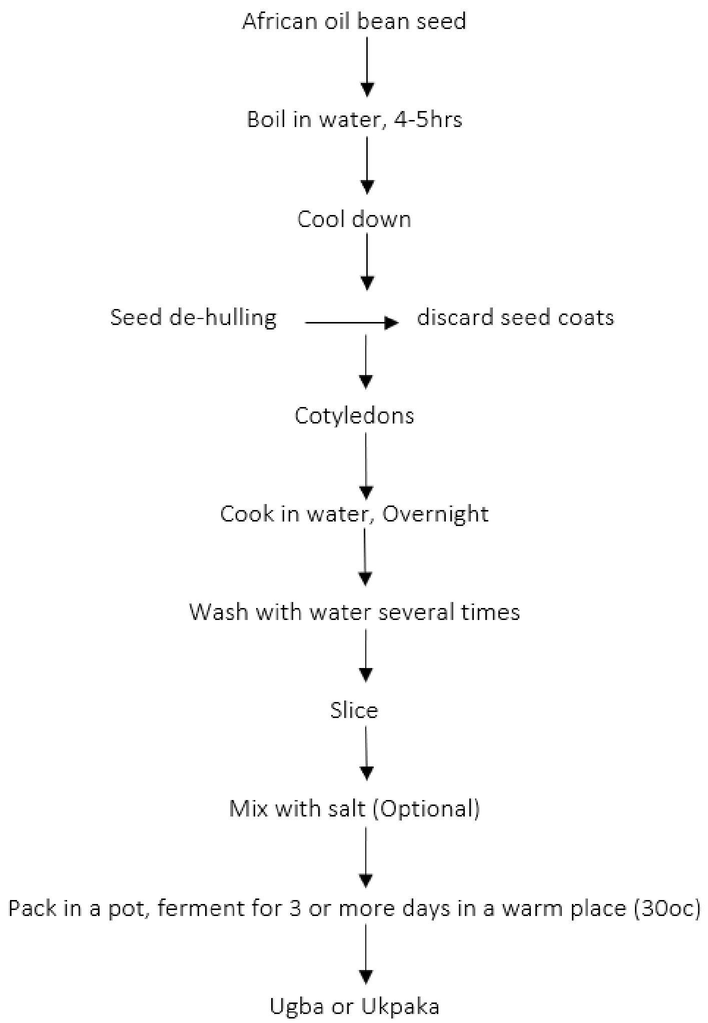

Figure 2. Flowchart for the preparation of ugba

Source: Odunfa & Oyeyiola, (1985)

However, Sokari & Wachukwu (1997) report that after washing and letting the sliced cotyledons drain in a basket lined with banana leaves (Musa sapientum Linn.), they were wrapped (roughly 40–50 gofslicesper wrap) with another leaf (Mallotus oppositifolius) and left to stand at room temperature for 72 hours. It was noted by Monago et al., (2004) that fermentation should last two to three days, and that fermentation lasting four days raised cholesterol levels, which may be problematic for those with cholesterol-related cardiovascular illness. The fermented bean slices are maintained close to embers to acquire the distinctive ugba flavor after fermentation, and the finished product is eaten as native salad. However, ugba that is fermented for a longer length of time (6–10 days) has a very soft texture that is used as flavouring for soups (Odunfa & Oyeyiola, 1985; Sanni et al., 2002). However, it was discovered that unfermented African oil bean seeds contained minute amounts of the growth-depressant caffeoyl putrescine as well as traces of the deadly alkaloid paucine. Unfermented African oil bean seeds have also been shown to include bacteria including E. Coli and Staphylococcus aureus as well as moulds that can form mycotoxins in food (Enujiugha et al., 2003). However, it is thought that these chemicals are neutralized during the heating and fermenting process.

2.3. Health Benefits of African Oil Bean Seed (AOBs)

Although the fermentation process may lower these levels, the African oil bean seed is a good source of minerals, vitamins, protein, carbohydrates, crude fibre, and oil. It also contains many phytochemicals, or saponins, that are found in most vegetables, beans, and herbs and have been linked to lower cholesterol levels. According to these experts (Ajayi & Oderinde, 2013), the protein level of African oil bean seeds is higher than that of foods high in animal protein, such as fish, oysters, beef, and pork. However, in contrast to other under-utilized African seeds including baobab, African pear, African nutmeg, and fluted pumpkin seed, the oil of African oil bean seed has a comparatively high viscosity (Ajayi, 2010). Africa oil bean seeds have several advantages, including:

