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# The Use of Prekese in Bread Making

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## ABSTRACT

The study sought to use prekese flour as composite flour in bread production. The objectives were to ascertain whether prekese can be used in the production of bread, evaluate the sensory characteristics of prekese bread and analyze consumers' level of acceptability of prekese bread. The researcher employed an experimental research design with a sample size of 54 respondents from the Department of Hospitality Management. The study used a questionnaire which was made up of open and close-ended questions to gather data. Microsoft Office Excel 2010 was used to analyze the data. The study concluded that the overall satisfaction of respondents was very high. Furthermore, the product under study was very tasty, smelt good and was highly accepted by the respondents as a developed product for the market. When respondents were asked what recommendation one would give regarding the use of prekese in making bread, most respondents indicated that sample C, which was 75% prekese flour and 25% wheat flour, is the best? The study further recommends that prekese bread should be introduced to the market because consumers would patronize the product.

**Keywords: Prekese; Bread; Flour; Potassium; Iron**

## INTRODUCTION

In recent years, functional foods, also known as nutraceuticals have gained popularity within health and wellness circles due to their highly nutritious health benefits. To Chiu, et al. they may protect against disease, prevent nutrient deficiencies, and promote proper growth and development [1]. According to Karelakis, et al. acceptance and the willingness to choose functional foods are dependent on several factors including the consumer's attitude, knowledge and motivation, health claim, sensory and non-sensory attributes, and socio-demographic variables [2]. In a study conducted by Amanfo, et al. it explained that spices are piquant or aromatic seasonings obtained from the bark, buds, fruits, roots, seeds or stems of various plants and trees [3]. In West Africa, a plant, botanically known as *tetrapleura tetraptera* and belongs to the family Fabaceae (formerly Leguminosae: *Mimosoideae*) and locally known in Ghana as 'Prekese' is used in variety of ways such as spice, medicine, and as a dietary supplement rich in vitamins. Chiu, et al. and Guiné, et al. reported on the chemical evaluation, nutritional and flavoring properties of 'Prekese' which contain varying amounts of protein, crude lipids, carbohydrates, crude fat and energy [1,4]. Studies have purported that a variety of local spices and/or ingredients have been used to prepare different meat products such as sausages and hamburgers [1,2,3]. Recent work by Acquah, et al. involving the use of 'Prekese' pod powder, as a spice in sausage and burger showed a promising result in the sensory characteristics and nutritional qualities of the products [5]. This study follows a similar approach to use 'prekese' in the preparation of bread. Reportedly, an under-utilized spice with characteristic fragrant and a piquant aromatic odour 'prekese' used as a popular seasoning spice in Ghana and other African countries [4,6]. Compared with other commonly used spices, it is a rich source of phytochemicals which contribute to its documented biological and pharmacological activities, including cardiovascular, anti-inflammatory, hypoglycemic, anti-hypertensive, anti-ulcerative, anti-microbial, and emulsifying properties [1,5].

Hence this study purports that the use of prekese in preparation of bread is healthy although not common in Africa. In Ghana, several soup and some dishes had been prepared with the use of prekese which includes goat soup, palmnut soup, and light soup. Also, local spices such as prekese can be used as

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nutritional or medicinal ingredient in drinks/tea. It was upon this backdrop that the current study intended to come up with a convenient preparation of prekese bread that could be easily eaten by students/workers for breakfast. The study also sought the sensory composition of prekese bread and the knowledge consumers have on the consumption of prekese bread in three different samples.

Research has revealed that 'prekese' is an essential plant that has been under-utilized in the catering industry. Considering its composition and additional value to consumers, it is necessary for the current study to research into this area and to investigate the importance of having to take in prekese. In addition, prekese is cooked in soup and fed to mothers to prevent postpartum contraction. It is also used to prevent certain types of ulcers, inhibit the growth of bacteria, as an anti-microbial, to reduce hypertension, to manage asthma, and to promote blood flow [5,7,8]. According to Addo-Beatson (2018), the fruit is used to prepare soup for mothers especially from the first date of birth to prevent post-partum contraction [7]. In Ghana, prekese has been used to flavor soft drink yet its usage in the preparation of bread is still not addressed. The current study recognizes that fruits and vegetables are the most perceived functional foods by most consumers. However, functional foods such as prekese contain components which may present a better and cheaper alternative for improving the general well-being of consumers. It has been noted that, prekese has been used as an ingredient in other foods and soup and pastries alike but not bread. This is a gap the current study seeks to address and posits that its usage needs to be encouraged. Further, this study is important because it provides for the awareness creation of the nutritional benefits from the consumption of prekese bread, be used as a guide and serve as an empirical data as it contributes to new knowledge.

