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Production of Cake Using Herbs and Spices As Flavourants (Cloves, Ginger, Lemongrass)

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ABSTRACT: Herbs and spices come from different parts of the plant, and are used to impart an aroma and taste to food. Several herbs have therapeutic properties such as anti-oxidative, anti-inflammatory, antidiabetic, antihypertensive and antimicrobial activities. Therefore, using herbs and spices as flavorants in baked goods could help to provide nutritional and medicinal values. Also, herbs and spices are used to improve the appearance and attractiveness of the baked goods for consumers and to increase the sale of these herbs. It is in this light that a study was carried out on the production of cakes using herbs and spices such as cloves, ginger and lemongrass as flavours. Cakes were baked using cloves, ginger, lemongrass and vanilla and given to a panel of 20 respondents for sensory evaluation. Water was provided to each panellist for thorough mouth rising after evaluating each sample to avoid confusion in perception of the qualities examined (taste, appearance, smell, overall acceptability). The sensory evaluation form used was the 9-point hedonic scale and panellists' identities were kept private, in line with the research ethics. Results obtained from the sensory evaluation showed the sensory analysis (mean scores) of prepared samples A (flavoured with clove), B (flavoured with ginger), C (flavoured with lemon grass) and D (flavoured with vanilla). Mean scores were calculated using the Microsoft excel software, 2016 version. For sample A, the mean scores obtained for appearance, taste texture, smell and overall acceptability were 8.50, 8.55, 8.55 and 8.60. For sample B the mean scores were 8.40, 7.85, 8.40, 7.75 and 8.25 respectively. The mean scores for the attributes in sample C were 8.45, 8.25, 8.30, 8.25 and 8.50 respectively. For sample D, mean scores were 8.35, 8.20, 8.35, 8.30 and 8.50 respectively. The study found that majority of the respondents accepted cake flavoured with cloves than other flavours. Therefore cakes can be flavoured with natural, rather than artificial flavours.

Keywords; Cake, Lemongrass, Cloves, Ginger, Sensory Evaluation, Flavouring Agent.

Introduction

Herbs and spices have been used to fortify foods throughout history as preservatives, flavour and therapeutic agents. Although herbs and spices are low-cost commodities, they are nowadays valued as gold or jewels. Herbs and spices were used by the ancient Egyptians and have been used for centuries in India and China. Today, herbs and spices can be used to increase the acceptability of foodstuffs and improve their health. The World Health Organization survey pointed that 70 – 80% of the world population depends on modern medicine mainly from herbal sources in their healthcare systems (Chan, 2003). Moreover, 80% of population in developing countries and up to 60% of the world's population depends directly on herbs and plants for their medical benefits (Shrestha and Dhillon, 2003). The first scientific research on the influence of spices as preservative was presented in the 1880s and display the antimicrobial properties of cinnamon oil against *Bacillus anthracisspores* (Tajkarimi et al., 2010).

Also, herbs and spices have been utilized as food additives all over the world, not only to enhance the organoleptic properties of food, but to also increase the shelf life by decreasing or eliminating the foodborne pathogens (Lai and Roy, 2004). Several studies have recommended the use of dietary herbs and spices for their beneficial effects on human health through their antimutagenic, anti-inflammatory, antioxidative, and immune modulatory properties (Conn, 1995). A dietary guideline refers to the utility of herbs as excellent source of antioxidants and as salt alternatives (Tapsell et al., 2006).

The use of herbs and spices has been incredibly important throughout history. Many were celebrated for their medicinal properties, well before culinary use. Modern science has now shown that many of them do indeed carry remarkable health benefits. In general use, herbs are plants with savoury or aromatic properties that are used for flavouring and garnishing food, medicinal purposes, or for fragrances. Culinary use typically distinguishes herbs from spices.

