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PHILIPPINE CITRUS FRUIT EXTRACTS ON BAKED BREADS: A QUALITATIVE OBSERVATION

RAMON S. DUENAS*

*TLE Faculty, College of Education, Nueva Ecija University of Science and Technology, Cabanatuan City,
Philippines

ABSTRACT

The focused of the study was on the qualitative descriptions based from careful observation of the effects of adding citrus fruit extracts on the mixture of bread. An experimental method was applied, ingredients and utensils were carefully prepared, and local Philippine citrus fruits were meticulously selected. Extraction of the citrus fruit extracts were diligently done before preparing the mixture of the bread to be baked. After preparing six different mixtures, the extracted citrus fruit extracts were poured unto the molder and mix with the bread mixtures, this having five different treatment with another mixture without any fruit extract on it. The six treatments were baked, cooled and pack for a five day observation. Results showed that the citrus fruit extracts hampered the development of molds on the surfaces of the baked breads thus lengthening the shelf life of the bread.

Keywords : Baked bread, citrus fruits, fruit juice extracts, molds, treatments

INTRODUCTION

Food is man's basic need for survival and since time immemorial; people have depended on plants for their source of food and medicine. [2] At present generation when man were very active as they involved in so many physical activities, source of energy particularly foods rich in carbohydrates were of high demand. One of the common sources of carbohydrates readily available were bread. As known since the early age, bread is a staple food prepared from grains which underwent a process such as flouring, doughing and baking.[4] To save more time for other important activities of man, bread preservatives became relevant and need. Through the discovery of yeasts, sugar, salt and other common preservatives bread can now last for several days. But health conscious people refrained from consuming commercial breads for fear of the preservatives used in lengthening its shelf-life as bread contains fat, flour treatment agent, bleach, reducing agent, emulsifiers, and a lot more preservatives. [6] Thus labeling on food package became a requirement in bread industry to inform the public of

the types of preservatives used. [3] Even how much man deviate from taking preservatives through food consumption, preservatives are needed to prevent molds from easily developing on the bread which causes the eventual spoilage. Accordingly, [5] [7] molds are kinds of fungi and they appear in different colors specially if they developed on foods like bread. Each mold has distinct color which basically differentiated it from other types of mold. Preservatives from natural sources are highly sought and most preferred especially for bread making. Thus this study experimented on the use of citrus fruits as sources of natural citric acid as preservatives. It tried to qualitatively describe how citric acid from locally available citrus fruits affects the condition of baked breads.

THE PROBLEM

This study described qualitatively the effects of Philippine citrus fruit extracts on the growth of molds on baked breads.

