

Production and Evaluation of Bread Produced From Dawadawa Fruits Pulp and Wheat Flour

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Abstract:

Production and evaluation of bread from dawadawa fruit flour was the aim of this study. The dawadawa fruits pulp was processed into flour and the proximate composition of the flour sample was determined. Bread were produced from composite flours of the dawadawa fruit and wheat at the ratio of 100:0, 50:50 and 70:30 respectively, using 100% wheat flour as control. Sensory evaluation was carried out on the bread samples. The result of proximate composition of the flour samples were

ranged by the following: protein content of 6.71-11.45%, ash content 1.37-2.89%, fat content of 4.18-9.60%, moisture content of 26.94-34.73% and carbohydrate content of 46.41-56.05%. The properties of the bread samples showed that the control was significantly ($p \leq 0.05$) different in colour, aroma, taste, texture and level of acceptability with a score of approximately 5.0 for each attribute. Sample (B and C) was also preferred in terms of texture, colour, and taste with a score of approximately 4.0.

Key words: *Dawadawa fruits pulp, Composite bread, Composite flour, Wheat, Parkia*

from which the flour is created, is for the most part imported and not delivered in Ghana, so as to lessen costs on wheat importation and more extensive usage for the inevitably processed dawadawa fruits pulp as composite ingredient to wheat flour in the preparation of various pastries and dough dishes.

Parkia biglobosa (Dawadawa) belongs in the family *Leguminosae* and the subfamily *Mimosoideae* (Hopkins 1983). Common names are African Locust Bean, fern leaf, monkey cutlass tree, two-ball nitta-tree. In French West Africa it is commonly known as néré, netto, ulele, séou, and ouli (Booth, 2002).

A medicine derived from *P. biglobosa* is of great value to rural communities that cannot afford nor have access to “modern medicine”. The importance of the tree and its products as medicine perhaps is the origin for its name (Ibrahim, 2015). The name of the tree and food product, Dawadawa is from Hausa, the lingua franca of West Africa, spoken by over fifty million in this part of the continent. In Swahili, a language also Arabic in origin, “Dawa” is defined as medicine, anything supplied by a doctor, including charms and talisman used by native medicine men. In Frafra, the tree is called dua. *P. biglobosa* is a perennial, deciduous tree reaching 7–20 m in height. The crown or canopy is large and wide spreading with low branches on a stout bole.

1. Background of the Study

Bread is a significant staple food item whose utilization is enduring and expanding in Ghana. It is nonetheless, generally costly, being produced using imported wheat that is not developed much in the tropics for atmospheric reasons (Edema et al., 2005). Endeavours have been made to advance the utilization of composite flours in which flour from privately developed yield and high protein seeds supplant a segment of wheat flour for use in bread, consequently diminishing the interest for imported wheat and creating protein enhanced bread. Despite the fact that there is presently a significant measure of accessible composite bread innovation, such bread still require at any rate 70% wheat flour to have the option to utilize (Eggleston et al., 1992). The major or obligatory ingredients in bread making are flour, water and yeast (Akobudu, 2006). The flour ought to have great amylase movement, the dampness substance ought to be fewer than 14% and the shading or appearance ought to be acceptable (Giami et al., 2004).

Bread has become the second most broadly expended non – indigenous food item after rice in Ghana. Till date most Ghanaian have not been acquainted with different sorts of bread separated from the one produced using 100% wheat flour. The wheat grain,

The most significant product from *P. biglobosa* is food. The food products collected from *P. biglobosa* are especially important due to the seasonality of fruit maturation and food availability. In March and April, the beginnings of ‘hunger season’ when other foods are becoming scarce, mature pods are collected for food. The seeds are used in preparation of Dawadawa, a protein and fat rich food. A study by Mertz et al(2001) surveyed families in Kandiga on vegetable consumption and seasonality and found that in two villages, Dawadawas consumed in 78% and 85% of all meals. Dobulong, the yellow starchy pulp that surrounds the seed, is an important food supplement. The dried powder is often mixed with water to produce a drink called dozimby the Dagbani tribe and bololoin Hausa (Konlani, 2009). Composite flours using a combination of wheat flours, with other flours such as cassava, sorghum, millet or maize in different proportions can be employed to produce a range of different breads (Dhingra, 2014). Hence, the aim of this research was to use Dawadawa fruitS pulp as composite ingredient to wheat flour in the production bread.