1. The seed is a good source of lipase (Liman et al., 2010).
2. The seed improves metabolism and possess anti-atherogenic property (Anike, 2019).
3. Nwosu et al., (2017) recommended the use of the seed in the treatment of diabetes because of the hypolipidemic activities it exhibited.
4. African oil bean seed could help to improve kidney functionality (Omeh et al., 2014).
5. The seed contains anti-inflammatory and analgesic properties which are used to treat gonorrhoea and convulsions in Cameroon (Tsobeng, 2013).
6. The oil of AOB seed is a good raw material for pharmaceutical industries because the extract from the seeds can inhibit the growth of micro-organisms such as *B. cereus, B. lichemiformis, L. species, E. coli* and *C. albican* (Okoye, 2016).
7. patients who regularly consumed fermented oil bean seeds had a reduced risk of cancer and tobacco-related diseases (John,2006)
8. The leaves, stems and bark of the AOBs can be decocted and used for treating gastrointestinal diseases such as diarrhea (Akah et al., 1999)
9. The bark of the African oil bean tree exhibits anthelmintic properties thus can be used for preparing herbal medicines for treating and destroying parasitic worms (Okoye, 2016)
10. The anthelmintic bark of the African oil bean tree can be crushed and decocted for treating leprosy sores (Okoye, 2016)
11. African oil bean seeds can be used for preparing herbal medicines for treating infertility (Ogueke, 2010)
12. The pods of AOBs and smoke from burnt African oil bean leaves can also be used for treating convulsion (Tsobeng, 2013)

The leaves of the African oil bean tree can be decocted with bush pepper and taken for treating fever (Ogueke, 2010)

2.4. Uses of African Oil Bean Seed (AOBs)

The African oil bean tree's seeds, leaves, stems, bark, trunks, and roots are all highly valuable for culinary, medicinal, and industrial uses. Uses for AOBs include the following

1. Dermatological Uses: The bark and seeds of the African oil bean can be used to make a local ointment to heal cuts, wounds, and itches. This is because the African oil bean has anti-inflammatory qualities. The seeds are a great source of raw materials to produce margarine, edible oil for cooking, oil paints, varnishes, and cosmetics (Odoemelam, 2015).

2. Culinary Purposes: African oil bean seeds can be used to make a variety of delicacies, as illustrated in figure (3), including sausages, nkwobi, porridge, abacha salad, soups, and vegetable yam. They can also be cooked, sliced, and left to ferment for three or more days. Ugba pod ashes can be used as a substitute for local cooking salt, and the seeds can be pounded into a powder to make bread (Isu & Ofuya, 2000).

3. Commercial Uses: Because African oil bean seeds are a great source of oil, they can be used to make cooking oil, soap, and candles. The edible seeds are encased in brownish shells that can be utilised as beads, decorations, hand bangles, purses, necklaces, outfits, rosaries and traditional dancing costumes. In addition to being used as firewood, the wood can be used to make charcoal.

Figure 3. Ugba/Ukpaka Abacha salad

Source: Isu & Ofuya (2000)

2.5. Nutritional Factor of Ugba

It has been frequently noticed that fermentation enhances the nutritional value of ugba. Because fermented foods harbor a variety of environmental microorganisms, such as mycelia moulds, yeasts, and bacteria, primarily lactic acid bacteria and micrococci, it has been demonstrated that the protein content, essential amino acids, vitamins, and mineral contents of most fermented foods increase during fermentation (Oyedeji, 2016). During fermentation, these microbes change the chemical components of raw materials, improving the nutritional value of the finished goods. These microbes are known to preserve perishable foods, improve the flavour and texture of bland diets, and fortify items with vitamins, minerals, bioactive substances, and vital amino acids for a healthy lifestyle. Additionally, they promote probiotic functions, enhance digestibility, impart antioxidant and antimicrobial qualities, degrade undesired compounds and anti-nutritive factors, and enhance digestibility (Chung et al., 2010; Shil et al., 2010; Savadogo et al., 2011; Makanjuola & Ajayi, 2012; Okechukwu et al., 2012; Olakunle & Adebayo, 2012; Tofalo et al., 2012). African oil bean seeds enhance nutritional availability and promote diet. It has been demonstrated that the fermented seed's amino acid component contains all 20 of the necessary amino acids (Table 2).