Many people use the terms interchangeably to mean any product of plant origin used primarily for seasoning food. Technically, herbs come from aromatic plants grown in the temperate zone. Herbs are the fresh and dried leaves generally of temperate plants and are usually green in colour while spices are the flower buds, fruits, seeds, barks, berries and roots typically of tropical plants and range from brown to black to red in colour. In general, spices have a more pungent flavour then herbs. It is possible for one plant to provide a herb and a spice. For example, for the plant of *Coriandrum sativum*, the leaves are used as the herb cilantro while the seed is used as the spice coriander. (PennState Extension, 2007). This study sought to use herbs and spices as flavourants in baked products as an alternative to artificial flavours. Specifically, the study actually focused to: Find out the various spices which can be used as

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flavourants in baked products; educate the population about herbs and spices as flavourants in baked products; evaluate the sensory attributes of baked goods using herbs and spices as flavourants.

Methodology

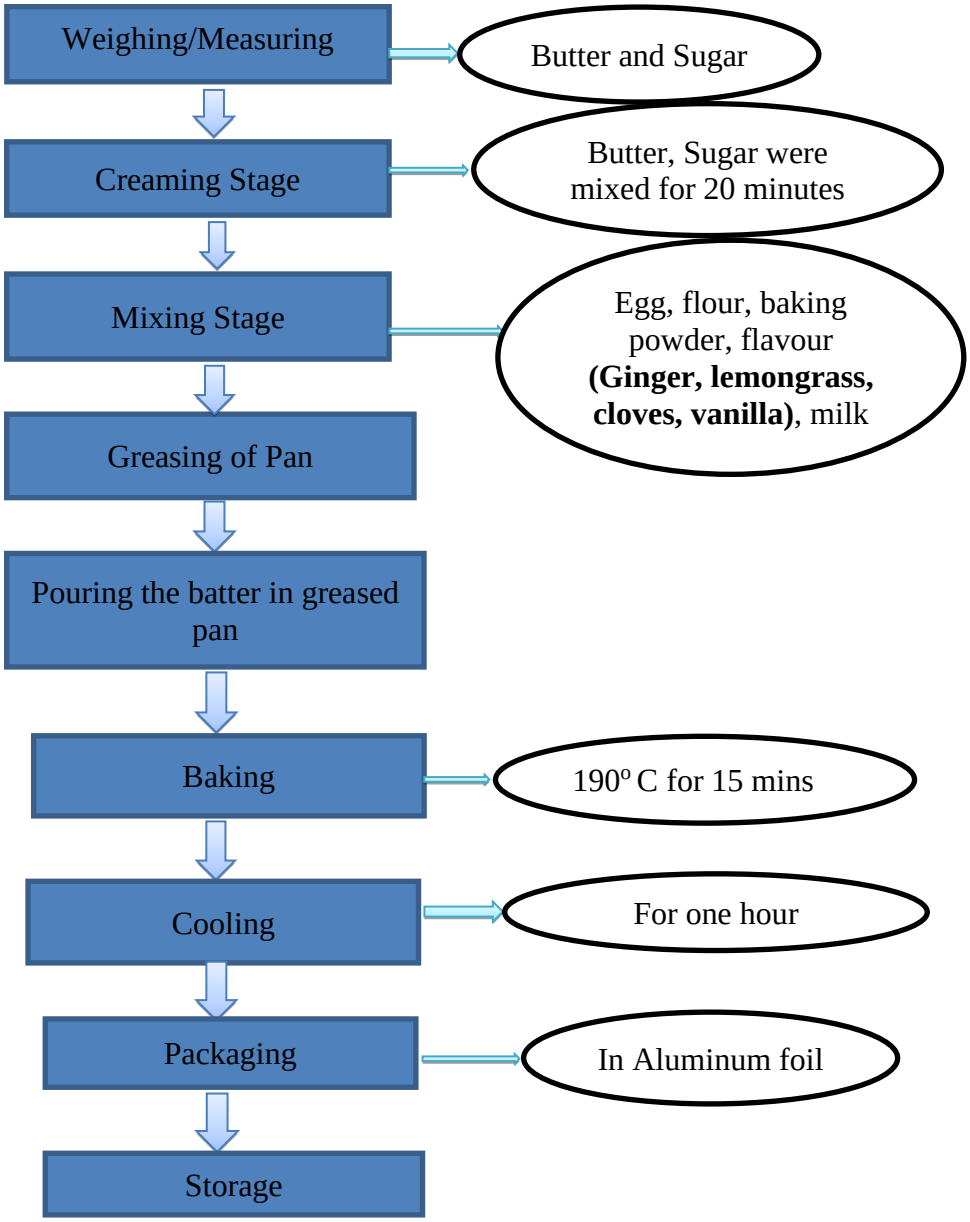

Figure 1. Process flow diagram for cake production

Method

Ingredients for each plain cake

- 2 cups of flour
- $^1/_2$ cup of sugar
- 1 cup butter
- 3 eggs
- 3 teaspoon baking powder
- 2 teaspoon Flavouring **(Ginger, lemongrass, cloves, vanilla)**
- 1 cup of diluted milk

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The oven was pre-heated**.** Thereafter butter, sugar were measured and put in four bowls. The mixtures were creamed using a wooden spoon until fluffy. Afterwards egg was whisk and added to the mixtures bit by bit. Flour and baking powder were then sieved and folded into the respective mixtures. One flavour each (Ginger, lemongrass, cloves, vanilla) was measured and added to the mixtures. Milk was then added. After this the baking pans were greased and **t**he batters or mixtures were poured in the greased pan. The mixtures were put in the oven and baked for 15 minutes at 190^{o} C. After this time, they was removed and allowed to cool. The cakes obtained were packaged and stored.

Results and discussion

The sensory analysis (mean scores) of prepared samples A (flavoured with clove), B (flavoured with ginger), C (flavoured with lemon grass) and D (flavoured with vanilla) were evaluated and scored on a hedonic scale of 1 (Dislike extremely) to 9 (Like extremely). Mean scores were calculated using the Microsoft excel software, 2016 version. The results obtained are presented on Table 1 below:

Table 1: Sensory analysis of prepared cake samples A, B, C and D

Sensory property	SAMPLE A Clove	SAMPLE B Ginger	SAMPLE C Lemon grass	SAMPLE D Vanilla
Appearance	8.50	8.40	8.45	8.35
Taste	8.55	7.85	8.25	8.20
Texture	8.55	8.40	8.30	8.35
Smell	8.30	7.75	8.25	8.30
Overall acceptability	8.60	8.25	8.50	8.50

The values on Table 1 are the mean scores obtained from 20 trained panellists drawn from various works of life in CHITECHMA University, for all the sensory attributes evaluated. For sample A, the mean scores obtained for appearance, taste texture, smell and overall acceptability were 8.50, 8.55, 8.55 and 8.60. For sample B the mean scores were 8.40, 7.85, 8.40, 7.75 and 8.25 respectively. The mean scores for the attributes in sample C were 8.45, 8.25, 8.30, 8.25 and 8.50. For sample D, mean scores were 8.35, 8.20, 8.35, 8.30 and 8.50. A comparative analysis of the attributes was carried out and it showed that the sample with the least attractive appearance was sample D (flavoured with vanilla), while that with the most attractive appearance was sample A (flavoured with clove), as shown on figure 2.