2. Materials and Methods

Research design

The study was based on both descriptive research design and experimental aimed to describe and access how dawadawa fruit pulp can be used in preparation of bread. The bread was developed by the method described by Foskett (2007) practical cookery.

Randomly selected of bread bakers within the Bolgatangamunicipality were involved in sensory analysis of the product.

Source of Raw Materials

Dawadawa fruits were obtained from Bolgatanga market alongside the strong flour, yeast, margarine, sugar and salt.

Preparation of dried Moringa leaves powder

Dawadawa fruits pods after purchased from the market brought to the house. Pods were opened in order to get rid of the damaged and unwanted ones. The fruits were then pounded with mortar and pestle into flour/powder and the flour sifted to separate the seeds from the pulp. The pulp was then packaged into a zipped polythene bag to be used later.

Flow chart of Dawadawa fruits pulp powder

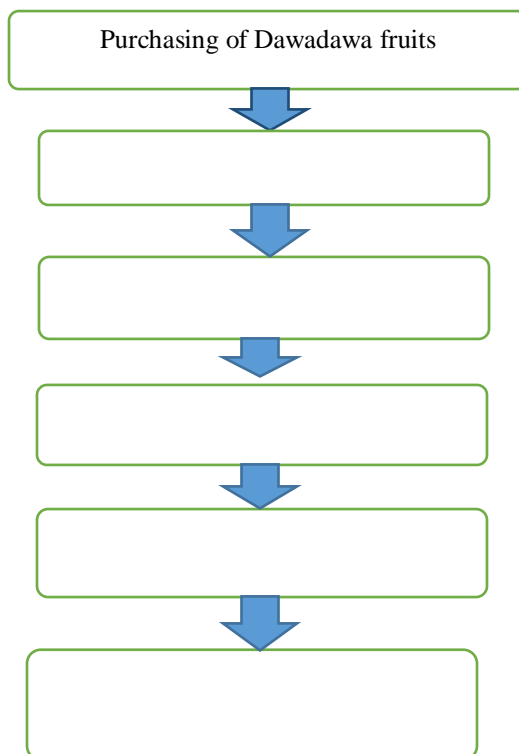


Figure 1: Flow chart for preparing Dawadawa fruits pulp

Formulation of Composite Flour and other Ingredients for bread Production

Three different samples of bread were produced and coded as A, B, and C. Sample A contained 80%

wheat flour and 20% Dawadawa fruits pulp. Samples B, 50% wheat and 50% Dawadawa fruits pulp and sample C 60% wheat flour and 40% Dawadawa fruits pulpas presented in Table 1.

Table 1: Formulation of Composite Flour and other Ingredients for Bread Production

INGREDIENTS	SAMPLE A=100% wheat	SAMPLE B = 50% wheat and 50% Dawadawa fruits pulp	SAMPLE C= 70% wheat flour and 30% Dawadawa fruits pulp
Wheat flour	200g	100g	120g
Dawadawa fruits pulp	-	100g	80g
Yeast	5g	5g	5g
Salt	3g	3g	3g
Margarine	20g	20g	20g
Sugar	20g	20g	20g
Milk powder	25g	25g	25g
Water	150 ml	150 ml	150 ml

Method of preparing of bread

The dawadawa fruit pulp and wheat flour bread were prepared by using the method described by Foskett (2007) practical cookery with minor changes as follows:

Dry ingredients such as flour, sugar, yeast, nutmeg were measured and incorporated with the margarine and processed into a soft with diluted milk and water. The different proportions of dough were manually kneaded and proofed in a mixing bowl covered with a

damped cloth under room temperature for 40 minutes. After the 40 minutes, the different proportions of the dough were knocked-back and moulded into desirable sizes and shapes. The bread was then kept in greased loaves tins and allowed to proof for the second time for at least 20 minutes before baking in a preheated oven for 15 to 30 minutes. Different samples of bread were zipped in polythene bag for proximate analysis and sensory evaluation.



