

Survey of Traditional Fermentation Practices During Fufu Production in 3 LGAs in Ogun State

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ABSTRACT

Cassava fermentation is a crucial process in fufu production, enhancing its texture, flavor and detoxification of cyanogenic compounds. However, variations in traditional fermentation practices, including the use of additives, raise concerns about food safety and quality. This study surveyed traditional fermentation practices employed during cassava fermentation for fufu production in three Local Government Areas (LGAs) - Ijebu North, Ijebu East and Odogbolu in Ogun State, Nigeria. A survey was conducted among 54 local fufu processors to assess their demographic profile, fermentation methods, methods used to improve the sensory properties of fufu and additives being used.

The results showed that all fufu producers make use submerged liquid fermentation was the dominant method (96.3%) being used, while 77.8% of the processors usually ferment for three days. Over half of the respondents (59.3%) use fermentation aids such as nails (37%), sandpaper leaves (*Ficus exasperata*) (11.1%) and *Jatropha curcas* leaves (9.3%) to accelerate the retting process, while 40.7% relied on natural fermentation without the use of aids.

On methods used to improve the sensory properties, findings also revealed that 81.5% of respondents maintained good hygiene to control odour, while 14.8% used alum to improve colour. Additionally, 57.4% of the respondents identified bland flavour as the most acceptable, while 88.9% do not use additives to alter aroma. The findings highlight a reliance on indigenous knowledge for fufu fermentation, raising concerns about the safety of certain additives. The study recommends promoting awareness of safer fermentation techniques to ensure high-quality, health-compliant fufu production.

Keywords: Cassava, Cyanogenic glycosides, fermentation aids, Ogun State, Traditional fermentation

Introduction

Fermentation is a traditional food processing method widely used across Africa for the preservation and transformation of staple crops. In Nigeria, fufu, a fermented cassava paste is a major dietary component, especially in the southern regions. The

process of fermenting cassava not only enhances the sensory properties of fufu but also plays a crucial role in reducing cyanogenic compounds naturally present in cassava (Adeyeye, 2016). Traditionally, cassava is peeled, soaked, and fermented in water over several days. However, to accelerate fermentation and improve yield, many local producers adopt unconventional practices. These include the addition

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of fermentation aids such as rusted nails, sandpaper leaves (*Ficus exasperata*), and *Jatropha curcas* leaves (Ogbete *et al.*, 2022). While these methods are rooted in indigenous knowledge, they raise growing concerns about food safety and public health, particularly due to the potential toxicity of some materials used.

In Ogun State, Nigeria, small-scale fufu production is a significant economic activity, primarily among women. Despite its importance, there is limited data on the specific fermentation practices used and their implications for consumer health. Understanding these practices is essential for developing targeted food safety interventions and promoting safer processing techniques without disregarding cultural traditions.

This study, therefore surveyed cassava fermentation methods used in fufu production across three Local Government Areas in Ogun State. The goal was to document current practices, identify commonly used additives, and assess their potential health implications (Obafemi *et al.*, 2022).

Methodology

Three Local Government Areas in Ogun State were used as the study area including Ijebu North, Ijebu East and Odogbolu LGAs. These local government areas were selected as the study area because of the predominant fufu processing activities going on the State, while these 3 LGAs are among the predominant fufu processors in the State. A survey was conducted by administering specially designed questionnaires to collect information on different methods applied in the traditional fermentation of cassava for fufu production.

The questionnaire was sectioned as follows

- I. Methods of Fermentation Used by Fufu Processors in the Study Area
- II. If they use fermentation aids to soften cassava during fermentation or they use the conventional traditional method without any aids.

III. Various Additives Used to Soften Cassava Roots by the Processors in the LGAs Surveyed

IV. Methods Used to Improve the Sensory Properties of Fufu by Processors in the Study Area

54 questionnaires were administered to the respondents (local fufu processors) and data was collected. Based on the data collected from the survey, the laboratory experiments were designed to investigate the effects of the aids being used and methods being employed on the properties of the cassava fufu paste.