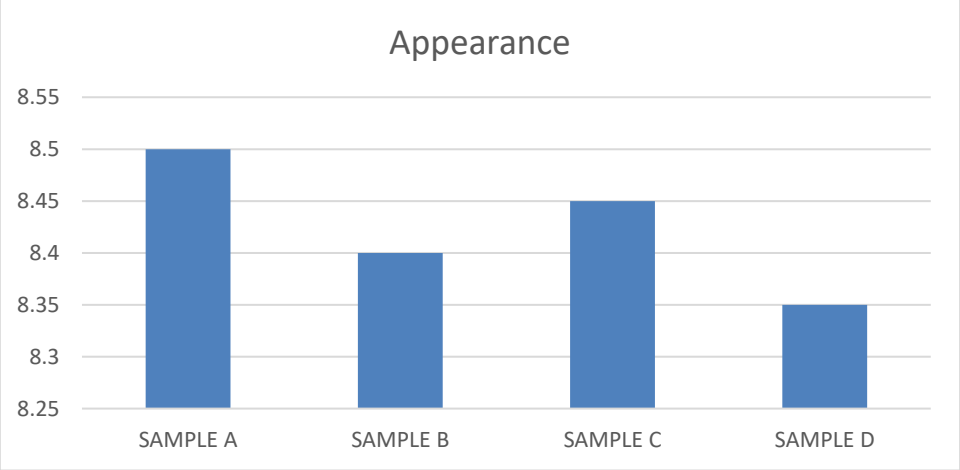

Figure 2: Showing respondents' preferences for appearance of the various samples

As far as taste is concerned, sample A was most desired by the respondents, while sample B was least desired. According to the results, samples C (flavoured with lemon grass) and D (flavoured with vanilla) were not too different in taste as shown on figure 3.

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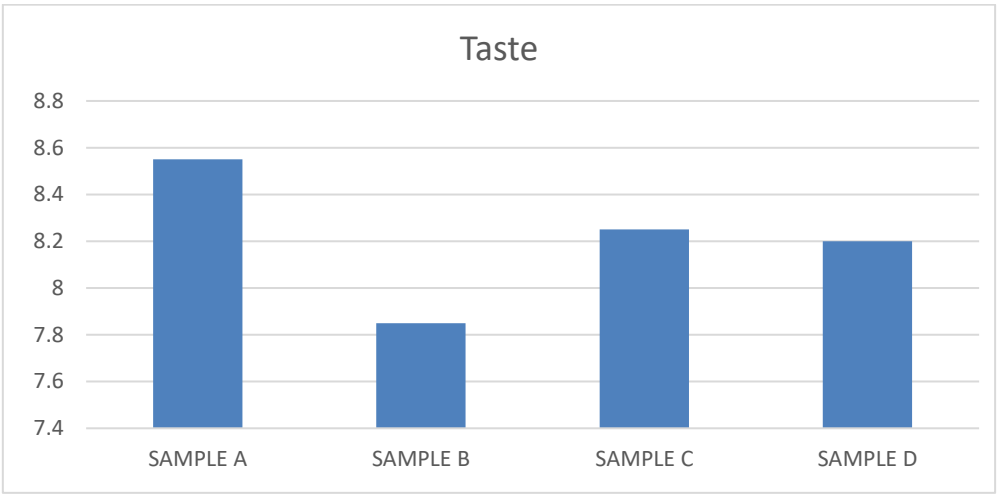

Figure 3: Showing respondents' preferences for taste of the various samples

From the results obtained, sample A had the best texture while sample C had the worst as shown on figure 4.