## LITERATURE REVIEW

According to Acquah et al. prekese has been used in Ghana for so many years now [5]. The Akans in Ghana use the fruit in treating hypertension and diabetes as a traditional medicine [6]. Prekese has been known as a medicinal plant in Africa for periods; the therapeutic properties of the plant have been recognized since 1948 and authenticated in laboratory and field experiments [1,4,8]. The tree grows best in secondary forests and rainforests, but is also found in savannah woodlands and rarely in African plains as well. The plant is part of different cultures and regions. Therefore, according to the region you live in, it has different names, but the prekese term is the most dominant in Ghana and universally accepted, for instance, the Yoruba call it 'aridan' while prekese is in Twi language [8].

Prekese has been known as a medical plant in African countries, and the therapeutic properties of the plant have been documented since 1948, and authenticated in laboratory and field experiments. Prekese or Tetrapleura, Tetraplera is a species of the pea family, and is native to West Africa. The fruit of the plants have a strong aromatic smell. When dried and broken, prekese is burnt like incense to wade evil spirits. It produces a powerful smell that will even alert a passer-by. Additionally, the fruit's burning is a great symbol of power with exceptional traditional and spiritual significance. Prekese is highly nutritious as it is packed with essential phytochemicals and nutrients that are essential for our body. It is also rich in iron, potassium, calcium, zinc, phosphorus, flavonoids, tannins, steroids and phenolic compounds [1,5,6].

Prekese fruits contain key minerals and vitamins such as vitamin A, B, C and D, zinc, iron, potassium, calcium, magnesium, selenium etc. Prekese also contain approximately (234.42 g/cal to 379.48 g/cal) of dietary energy, 7.44% to 17.50% crude fat. The fruit has a pungent aromatic odor attracting it as a key species in soup, stew and as herbal medicine, among others. In modern Ghana, prekese is used in preparing one of the Ghana's favorite soups; Ebunu. Prekese is a great remedy when one is suffering from a cold. The best way to use the plant is to soak it in water. It is said to greatly relieve fever and body temperature. People also try this remedy when suffering from enema, constipation and emetic.

Prekese helps to reduce weight especially for those who gained too much weight [9]. When prekese is brewed, it is used in making tea, which has the ability to cleanse all the extra fats in the body. Therefore, one of the benefits of prekese tea is weight loss upon regular intake. It is preferred by many because it has no side effects. The plant is a rich source of vitamins, iron, calcium, potassium, zinc, and magnesium. It helps in strengthening the immune system. The presence of iron in the plant help in regeneration lost blood, zinc provides protections against the virus that leads to respiratory tract infections, while potassium and calcium help in managing, preventing, and controlling muscle disorders and bone strengthening.

## SENSORY COMPOSITION OF PREKESE BREAD

The looks of a food or beverage impact crave ability and acceptance, before the product touches the lips [2,4,6]. The appearance of a meal has shown impact on appetite stimulation or depression resulting in pleasure or total depression.

Colour is the visual appraisal of products, and is one of the important criteria to attract consumers [1,5]. Colour is an essential indicator of the quality of the product, as the appearance influences the acceptability by consumers. Prekese is a shiny, glabrous dark, has a grey/brown, smooth/rough bark with glabrous young branchlets. The flower is yellow/pink and racemes white the fruit has dark brown, four winged pods 12-25 cm × 3.5-6.5 cm. It is generally found in the lowland forest of tropical Africa. The fruit consist of a fleshy pulp with small, brownish-black seeds [3,8].

The plant has many traditional medicinal uses mainly in the management of convulsion, leprosy, inflammation and rheumatic pains. Infusion of the whole fruit is taken as a recuperative tonic [10,11]. The fruits and seeds are rich in some macro-element such as potassium, iron, magnesium and phosphorus but sodium content was low [12,13]. Based on the literature, this current study associated the product to have appearance as a sensory composition.

