

SENSORY AND TEXTURE ATTRIBUTES OF MANUALLY AND MACHINE-SLICED OKAZI (*GNETUM AFRICANUM*) LEAF OF DIFFERENT SLICE THICKNESS AND LENGTH IN SOUP PREPARATION

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Abstract: A traditional Nigerian soup called "Okazi" is made from the *Gnetum Africanum* woods shrub, which the Igbo people call "Okazi." The main reason okazi is so highly valued by the Igbo people is because of its medicinal qualities, which are particularly beneficial to the digestive system. In the southeast of Nigeria, Okazi (*Gnetum Africanum*) leaf is a popular wild, native dark green leafy vegetable due to its flavor and palatability. It tastes a little bit harsh. The edible leaves are typically cut into strips and added to soups and stews, among other dishes. The characteristic fibrous texture of okazi leaves makes them tough to cut. The leaves are thick and paper-like. The thickness and length of the Okazi leaf slices cut by hand and by machine were measured with a Vernier caliper. For the experiment, a fully randomized design was utilized. The sensory and textural characteristics of the soup and okazi leaf were evaluated in the study using machine and hand slices of okazi leaf with different thicknesses. The study population consisted of twenty panelists. The outcomes were calculated using a hedonic scale with nine points. A carefully thought-out questionnaire was also used to determine how popular and how much was consumed of the soups and raw leaves. At the $p < 0.05$ level, the data were statistically examined using an analysis of variance (ANOVA). The results showed that the hand-cut sample B, which measured 0.2 cm and 3.0 cm, and the machine-cut sample A, which measured 0.3 cm and 3.1 cm in thickness and length, had the most acceptability in terms of color, aroma, texture attributes (chewiness, juiciness, fibrousness), and overall acceptability. The outcomes showed that the okazi leaf slices made by machine and by hand, with different thicknesses and lengths used in the soup, did not differ significantly ($p < 0.05$).

Keywords: Okazi, Hand slices, Machine slices Sensory Qualities, Acceptability.

1.0 INTRODUCTION

In general, vegetables are the edible portions of plants or food crops that are harvested, consumed raw or as a component of a larger meal, and have a relatively high moisture content when they are first harvested (Ihekoronye & Ngoddy, 1985). According to Shade et al. (2004), vegetables are agricultural products that are also significant sources of protective foods that are very helpful for preserving health and preventing disease. While some vegetables can be grown on marginal soil with relatively reduced management costs, their nutritional value has been overlooked in favor of exotic plants, resulting in their underutilization (Odhav et al., 2007). Regardless of whether they have seeds or not, a food processor will classify vegetables as plant material that is consumed with the main course of a meal. Some vegetables may be considered wild if they are trees, herbs, shrubs, climbers, or erect plants that traverse plant kingdoms. The edible part could be a bud, bulb, or petiole; it could also be a tuber storage stem like taro, beet, carrot, or sweet

potatoes. Ihekoronye and Ngoddy (1985) defined vegetables as belonging to the leafy category, which includes, among other things, cabbage, fluted pumpkin, lettuce, spinach, bitter leaf, and "okazi" leaf; Modified bud vegetables, like onion and garlic; fruit vegetables, such as cucumber, pepper, tomatoes, eggplant, and okra; immature green legumes, like green beans and green peas; cereals, like sweet corn; Cauliflower is a flower vegetable; veggies with roots, like sweet potatoes and cassava; vegetables with tubers, like yam and potatoes; and vegetables with stems, like asparagus, etc.

Vegetables are important parts of a human diet because they help the various body systems function normally. They give our cells vitamins (B complex, C, and A), minerals (calcium, iron, etc.), fibers, essential oils, and phytonutrients (Ray and Bhunia, 2007). Vegetables are low in fat and calories (Banerjee et al., 2012). Vegetables can be used as minor or major ingredients in food (sauces, stews, soups, and salads) to serve a variety of purposes. Some of these include flavoring food (onions, garlic, and pepper,

for example) and garnishing prepared dishes to improve their visual appeal (carrots, green peas, and green beans, among others).