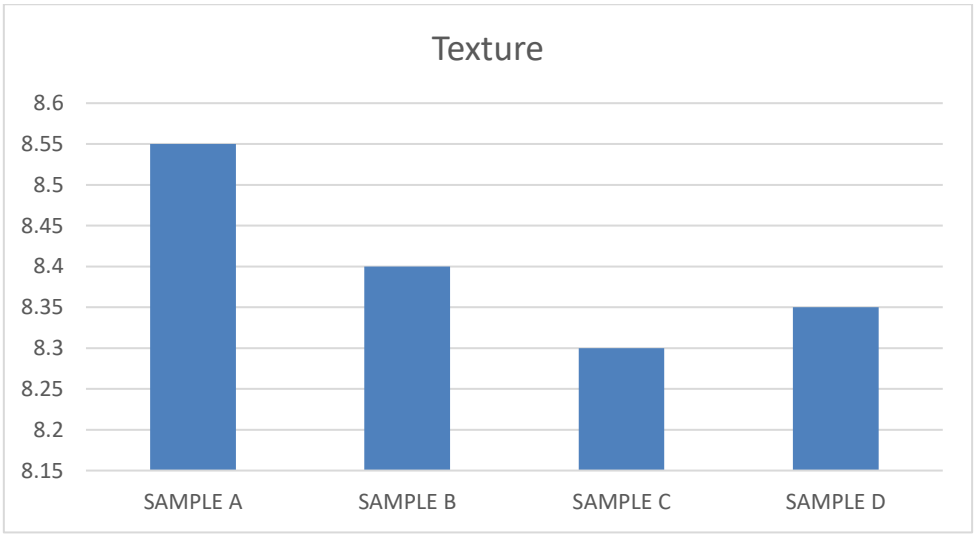

Figure 4: Showing respondents' preferences for texture of the various samples

With regards to smell, the results obtained (figure 5) showed that samples A and D, flavoured with clove and vanilla respectively were most preferred by evaluators while sample B, flavoured with ginger was least preferred.

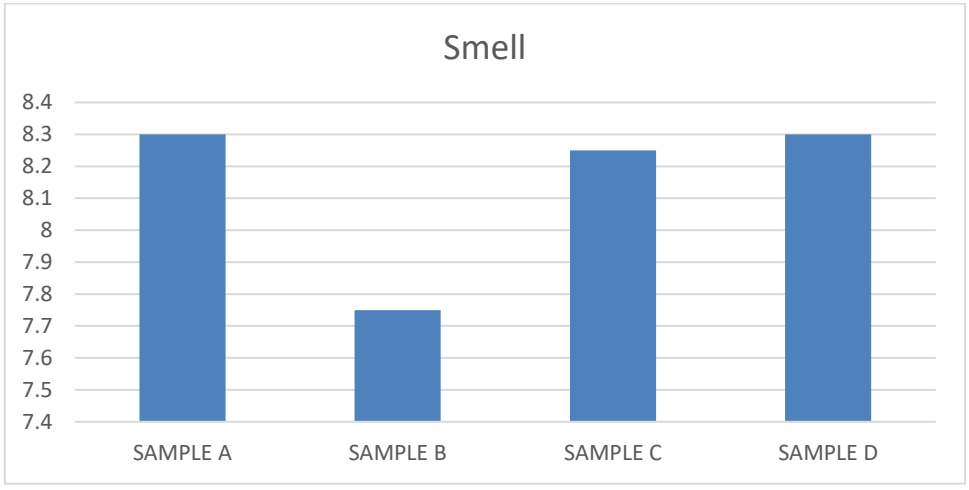

Figure 5: Showing respondents' preferences for smell of the various samples

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Overall, sample A, flavoured with clove was the most preferred of the samples (mean score 8.6), while sample B, flavoured with ginger was the least preferred. Samples C and D had equal preference (mean score 8.5). These results are shown on figure 6.