The bark, fruits, and leaves are also packed with medicinal agents. The fruit is rich in sugar and is used to flavor food, especially traditional West African soups, as well as a flavoring in desserts and baking [2,8,10]. The long hard fruit is dried and grated, or boiled into soup and removed before serving. In ad-

dition to being used as a seasoning, prekese is widely used as a medicine for many ailments. The fruits and flowers are also used as perfume in locally made products (**Figures 1-5**).

**Figure 1:** Raw prekese

**Figure 2:** Roughly cut prekese

**Figure 3:** Milled prekese

**Figure 4:** Prekese dough

**Figure 5:** Prekese bread

Aroma is volatile compounds which are perceived by the odor receptors of olfactory tissue of the nasal cavity. Aromatic compounds are released during the mastication process. Smell appraises the aroma of food that is important in the gratitude of flavor. A pleasant smell of prekese makes food delicious [1,3,5,12]. To provoke a sensation of smell, the stuff must be in a gassy state. The fruits of the plant have strong aromatic smell well insect repellant properties [10]. The smell is so strong that any passerby knows that somebody is cooking with or burning prekese, for this reason it is a symbol of power [14]. In addition, changes in fatty acid profile may be responsible for subjective firmness and sensory tenderness differences [4,8,10].

Study conducted in Ghana, Nigeria and Uganda by (Kemigisha, et al. and Lukin, et al.) resulted that scientific finding indicated the medicinal and nutritional properties of prekese which is vital for rural livelihood sustainability [11,13]. Results revealed the importance of prekese for medicinal and food uses in local communities and its potential for improving local livelihoods through its domestication [10,12,13].

## MATERIALS AND METHODS

To achieve the purpose of the study, a target population of student of Takoradi Technical University, Hospitality Management Department were used as respondents. Simple random sampling technique was used in this study to select respondents for this study. Thus, each individual in the population has an equal chance of being selected in the study [15]. Simple random technique was used because every element in the population contains the same kind of characteristics, requires minimal knowledge of the population, and the internal, as well as external validity, is high and it is easy to analyse data.

The materials used included prekese, flour, sugar, yeast and fat which were carefully measured and processed for the production of the product which is prekese bread. The study made three different samples of the product and presented them as sample A, B, and C. These samples were prepared with same ingredients but in different quantity.

The product was prepared at small scale kitchen (mini lab) of the Takoradi Technical University with the steps shown in the flow chart below. The prekese was first cleaned to remove sand particles, then, cut it into cubes. The prekese was further sun-dried for about 3 hours. The dried prekese was blended and sieved to get a smooth texture. The process has been outlined in the pictures for the production of prekese flour. It is appropriate to note that sample A, B, C all had same ingredients, however, the difference is the quantity used in the prekese bread (**Tables 1-3**).

**Table 1:** Sample A

| Sample A-100% Prekese flour bread | |
|---|---|
| **Ingredient** | **Quantity** |
| Prekese Flour | 600 g |
| Fat | 10 g |
| Sugar | 10 g |
| Yeast | 11/2 tbsp |

**Table 2:** Sample B

| Sample B-Prekese flour 50% Wheat flour 50% | |
|---|---|
| **Ingredient** | **Quantity** |
| Prekese Flour | 300 g |
| Wheat flour | 300 g |
| Fat | 10 g |
| Sugar | 10 g |
| Yeast | 11/2 tbsp |

**Table 3:** Sample C

| Sample C-Prekese flour 75% Wheat flour 25% | |
|---|---|
| **Ingredient** | **Quantity** |
| Prekese Flour | 450 g |
| Wheat flour | 150 g |
| Fat | 10 g |
| Sugar | 10 g |
| Yeast | 11/2 tbsp |

## ANALYTICAL MEASUREMENTS

The Table 4 shows the results obtained from the questionnaire that was distributed to the respondents with respect to their gender. The categories of gender were males and females. Their frequency was shown in the table and also the valid percentages were recorded. The majority of student respondents were females with a frequency of 32 (59.3%). The male student respondents were also 40.3% with a frequency number of 22 students.