Okazi, also known as *Gnetum africanum*, is a dark green leafy vegetable that grows naturally in humid forest zones ranging from Central Africa to Angola and Nigeria (Schippers and Bisong, 2000). It is a member of the Gnetaceae family. In Nigeria's rainforest, the plant thrives as a wild, evergreen climbing plant that is highly sought-after and expensive in local markets. Perennial liana, evergreen and dioecious, that can reach a maximum length of 10 meters, while it can occasionally grow longer and branching (Orwa et al., 2009). There are domesticated and wild forms of okazi. According to Ali et al. (2011), the phrase "wild species" refers to the wild variation, whilst "domestic species" refers to the recently domestically cultivated ones that are kept as exotic plants in households in South Eastern Nigeria. The edible leaves are often thinly sliced and used in a variety of recipes and cuisines across the world, including stews and soups like edikang, afang, achara, okazi, and egusi soups (Okerulu, and Onyema, 2015). Aspartic acid, dietary fiber, carbs, protein, vitamins, salt, magnesium, calcium, iron, zinc, manganese, potassium, copper, glutamic acid, leucine, proline, and cysteine, among other vital amino acids that the body needs, are all abundant in okazi leaf. Phytochemicals include tannins, flavonoids, phenols, and saponins are also present. These substances possess antibacterial, anti-inflammatory, anti-cancer, and antioxidant qualities. Okazi's comparatively high protein content indicates why it has a high concentration of important amino acids, which can serve as a backup energy source, particularly in situations where glucogenesis damages the body's ability to metabolize carbohydrates (Okerulu, and Onyema, 2015). "Okazi " can be grown as a supplemental crop on tree farms since it thrives in shaded environments. In particular, it has been proposed that the vine might be grown alongside oil and rubber trees as a supplemental crop. However, if impoverished farmers do not have access to sustainable grounds, growing okazi may prove challenging due to the requirement for shade, but not overly damp conditions. The glossy, stiff (difficult to cut) leaves of okazi resemble those of an orange tree. It doesn't really have a distinctive smell, but it has a slightly bitter taste which is usually added to soups. The leaf is appreciated the way it is thinly sliced, unlike other leafy vegetables. This study sought to identify the sensory characteristics of Okazi (*Gnetum africanum*) leaves cut both manually and mechanically, with varying thicknesses and lengths of slices, for soup preparation.

2.0 MATERIALS AND METHODS

2.1. Source of Raw Materials

Gnetum africanum, often known as okazi, was obtained from Uzuakoli in Abia State and the University of Nigeria's Nsukka campus. Using a knife, tray, and slicing board, the leaves were manually sorted and chopped into different sizes. A manufactured machine was also used for this purpose. Using a vernier caliper, the manual (hand cut) and machine slices of okazi leaves were separated based on their thickness and length. The samples were coded as samples A, B, C, and D, which stand for machine and knife slices from Uzoakoli in Abia state and the University of

Nigeria Nsukka campus, respectively. Four distinct okazi soups that were made using the okazi samples were evaluated for sensory analysis.

2.2 sample preparation

Ingredients/ soup preparation

Among the ingredients used to make okazi soup are 627 g of beef, 294 g of stockfish, 80 g of okazi leaf, sliced both manually and by machine, 327 g of dried fish, 45 g of crayfish, 141 g of palm oil, 40 g of salt, 315 g of egusi, 88 g of osu, 17 g of seasoning cubes, 31 g of ofor (thickener), 42 g of chili pepper, and 2000 milliliters of water. A gas cooker was used to cook the meat for 20 minutes, or until it was practically cooked, after seasoning it with salt, pepper, bouillon cubes (knor), and stockfish. During the steaming process, the previously cleaned dry fish were combined to prevent the fish from overcooking. The egusi was added to the ground pepper and pounded with a mortar and pestle. One cooking spoon of warm water from the meat pot was added, and the pounded mixture was continued until the egusi blended with signs of oiliness. Fifteen grams of chili peppers were ground using a kitchen blender (Panasonic, 1 speed MX 1021) until fairly smooth. After being crushed, the egusi was mixed and lumps formed. The meat pot was filled with water, brought to a boil, and then added crayfish, seasoning, chili pepper, and palm oil. For ten minutes, the mixture was stirred constantly, and the oil's color changed from red to yellow. After adding the ofor to the soup, give it a short toss to combine. The soup was finally done when okapi leaves were added and cooked for three minutes. Additional sliced okazi leaf samples were prepared using the same process.