Result and Discussion

Methods of Fermentation Used by the Fufu Processors in the Study Areas

Table 1 and 3 shows the data for the different methods of fermentation used by the fufu processors in the three Local Government areas surveyed in this study. A total of 96.3 % of the respondents in the 3 LGAs use submerged liquid fermentation method (soaking the cassava roots) for processing cassava into fufu, while only 3.7 % use mashing and bagging method (solid substrate fermentation). This agrees with the findings of Owolarafe *et al.* (2018) who confirmed that different processors adopt various methods to ferment cassava with the aim of removing cyanogen. With respect to preference of cassava variety being used, majority of the processors (64.8%) prefer the agric cassava species for manufacturing *fufu*, while only 35.2% utilize the white cassava variety (Table 3). The Agric cassava variety is the improved biofortified cassava variety. This biofortified variety has been reported to possess more nutritional benefits such as high provitamin A content (Bechoff *et al.*, 2018). This higher preference for this cassava variety in the study areas may impact positively on the nutritional status of consumers. Nigeria adopted pro vitamin A cassava varieties with yellow roots to address vitamin A deficiency, particularly among children. Cassava varieties can help reduce vitamin A deficiency in rural communities. This indicates that *fufu* produced in the study area will be suitable for

Table 1: Methods Applied Durinf Fermentation and Indices for Terminating Fermentation of Cassava for production of Fufu by Processors in the 3 LGAs Surveyed in Ogun State

Variables	Classification	All L.G.A.s		Ijebu North L.G.A.		Ijebu East L.G.A.		Odogbolu L.G.A.	
		Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Do you ferment cassava before processing into fufu?	Yes	52	96.3	18	100.0	17	94.4	17	94.4
	No	2	3.7	0	0.0	1	5.6	1	5.6
	Total	54	100.0	18	100.0	18	100.0	18	100.0
Why do you ferment?	Texture	37	68.5	12	66.7	13	72.2	12	66.7
	Taste	15	27.8	5	27.8	5	27.8	5	27.8
	Flavour	2	3.7	1	5.6	0	0.0	1	5.6
	Total	54	100.0	18	100.0	18	100.0	18	100.0
In what form do you ferment?	Soaking	52	96.3	18	100.0	17	94.4	17	94.4
	Mashed and bagged	2	3.7	0	0.0	1	5.6	1	5.6
	Total	54	100.0	18	100.0	18	100.0	18	100.0
How many days does the fermentation takes place?	2 days	1	1.9	0	0.0	0	0.0	1	5.6
	3 days	42	77.8	16	88.9	14	77.8	12	66.7
	4 days	11	20.4	2	11.1	4	22.2	5	27.8
	Total	54	100.0	18	100.0	18	100.0	18	100.0

healthy immune system and vision

The survey also revealed that the processors from these 3 LGAs ferment cassava to develop its sensory properties and acceptability, with most of them (68.5 %) preferring development of texture as their reason for fermenting cassava, while 27.8 % aimed at achieving improved taste and only 3.7 % of the respondent's ferment cassava for aroma development. This is in accordance with Tomlins *et al.* (2007) who reported that textural properties such as smoothness, easiness of swallowing, and drawability are major attributes that drive acceptance of fufu by both men and women. This was later corroborated by Otoo *et al.* (2018) who opined that texture is one of the key desirable sensory attributes of fufu. This may explain why most of the producers chose texture as the reason they ferment fufu.

Concerning the number of days required by the processors to achieve an adequately soft mash for fufu production, findings revealed that majority of the producer's ferment fufu for 3 days (77.8 % in all LGAs, 88.9 % in Ijebu North, 77.8 % in Ijebu East and 66.7 % in Odogbolu) while 20.4 % of the producers in All LGAs ferment fufu for four days

(Table 1). Owolarafe *et al.* (2018) reported that soaking cassava for 3-5 days is predominant in Ilaro and Abeokuta areas of Ogun State whilst Onyeka *et al.* (2024) reported that fermentation for 4-5 days is sufficient for the optimum development of nutrients and reduction of hydrogen cyanide of cassava roots for cooked fufu paste.