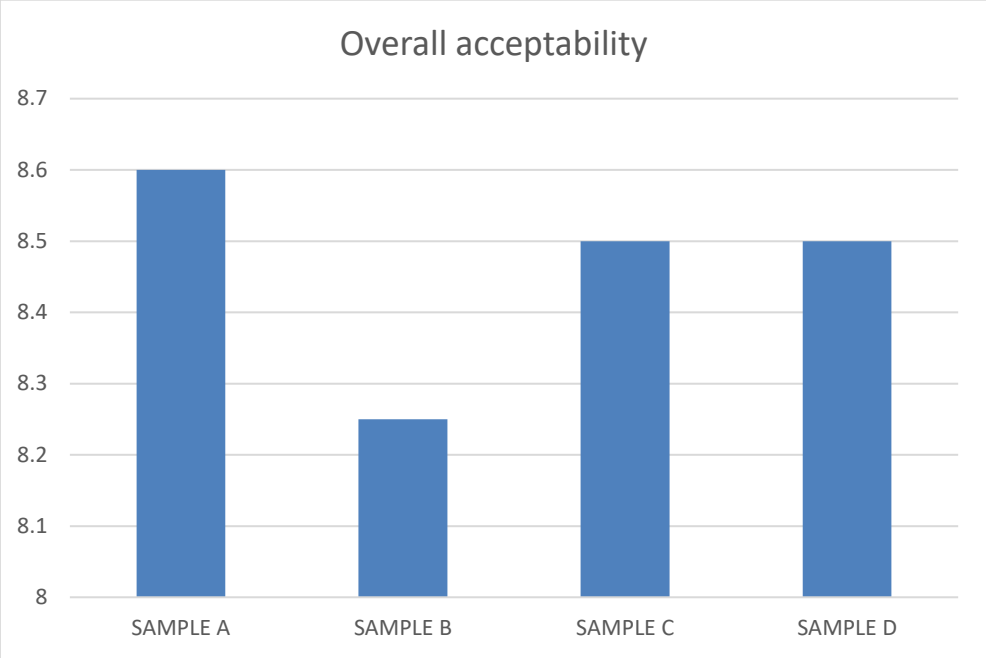

Figure 6: Showing respondents' overall acceptability of the various samples

Discussions

Appearance refers to the way something looks that is the act or fact of appearing, as to the eye or mind of a person, (Oxford dictionary). From figure 5 above, it can be seen that the sample with the most attractive appearance was sample A (flavoured with clove). This is because cloves contain *eugenol* and it is well known that in a complex system such as cakes, several ingredients interact and pair with each other and this affects the sensory properties. (Merr and Perry, 2021).

Taste refers to sensation perceived by the tongue which includes sweet, salty, sourness and bitterness (Goldsmith, 2008). As far as taste is concerned, it can be seen that sample A was most desired by the respondents, while sample B was least desired. This is because a major component of clove taste is influenced by the chemical *eugenol* and the quantity of the spice required is typically small. (Merr and Perry, 2021).

Texture is the physical feel of something; smooth, rough, fuzzy, slimy. Texture has to do with how an object feels and its ingredients. From the study It can be seen that sample A had the best texture while sample C had the worst. However, it should be noted that flavour is not a function of texture. The texture of food is determined by its constituents such as sugar, lipids, proteins, etc. therefore the difference in texture observed in this study could have been due to slight variances in preparation of the different samples.

Smell is often expressed as a combined sensation perceived through the chemical senses of taste and aroma as well as chemical irritation in the buccal cavity. Base on the results obtained, samples A and D, flavoured with clove and vanilla respectively were most preferred by evaluators while sample B, flavoured with ginger was least preferred. According to Merr, And Perry, 2021, Cloves are aromatic flower buds of a tree in the family *Myrtacear*, *Syzygium aromaticum* and its botanical name is *Eugenia aromatic*. Cloves have natural flavour compounds such as eugenol and polyphenols. These compounds and others present in clove is what contributed in the pleasant smell of sample A. for sample D, vanilla was used as flavour. It is a plant extract which has a pleasant smell, is popularly used to flavour cakes and other baked products and is cherished by most people. Sample B, flavoured with ginger was the least preferred, of all the flavours used. This is because ginger rather has strong and not pleasant flavours as far as flavouring cakes is concerned.

Overall acceptability; sample A, flavoured with clove was the most preferred of the samples (mean score 8.6), while sample B, flavoured with ginger was the least preferred. Samples C and D had equal preference (mean score 8.5). It can thus be concluded that clove can be conveniently used as flavour for cakes since it is natural and contain component like eugenol, has a good flavour and many people like it. On the contrary, ginger was not very much accepted by the evaluators thus, it would not be advisable to use it to flavour cakes especially for commercial purposes. It could however be used by individuals who cherish it, to flavour their cakes at home.

Conclusion

The study concluded that herbs and spices can be used as flavourants in cake making since they are natural and have not undergone any processing; the natural components and flavours are still in place. The taste, smell, appearance, texture and overall acceptability of cake flavoured with cloves were acceptable and preferred to the other flavoured cake. Respondents said cloves cake was tasty and nutritious and had a perfect texture. The other flavours like ginger and lemongrass can still be used but not for commercial purposes but for individuals who cherish it to flavour their cakes at home.

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