2.3 Sample analysis

Sensory evaluation of the manually and machine sliced *Gnetum africanum* leaf

Twenty semi-trained panelists, including employees from the Department of Food Science and Technology and the Department of Home Economics and Hospitality Management Education at the University of Nigeria, Nsukka, assessed the samples' sensory profiles for a variety of sensory qualities, including color, flavor, texture, aftertaste, mouthfeel, appearance, and overall acceptability. The manually and mechanically cut leaves were coded as samples A, B, C, and D based on the thickness and length of the slices. Four distinct okazi soups were made using the okazi samples, and their sensory appeal was assessed. The Department of Home Economics and Hospitality Management Education Food and Nutrition Laboratory served as the test site for the sensory evaluation. The panelists were given individual plates of soup and garri, a common starchy staple, and were seated with comfort. The samples came with an evaluation score sheet. The soup samples were labeled appropriately, and between tests, spoons, forks, water, and carrots were given to rinse the mouth and avoid aftertaste. These are a set of steps to reduce bias. Using a nine-point Hedonic scale, where "9" denotes strongly like and "1" denotes extreme dislike, the degree of variations between the Okazi soup samples for each sensory quality was examined (Ihekoronye and Ngoddy, 1985).

3.0 RESULT



Plate 1: Okazi soup with knife slices of okazi leaves for samples A and B.



Plate 2: Okazi soup with machine slices of okazi leaves for sample C and D

3.1 Table 1: Sensory scores of soups prepared with different thicknesses of the machine and manually sliced *Gnetum Africanum* (“okazi”) leaf.

Samples	Colour	Appearance	Mouthfeel	Taste	Aftertaste	Flavour	Overall acceptability
A	8.35 ^b ±0.49	8.30 ^a ±0.57	8.45 ^a ±0.51	8.40 ^a ±0.50	8.45 ^a ±0.51	8.50 ^a ±0.51	8.30 ^a ±0.57
B	8.45 ^b ±0.51	8.55 ^a ±0.51	8.35 ^a ±0.49	8.40 ^a ±0.50	8.40 ^a ±0.50	8.55 ^a ±0.51	8.40 ^a ±0.47
C	8.00 ^c ±0.00	6.10 ^b ±1.65	7.65 ^b ±0.49	7.75 ^b ±0.71	7.70 ^b ±0.73	8.45 ^a ±0.51	7.90 ^b ±0.64
D	8.95 ^a ±0.22	6.35 ^b ±0.88	8.20 ^a ±0.89	8.05 ^{ab} ±0.68	7.80 ^b ±0.61	7.80 ^b ±0.52	7.75 ^b ±0.44

Values are the mean ±standard deviation of 20 panelists. Values bearing different superscripts within the same column are significantly $P \leq 0.05$ different.

Key: *Gnetum Africanum* leaves (okazi) that have been machine-sliced with a 0.3 cm slice thickness and 3.1 cm slice length make up Sample A. Sample B is a hand sliced *Gnetum Africanum* slice that is 3 cm long and 0.2 cm thick. Sample D: *Gnetum Africanum* leaves cut using a knife, with a slice thickness of 0.5 cm and a slice length of 3.9 cm; Sample C: *Gnetum Africanum* leaves (okazi) sliced by machine, with a slice thickness of 0.6 cm and a slice length of 3.9 cm.