**Table 4:** Respondents biodata

| Variables | Categories | Frequency | % |
|---|---|---|---|
| Age Groups | 18-25 | 40 | 74.1 |
| | 26-36 | 8 | 14.8 |
| | 37+ | 6 | 11.1 |
| Total | | 54 | 100 |
| Gender | Males | 22 | 40.7 |
| | Females | 32 | 59.3 |
| Total | | 54 | 100 |
| Marital Status | Single | 46 | 85.2 |
| | Married | 8 | 14.8 |
| Total | | 54 | 100 |

Further, the data in Table 4 revealed the age group of respondents with majority being 18-25 years representing 74.1%. Also, those who fell between the ages of 26-36 were 8 representing 14.8% and a lower percentage of 11.1, being 37 years and above.

Moreover, the marital status of the respondents was also received. The results showed 46 respondents were single, indicating 85.2% with 8 respondents indicating 14.8% as married students. As typical of universities and colleges, the age ranges and marital status is depicted in the respondents. Thus, higher percentage of the respondents being single and in the age bracket of 18-25 years. Hospitality programs has oftentimes been dominated by females hence the 32 for female.

### Usage of Prekese

Table 5 talked about the responses obtained from the respondents regarding the variables such as "ever seen prekese," "eaten prekese" ''possibility of obtaining flour from prekese.'' Respondents were made to select Yes/No to indicate their choice.

**Table 5:** Ways of using prekese

| Variables | Categories | F (%) |
|---|---|---|
| Have you ever heard or seen prekese before? | Yes | 51 (94) |
| | No | 3 (6) |
| Total | | 54 (100) |
| Will you eat prekese? | Yes | 46 (85) |
| | No | 8 (15) |
| Total | | 54 (100) |
| Is it possible that flour can be obtained from prekese? | Yes | 36 (66.7) |
| | No | 18 (33.3) |
| Total | | 54 (100) |
| Do you think prekese can be used in the preparation of bread? | Yes | 42 (77.8) |
| | No | 12 (22.2) |
| Total | | 54 (100) |

In Table 5, four items measured the ways of using prekese in the production of bread. The questions basically demanded from the respondents to ascertain whether they had knowledge of prekese being used in bread production. The respondents were to respond to each question by ticking 'Yes', or 'No' as represented in the Table. The results showed that, for the first question, 51 (94%) respondents responded Yes and 3 (6%) responded No. This shows that majority of the respondents have heard or seen prekese before, and only a hand full has not.

With majority of the respondents being affirmative, it revealed 46 (85%) as Yes with only 3 respondents saying No. Using the majority of the response, it is believed people would consume prekese made products.

Further, the third question showed 36 and 18 responded Yes and No respectively, that is when respondents were asked to state their views regarding the possibility of obtaining flour from prekese to make bread. Though 33.3% of the data showed that prekese flour could not be made, a higher figure of 66.7% of the respondents agreed that prekese flour could be made.

The final question in Table 5 required respondents to share their opinion on whether prekese flour could be used in the production of bread. A total of 42 respondents with a percentage of 77.8 recorded 'Yes'. This is in line with empirical data in a study conducted by Adanse et al. (2020) that used processed prekese flour in making two samples of garden-egg soups and sauces [8].

## SENSORY EVALUATION AND ACCEPTABILITY OF PREKESE FLOUR PRODUCTS

As indicated earlier, all samples have same ingredients but different quantity. Sample A is 100% prekese flour bread, sample B 50% wheat flour, 50% prekese flour and sample C 75% wheat flour, 25% prekese flour. The difference in quantity was to help solicit response from the respondents regarding taste, texture, smell and feel using the 5-Likert scale.

The Figure 6 shows the summary results of the sensory evaluation for Sample A, Sample B, and Sample C. For the Sample A, the summary results showed that 69% of the responses disliked the prekese bread. Meaning, the sensory evaluation of Sample A which consisted of (appearance, colour, taste, flavor, and texture) was proven to be disliked very much by the students, therefore, Sample A is unacceptable. Most often than not, Ghanaians use prekese for soups, sauces and stews and therefore could not be accepted when used for bread. For Sample B, the data showed that 70% of the responses neither liked nor disliked the prekese bread (Sample B). Therefore, the sensory evaluation of Sample B may or may not be accepted by the students. Finally, the responses for Sample C showed that 83% of the respondents liked very much the prekese bread. It worth noting that, Sample C was made up of 75% prekese flour and 25% wheat flour and that had the highest acceptability number.