Sample A: 100% wheat flour bread



Sample B: 50% wheat, 50% Pulp)



Sample C: 70% wheat 30% Pulp

Fig. 2: Samples of bread.

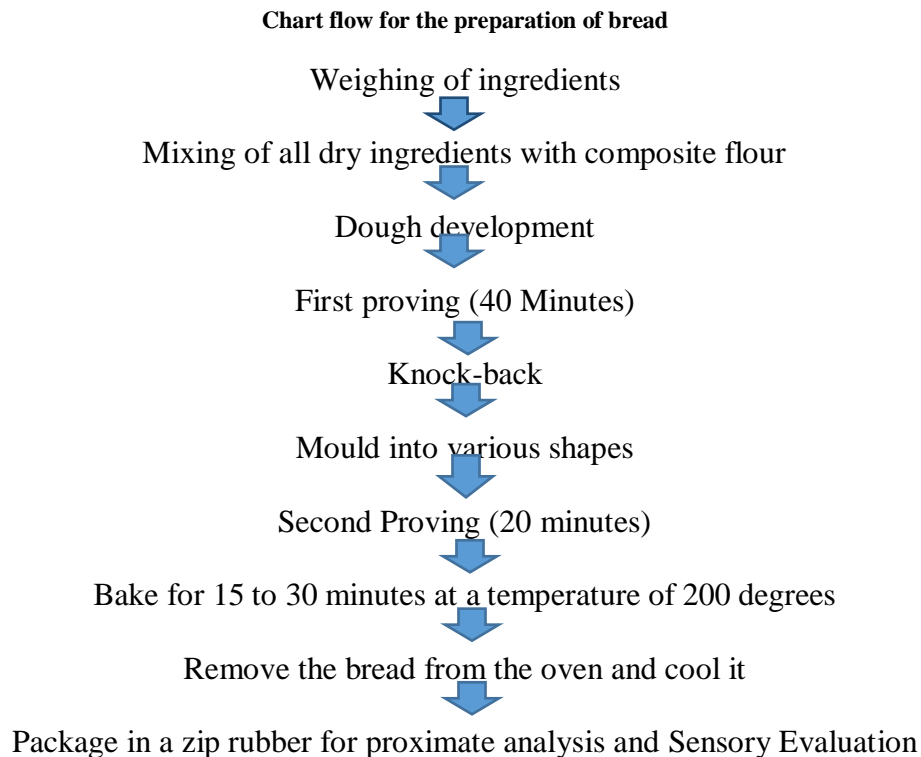


Fig. 3: flow chart of bread Preparation

Validation of the procedure

The products were developed based on three (3) different types. At the end of each process the products were analyzed by other caterers, food production lecturers, and catering students. Their comments and suggestion were used to modify the procedure before the final product was developed. The questions on the ballot sheet were set in simple language. Terminologies used in the questionnaire were explained to respondents who needed assistance. The processing procedure, flow chart, and questionnaire were given to bread consumers to answer.

Sensory analysis

The bread sensory qualities were assessed by a test panel of 50 respondents. A hedonic scale quality analysis as described by Larmond(1997) was used

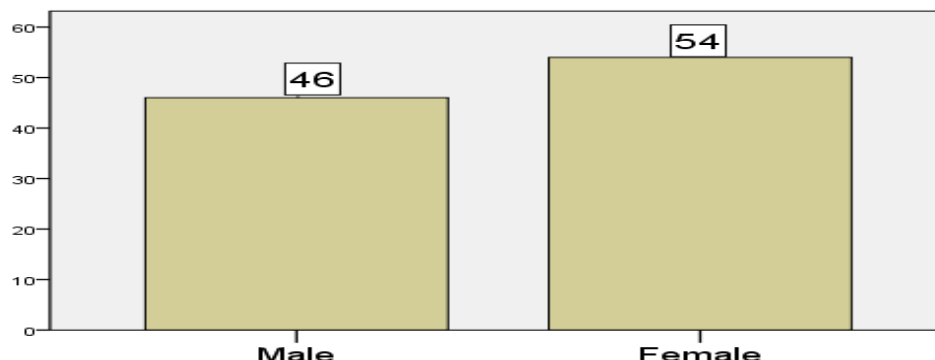
with 5= like very much, 4= like slightly, 3= neither like nor disliked, 2= dislike slightly and 1= dislike very much to evaluate the colour, taste, aroma, texture, and overall acceptability of the samples. The panelists were instructed to rinse their mouths with water after tasting every sample and not to make comments during evaluation to prevent influencing other panelists. They were also asked to comment freely on samples on the questionnaires given to them.