Additives Used to Soften Cassava Root by the Processors in the LGAs Surveyed

The responses of fufu producers surveyed in the study areas on various additives used to soften cassava tuber are presented in Table 2. Regarding indigenous practices they employ to hasten fermentation/softening of the roots, 40.7 % of the respondents in all three LGAs said they do not employ any artificial means to achieve softening but allow the natural process of softening. On the other hand, among those who use other means, 37 % use nail, while 11.1 %, 9.3% and 1.9% use sandpaper leaves, *Jatropha curcas* leaves and ashes, respectively. This is an indication that more than half of the respondents (59.3 %) in the 3 LGAs surveyed employ various additives to hasten fufu fermentation.

Table 1: Methods Applied During Fermentation and Indices for Terminating Fermentation of Cassava for production of Fufu by Processors in the 3 LGAs Surveyed in Ogun State

Variables	Classification	All L.G.A.s		Ijebu North L.G.A.		Ijebu East L.G.A.		Odogbolu L.G.A.	
		Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Do you add any additives? to the cassava tuber to aid rapid softening?	Yes	29	53.7	8	44.4	12	66.7	9	50
	No	25	46.3	10	55.6	6	33.3	9	50
	Total	54	100.0	18	100.0	18	100.0	18	100.0
What do you use to hasten the fermentation process?	No	22	40.7	9	50.0	5	27.8	8	44.4
	Nail	20	37.0	6	33.3	8	44.4	6	33.3
	Sandpaper leaves	6	11.1	2	11.1	3	16.7	1	5.6
	Jatropha carcass leaves	5	9.3	1	5.6	2	11.1	2	11.1
	Ashes	1	1.9	0	0.0	0	0.0	1	5.6
	Total	54	100.0	18	100.0	18	100.0	18	100.0

Table 3: Fermentation Practices and Influencing Factors for the Production of Fufu by Processors in the 3 LGAs Surveyed in Ogun State

S/N	Question	Responses (54 respondents)	Highlights
1	Which cassava variety do you use?	White (35.2%), Agric (64.8%)	Agric cassava preferred
2	Do you ferment cassava tuber before processing into <i>fufu</i> ?	Yes (96.3%), No (3.7%)	Practice common across all LGAs
3	Why do you ferment cassava?	Texture (68.5%), Taste (27.8%), Aroma (3.7%)	Texture improvement key reason
4	In what form do you ferment cassava?	Soaking (96.3%), Mashed and Bagged (3.7%)	Soaking dominates
5	Do you add hot water during soaking?	Yes (22.2%), No (77.8%)	Mostly not added

Previous studies have investigated the influence of fermentation aids on the fermentation process of cassava for fufu production. Udensi *et al.* (2019) reported that the use of nail hastens fermentation, while Umeh and Odibo (2014) compared the influence of different additives including nail, potash and fresh leaves of *Jatropha curcas* on fermentation of over-matured cassava roots (above 18 months) to wet fufu paste. This shortening of the retting period of cassava during fufu production due to the use of additives may be responsible for the application of different additives used by most of the processors in the study areas. More respondents in all LGAs use additives (53.7%) to hasten fufu fermentation than those who do not use additives (46.3 %). Ijebu East LGA had the highest producers that use additives (66.7 %) when compared to other LGAs surveyed.

Conclusion and Recommendation

The traditional fermentation techniques for making fufu in Ogun State, Nigeria's Ijebu North, Ijebu East, and Odogbolu Local Government Areas have been critically examined by this study. It demonstrates that whereas traditional knowledge is crucial in directing fermentation procedures, the usage of some additives, like nails and some plant leaves, may be harmful to one's health even though they are effective at speeding up the retting process. The majority of processors focus on texture and use three-day submerged fermentation, with a significant percentage using non-traditional additives to accelerate softening. These procedures increase processing efficiency, but they also highlight possible food safety issues that need immediate action. For a better result with the consideration of the safety of individuals, Safer and scientifically validated methods that preserve both traditional values and food safety should be promoted through community trainings and workshops.

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