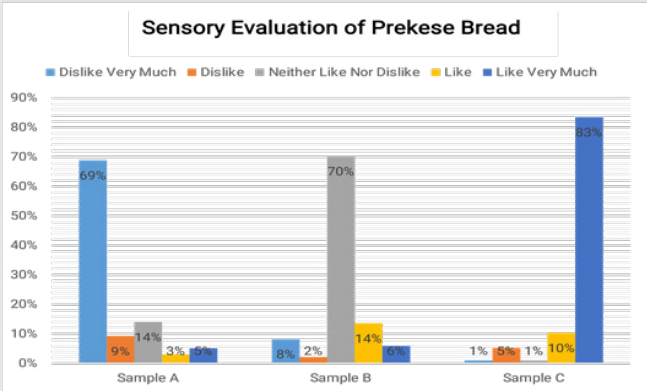


**Figure 6:** Sensory evalution

## KNOWLEDGE OF PREKESE BREAD PREFERENCE

The table below shows the data gathered on the consumers preference regarding prekese bread. When respondents were asked ''will you encourage the use of prekese flour in the preparation of bread?'', ''would you recommend prekese flour in bread making commercially?'' ''which sample would you recommend for commercial sale?'', their responses are tablated in **Table 5**.

The **Table 6** shows the responses from the survey. The researchers represented gave the respondents two options which are in the category column in the table. They are 'Yes' and 'No'. The researchers asked the respondents if they would encourage the use of prekese four in the preparation of bread. The responses showed that, 77.8% said yes, whereas 22.2% responded no. Further, the researchers enquired if the respondents would recommend prekese flour in bread making commercially. The responses showed that 77.8% of the respondents said yes whereas 22.2% said no. Also, the researchers asked the respondents which sample they would recommend for commercial sale. The responses showed that 57.4% of the respondents said they would recommend Sample C, 31.5% of them said they would recommend Sample B, while 11.1% of them said they would recommend Sample A.

**Table 6:** Prekese bread preference

| Variables | Categories | Frequency (%) |
|---|---|---|
| Will you encourage the use of prekese flour in the preparation of bread? | Yes | 42 (77.8) |
| | No | 12 (22.2) |
| Total | | 54 (100) |
| Would you recommend prekese flour in bread making commercially? | Yes | 42 (77.8) |
| | No | 12 (22.2) |
| Total | | 54 (100) |
| Which Sample would you recommend for commercial sale? | Sample A | 6 (11.1) |
| | Sample B | 17 (31.5) |
| | Sample C | 31 (57.4) |
| Total | | 54 (100) |

## RESULT AND DISCUSSION

As a follow up question, respondents were asked the product sample they preferred and greatest of the respondents said they would prefer sample C. Secondly, it required respondents to share their views on recommendations they would give upon the use of prekese in the production of bread. It was seen that most of the respondents chose to recommend Sample C. This could be attributed to sensory characteristics associated with it as higher percentage of the respondents stated, as paraphrased "Sample C, because the taste of the prekese is felt in the mouth." However, others are of the view prekese bread would be recommended due to the health benefits associated with prekese consumption. This can be supported by Adanse et al. who reported in their findings that prekese is a species of the pea family with various medicinal benefits. Similarly, Teye et al. found out that the purpose of plant tetrepleura tetraptera (prekese) is used as a dietary supplement and its sweet fragrance of prekese is highly valued by most Ghanaians [8,15].

## CONCLUSION

The study found out that prekese flour can be used in the preparation of prekese bread. This notwithstanding, the study recommend prekese flour should be mixed with a percentage of wheat flour to obtain good prekese bread. In this wise, it can be produced commercially on the Ghanaian market. Further, the study also found out that prekese bread adds a good appearance, taste, colour, flavor, texture and aroma, hence, consumers are encouraged to patronize it. Further, based on the findings, the study recommends that prekese bread should be consumed on normal basis due to its nutritional and health benefits. The Ministry of Food and Drugs Authority of Ghana should also encourage small size entrepreneurs in the use of prekese for bread making and certify sale of it.

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## CONFLICT OF INTEREST

The author declares that there no conflict of interest regarding the publication of this paper.

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