Statistical Analysis

Data were obtained in form of mean and standard deviation and subjected to analysis of variance (ANOVA) and the means separated using Fishers LSD (Least significant difference) test. Microsoft Excel and Statistical Package for Social Science (SPSS) were used to analyze the data.

Analysis and discussions

Analysis of demographic data about the respondents



Source: Field survey, 2019

Figure 1: Gender Distribution of the Respondents
The figure above indicates the sex distribution of the respondents from the study area. The figure indicates that, 54% of the respondents were female and 46% of

the respondents represent the male’s portion. This observation indicates that, majority of the respondents from the study area were females.

Table 2: Age Distribution of the Respondents

Age	Frequency	Percentage (%)
18-24years	19	38
25-34years	29	58
35-44years	2	4
Total	50	100

Source: Field Survey, 2019

This study involved 50 respondents and out of the total respondents, 18 respondents were between the age group of 18-24years which represents 38%, 29 respondents were between the a group of 25-34years which represents 58% and 2 respondents were

between the age group of 35-44years which also represents 4%. This clearly demonstrates that majority of the respondents were in between the age group of 25-34 years

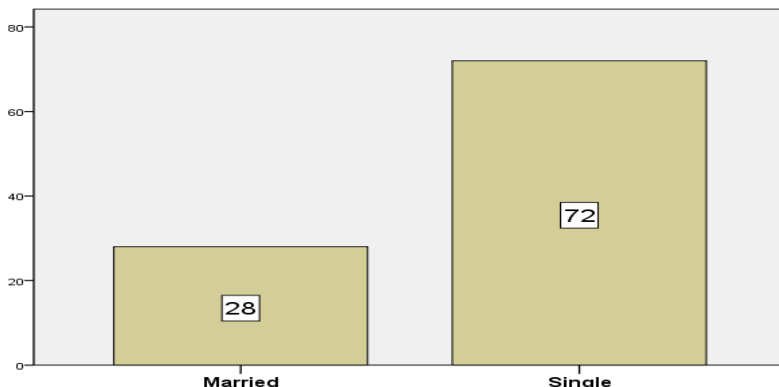
Table 3: Educational Level of the Respondents

Educational level	Frequency	Percentage (%)
Junior High	5	10
Senior High	14	28
Tertiary	31	62
Total	50	100

Source: Field Survey, 2019

The research seek to find out the level of education of the respondents and out of the total number of the respondents, 5 respondents representing 10% were in junior high , 14 respondents representing 28% indicate that they complete senior high and 31

respondents representing 62% also indicate that they are in tertiary education. It is clearly known that majority of the respondents are undergoing tertiary education.



Source: Field Survey, 2019

Figure 2: Marital Status of the Respondents

This study involved 50 respondents and out of the total respondents, 28% of the respondents indicate that they are married and are living with their

families and 72% indicates that they are still single. This observation clearly states that, the study area is dominated by people who are not married.

Table 4: Proximate Composition of the Wheat andDawadawafruits pulp bread

Samples	Moisture%	Ash%	Fat%	Protein%	Carbohydrate%
A	26.94±0.03	1.37±0.02	4.18±2.03	11.45±0.73	56.05±1.35
B	34.73±0.01	2.51±0.10	9.60±2.09	6.71±0.06	46.45±2.15
C	33.95±0.02	2.89±0.03	8.90±0.88	7.83±0.12	46.41±0.77

Moisture

The moisture content of the product dawadawa pulp fruit flour bread increased from 33.95-34.73% with increase in the percentages (30% and 50%) of the pulp flour. This could be due the added pulp fruit which has been proven to have high affinity for moisture. The relative high moisture content of the product calls for proper packaging to prevent spoilage. However, the control had the lowest moisture content of 26.94%.