Table 2. Amino Acid Content (g/100g protein) of African Oil Bean Seeds

Amino acids	Content
Aspartic acid	7.95-10.30
Threonine	3.27-4.17
Serine	4.80-5.54
Glutamic acid	9.32-11.60
Proline	2.90-5.77

Amino acids	Content
Glycine	3.84-4.62
Alanine	3.81-4.70
Cysteine	1.10-4.80
Valine	4.90-6.60
Methionine	0.90-1.80
Isoleucine	3.30-4.88
Leucine	5.30-6.68
Tyrosine	1.80-5.58
Phenylalanine	5.01-7.00
Lysine	5.46-6.97
Histidine	1.53-2.44
Arginine	4.70-6.53
Tryptophan	1.15-1.78

Source: Mba et al (1974) & Achinewhu (1982)

The seed has the potential to be a source of protein due to its high essential amino acid content (Achinewhu, 1982). It seems that the most abundant amino acid in the seed and it's fermented by product is glutamic acid. This could be the reason why southeastern Nigeria uses it as a flavouring agent for soups. The fermented seeds also contain significant levels of aspartic acid, lysine, and phenylalanine. Saturated fatty acids make up approximately 75% of the seed's oil component, whereas unsaturated fatty acids make up 25% (Kar & Okechukwu, 1978; Onwuliri, et al., 2004; Table 3).

Table 3. Fatty Acid Composition of African Oil Bean Seeds

Composition	Values
Yield of oil (%)	43.3
Saturated Fatty Acids	
Palmiitic acid	3.4
Behenic acid	5.2
Lignoceric acid	12.0
Unsaturated Fatty Acids	
Oleic acid	29.0
Linoleic acid	42.8
Linolenic acid	3.2
Gadoleic acid	0.28

Source: Achinewhu (1982)

It appears that of the saturated fatty acids, lignoceric acid makes up the most, approximately 12% of the total fatty acid content, while palmitic acid makes up the least, 3.4%. Linoleic acid, which makes up 42.8% of the seeds, is the main unsaturated fatty acid. Additionally, there is a notable amount of oleic acid (29.0%). There are extremely minor levels of linolenic and gadoleic acids (3.2 and 0.28%), respectively. Edible oils should not include significant levels of lignoceric and behenic acids (Odunfa, 1986). Odoemelam (2005) did point out that because of its high level of unsaturation, it can be used as a drying oil for paints, varnishes, and cosmetics as well as for cooking. According to Duke (1981), the seeds have low vitamin content and are not a good source of calcium or phosphorus. Table (4) illustrates the reported decrease in mineral and vitamin concentrations during fermentation. It has been discovered that when the seeds ferment, their niacin and riboflavin levels drop.

Table 4. Mineral and Vitamin Content of Unfermented and Fermented Ugba

Component (mg/100g)	Unfermented ugba	Fermented ugba
Minerals		
Phosphorus	172	-
Calcium	192	110
Iron	16	3.3
Vitamins		
Thiamin	0.07	0.07
Riboflavin	0.32	0.30
Niacin	0.90	0.30

Source: Duke (1981)

2.6. Anti-Nutritional Factors and Phytochemicals of Ugba

Due to a few disadvantages, African oil bean seeds are not edible when they are not fermented. The anti-nutritional components of raw and fermented African oil bean seeds are poorly understood. Enujiugha & Agbede (2000) and Kar & Okechukwu (1978) did, however, report that unfermented AOBs included a variety of harmful and/or anti-nutritional elements. Table 5 shows that Okorie & Olasupo (2014) found tannins, saponins, alkaloids, steroids, glycosides, flavonoids, and phytate in the unfermented African oil bean seed. According to Okorie and Olasupo's (2014) study, the amount of these harmful components in the fermented AOBs (ugba) was significantly decreased by processing and fermentation. This is mostly because the seeds were soaked for a whole night and then washed in water before to fermentation, which significantly impacted all the phytochemicals and anti-nutritional elements found. The amount of tannin in the soaked seeds decreased and eventually disappeared from the ugba samples after the seeds fermented for 24 and 48 hours, respectively. The soaking and fermentation processes also resulted in low levels of saponin and flavonoid content, alkaloids, steroids, and glycosides.

Table 5. Anti-nutritional factors and Phytochemicals in African Oil Bean Seed

	Processing method		Fermentation period (hrs)		
Phytochemicals	Unsoaked	Soaked	24	48	72
Tannin	+++	+	-	-	-
Saponin	+++	++	+	+	+
Flavonoid	+++	+	+	+	+
Alkaloid	++	-	-	-	-
Steroid	++	+	+	+	+
Glycoside	+++	+	++	+	+

+++, very high; ++, high; +, low; -, absent

Source: Okorie & Olasupo (2014)

3. Postharvest Handling and Packaging/Storage of Fermented African Oil Bean Seeds (Ugba)

The African oil bean seeds are hard and are not susceptible to physical damage during postharvest handling. Many post-harvest losses of the seeds are mostly due to physiological damage, pests attack and diseases. The physiological changes are made possible because of high moisture contents of the seeds at harvest. It was stated by (Guru & Mishra, 2017) that the two significant factors affecting physiological deterioration of products are pre-harvest factors (temperature, moisture status, mineral nutrition and cultural practices) and postharvest factors (temperature, chilling injury, light, gases such as carbohydrate, oxygen, and ethylene). Ugba has a low shelf life, and whenever the product is not marketed within days of processing, the product will be lost to spoilage, that's why different packaging method has been studied to increase the shelf life.