3.2. Textural Attributes of the machine and manually sliced okazi leaves.

Table 8: The textural characterization of machine and manually sliced okazi leaves

Samples	Juiciness	Fibrousness	Chewiness
A	2.60 ^a ± 0.54	3.80 ^a ± 0.83	2.40 ^b ± 0.55
B	2.60 ^a ± 0.45	2.80 ^a ± 0.83	3.40 ^a ± 0.55
C	3.00 ^a ± 1.20	3.20 ^a ± 1.30	2.20 ^b ± 0.45
D	3.20 ^a ± 0.85	2.60 ^a ± 0.54	3.40 ^a ± 0.75

Values are mean ± standard deviation of 5 panelists. Values bearing different superscript within the same column are significantly P < 0.05 different.

Key: Gentum africanum leaves (okazi) were machine-sliced in Sample A, measuring 0.3 cm in thickness and 3.1 cm in length, while Gnetum africanum leaves were manually-sliced in Sample B, measuring 0.2 cm in thickness and 3 cm in length. Sample D: Gnetum africanum leaves cut using a knife, with a slice thickness of 0.5 cm and a slice length of 3.9 cm; Sample C: Gnetum africanum leaves (okazi) sliced by machine, with a slice thickness of 0.6 cm and a slice length of 3.9 cm.

4.0 DISCUSSIONS

Machine-sliced Gnetum Africanum leaves had a color range of 8.00 in Sample C to 8.95 in Sample D for sensory ratings. While samples C and D were considerably (p < 0.05) different from samples A and B, samples A and B were not statistically (p ≥ 0.05) different from each other. The species of the leaf slices could be the reason for this. Samples C and D were bought straight from the farmer on the bush farm, while Samples A and B were domesticated. However, because of the way the leaves were lightly sliced, sample B was frequently favored. There were variations in the look, mouthfeel, flavor, aftertaste, and acceptability overall, with scores between 6.35 and 8.30, 7.65 and 8.45, 7.75 and 8.40, 7.70 and 8.45, and 7.75 and 8.40, respectively. While samples A and B did not differ significantly from each other (p > 0.05), they did differ considerably from samples C and D (p < 0.05). Examples C and D had larger slices in both thickness and length when compared to examples A and B, but there was no difference in the flavors, taste, aftertaste, appearance, mouthfeel, or acceptability overall. Thus, the soup's sensory profile was unaffected by the length or thickness of the slices.

Five panelists were used in the texture measuring process, which involves employing the senses to detect the texture of food through mouthfeel or fingerfeel. Evaluations of food texture, including its fibrousness, juiciness, and chewiness, are derived from intricate processes involving the gustatory epithelium. Auditory signals, teeth, saliva, and tongue (Guinard and Mazzucchelli, 1996). The results above indicate that samples A, B, C, and D were marginally juicy. The juiciness of samples A, B, C, and D did not, however, differ substantially (p > 0.05). Samples A, B, C, and D did not differ statistically (p > 0.05) in terms of fibrousness. Samples A, B,

C, and D differed considerably (p > 0.05) in terms of chewiness. The chewiness of the leaf was impacted by the way the okazi was sliced. As reported by (Apolot et al., 2018), the result achieved is comparable to the leaves of *Solanum aethiopicum* and *Amaranthus lividus*, which have a smooth and soft texture, somewhat juicy, chewable, and slightly fibrous.

CONCLUSION

Samples A and B from the University of Nigeria Nsukka Campus did not significantly differ (p ≥ 0.05) in the gnetum africanum ("okazi") soup when prepared using varying slice thicknesses and lengths. This is likely because the plant was domesticated, resulting in soft and tender leaves, while Samples C and D had tough leaves, likely as a result of the purchase area (bush farm). Consequently, the soup's sensory scores were influenced by okazi leaves from various regions, but the sensory scores of "okazi" soup were unaffected by the length or thickness of the slices. Based on the Okazi leaf samples' textural characteristics, there were no differences (p > 0.05) in the machine and hand slices' juiciness and fibrousness; however, there were significant differences in the samples' chewiness. As a result, the chewability of the okazi leaf was influenced by the thickness and length of the slice.

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