Ash

The control sample had 1.37% of ash content. However, the ash content (mineral) of the samples increased from 2.52-2.89% with increase in the percentage (30% and 50%) of the dawadawa pulp

fruit flour respectively. Ash is a non-organic compound containing mineral content of food and nutritionally its aids in the breakdown of the other compound (De humen, 2003). The high ash content of the product could be a source of the minerals which apart from its nutritional value are good for good skin and bones (Akinkugbe, 2009).

Fat

The fat content increased from 8.90-9.60% with an increase in the percentages dawadawa pulp fruit flour of (30-50%). The increase in fat content could be due to the increase of dawadawa fruit flour .The high fat content can cause rancidity to the products. The increase in the fat content could be a good source of energy to human body.

Protein

The control sample (A) had a protein content of 11.45%. However, the protein content of samples (B and C) decreased from 7.83-6.71% with increase in the percentages (50%-30%) of the dawadawa fruit flour. The decrease in protein content could be due to additional dawadawa fruit flour which may contain less protein. Protein content can be improved by reducing the percentage of the dawadawa fruit flour.

Carbohydrate

The control samples(A) had highest carbohydrate content of 56.05%.The carbohydrate content of sample (B and C) are almost the same or similar with their carbohydrate content of 46.45% and 46.41%. The decreased in carbohydrate content could be due to the low carbohydrate content of the dawadawa fruit flour.

Table 5: Sensory Analysis of the Bread

Samples	Colour	Texture	Aroma	Taste	Level of acceptability
A	4.48±0.40	4.86±0.40	4.50±0.61	4.84±0.46	4.82±0.43
B	4.32±1.01	4.16±0.88	3.46±0.99	4.08±0.89	3.68±0.91
C	4.26±0.94	4.30±0.95	3.76±0.74	4.28±0.75	3.50±0.86
LSD	0.897	0.326	0.828	0.673	1.501

Colour

The control sample (A) had mean score of approximately 4.0. However, the produced with 30% and 70% of Dawadawa fruit flour blends had a similar mean score of approximately 4.0.The colour of the control sample were not significantly ($p \leq 0.05$) different from all other bread samples (B and C) with the similar mean score of approximately 4.0, that is “like slightly”.

Aroma

Aroma is an attribute that influences the acceptance of the bread. The control sample had the highest score of approximately 5.0 that is “like very much”, followed by sample C with a score of approximately 4.0 that is “slightly like”. Sample B had the lowest rating according to the respondents with the mean score 3.0 that is “neither like nor dislike”. The control sample was significantly ($p \leq 0.05$) different from all other bread samples in Table below.

Texture

It was noticed that the texture of bread sample (B and C) with the mixture of 50% and 30% dawadawa fruit flour had an average score of 4.0 and was “like slightly” in texture. The control Sample (A) was significantly ($p \leq 0.05$) different from the bread

Conclusion

The results from the study indicate that dawadawa fruit pulp can be used to produce quality bread. Moreover, dawadawa fruit flour can be used as

samples produced with mean score of approximately 5.0 that is “like very much”.

Taste

The control sample had the highest taste score of approximately 5.0 which is “like very much”. This was similar to sample (B and C) which were “slightly like” with a taste score of approximately 4.0. This result proves that both samples were equally accepted in terms of taste. However, the control sample were significantly ($p \leq 0.05$) different from the other samples (B and C). From the results, it could be observed that up to 30% and 50% of substitution with dawadawa fruit flour could be accepted by the consumers.

Level of Acceptability

The attribute of the bread (Aroma, colour, texture and taste) can influence the overall acceptability of the product. There was significant ($p \leq 0.05$) difference between the control and other samples (B and C) in terms of acceptability. The control sample had the highest score of approximately 5.0 (like very much) and sample (B and C) had the lowest score of approximately 4.0 that is” like slightly”.

substitute with wheat flour up to 50% level in production of bread without any effects on the sensory attributes of the products and also, sample (B and C) has a common carbohydrate level. Bread

made from (70% wheat flour and 30% dawadawa fruit pulp) and 50% wheat flour with 50% dawadawa fruit pulp substitutions had average mean scores of approximately 4.0 and most of the attributes were accepted by the respondents. Besides the control sample, sample (B and C) respondents and had higher ratings in taste, aroma and texture with mean scores of approximately 4.0 for each attribute.

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