Packaging of ugba using different packaging materials are methods used by some workers for the storage of ugba to extend the shelf life of the products. Ugba are traditionally packaged by wrapping a handful with different kinds of leaves (figure 4). The wrapping of the seeds with leaves is believed to aid the fermentation process. The leaves wrapping and the poor handling measures contaminates the product (Nwagu et al., 2010). Besides, leaves-wrapping creates openings for microbes to enter the product resulting to rapid deterioration. The leaves-wrapped product has a low shelf life of not more than 5 days under tropical ambient conditions of 31 -32^{0}C. Ogbulie et al (2018) in their study, packaged ugba in low- and high-density polyethylene sachets and aluminum foil wraps as well as treatment with chemical preservatives such as 2% sodium chloride (Nacl). However, none of the methods could extend the shelf life beyond 8 days. Besides, some preservatives can alter the organoleptic properties of food, and carrying out Hedonic test will be useful in evaluating the effects of the preservatives and storage methods on the organoleptic characteristics of the product (Ogueke & Aririatu, 2004; Kabuo et al., 2013). Mbata and Orji (2007) in their study applied a process of pasteurization at a temperature of 98-100^{0}C for 30min, which they said eliminated all the organisms present including the organisms used for the fermentation. This was able to extend the shelf life to eight (8) days. They also attempted to package the ugba in re-usable bottles/cups and the containers were sterilized before use and the products pasteurized in the containers. These were able to keep for six weeks. The colour, taste, aroma, softness and other physicochemical properties of the products before and after keeping for six weeks compared favorably well with the locally produced ugba. Enujiugha & Akanbi (2008) used conventional batch retort procedures. The sliced and fermented beans were canned in three different media (brine, reined ground oil and tomato sauce) and the product was able to sty fir six (6) months at ambient temperature storage. Total viable count after 6 months of were 9.3 x 103, 1.7x 104 and 6.0x103 cfug-1 in brine, refined groundnut oil and tomato sauce respectively while the free fatty acids content (oleic acid) were 3.12g, 2.54g and 3.98g respectively. The peroxide values obtained after storage were 11.63, 9.54 and 10.02 meg kg-1 respectively, while the acid values (mg, NaOH g-1 oil) were 6.43, 5.10 and 7.92 respectively. Sensory evaluation of the canned products showed that the groundnut oil canned products was least acceptable in terms of aroma and overall acceptability although all the products showed increased softening and colour darkening with the prolonged storage. Furthermore, they used starter culture of washed cells of Bacillus subtilis and Bacillus megaterium to ferment the sliced and sterilized slices of African oil bean seeds for 48 hours at room temperature (30±2^{0}C). Although they observed no microbial growth on the product at the end of six (6) weeks of storage, they did not indicate whether the intrinsic properties of the product were affected

Notably, the various methods evaluated, when compared to leaves wrapping, have the advantage of reducing or preventing the entrance of microbes that leads to product spoilage. Nonetheless, none of the methods is satisfactory in solving the packaging and storage problems of African oil bean shreds/slices.

Figure 4. AOBs shreds **Wrapped AOBs**

Source: Augustine et al (2022)

4. Conclusion and Recommendations

The growing population of developing nations has put enormous pressure on the staple food availability of the people, and imported foods are relatively expensive and unaffordable to the majority of the populace due to poverty. To ensure food security in these regions, research on nutritious but neglected crops that grow and flourish with little or no special care, like African oil bean plant, should be encouraged throughout the nation. The plant is being processed through a natural solid-state fermentation (proteolysis) to produce ugba which is an important part of the diet of the Ibos and other ethnic groups in the eastern and southeastern parts of Nigeria. Fermentation of the oil bean seeds leads to increase in the nutritional values of the product. Considering the nutrient attribute, the phytochemical, proximate, mineral and vitamin constituents of African oil bean, the crop could be regarded as a great complementary food for household nourishment and an essential raw material for food and pharmaceutical industries. African oil bean seeds have great prospect of improving the economy of households and the nation through value addition. More so, any value addition on the African oil bean seeds could possibly create wealth and jobs for the teeming youth population of the nation. Furthermore, improving the postharvest operations of African oil bean seeds to increase its shelf life through research could help to tackle food insecurity in the nation.

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