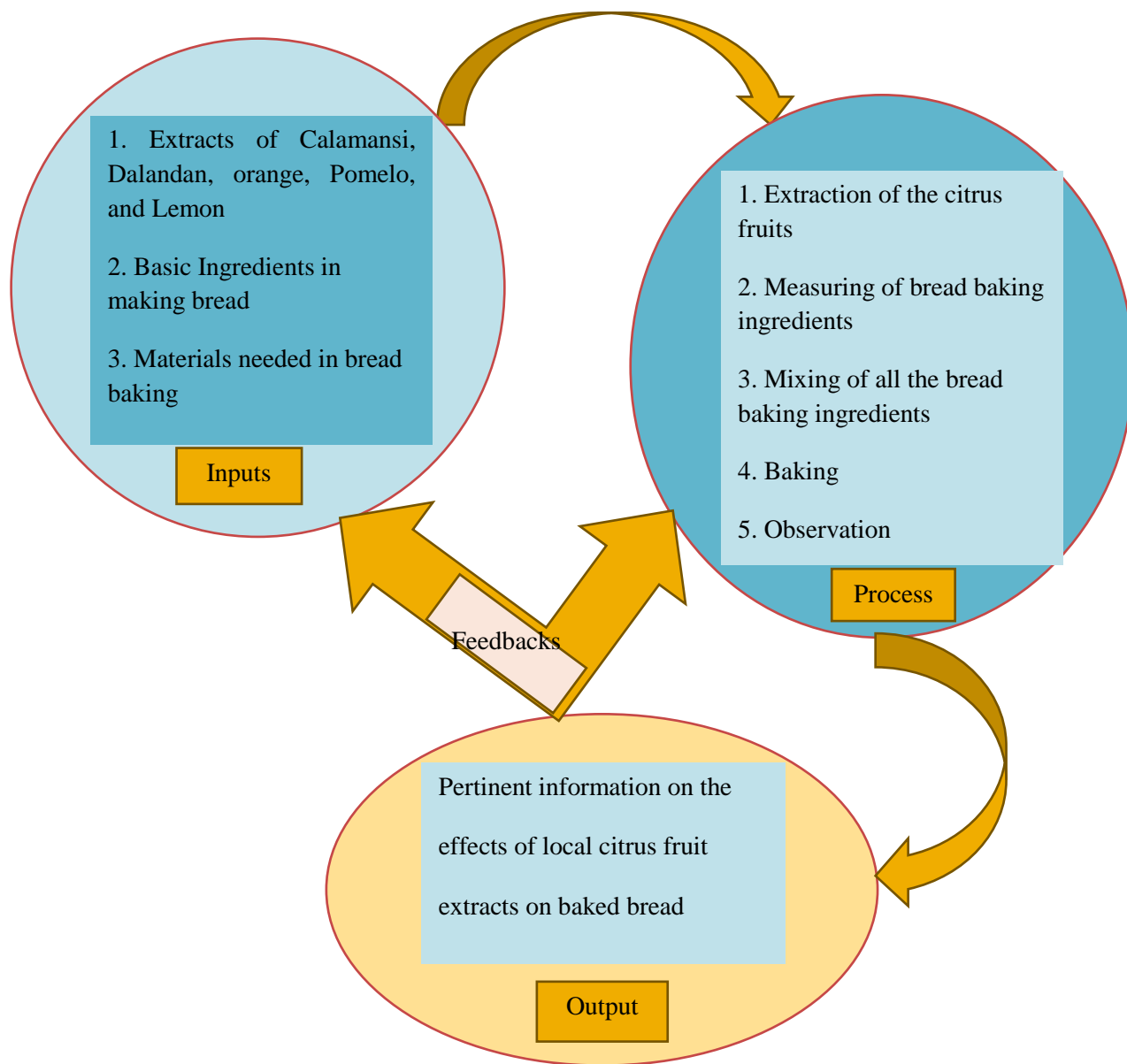
Specifically, the study sought answers for the following questions:

1. How may the baked bread prepared in 5 Treatments of citrus fruit extracts be compared in terms of?
 - 1.1 Color of molds,
 - 1.2 Number of molds identified through colors,
 - 1.3 Rate of molds reproduction, and
 - 1.4 Shelf life of bread?
2. How may the observed quality of baked bread with citrus fruit extracts be compared with baked bread without fruit extracts?
3. Which of the experimental fruit extracts can best protect the baked bread from rapid mold development?

HYPOTHESIS

Based from the above stated questions, the study hypothesized that the color of molds, number of molds identified through color, rate of molds reproduction and shelf life of the baked bread have no significant differences under the 6 treatments T₁, T₂, T₃, T₄, T₅, and T₆.

Figure 1: The Research Paradigm of the Study



SCOPE AND DELIMITATION

This study basically include extracts of five local Philippine citrus fruits namely Calamansi, Dalandan, Orange, Pomelo, and Lemon as an aggregate ingredient in bread baking. The palatability of the baked bread with extracted citrus fruits was tasted and judged by Technology and Livelihood Education (TLE) teachers, TLE students and guest juries. The actual baking and observation were all occurred and done at TLE laboratory room of the College of Education.

METHODS AND PROCEDURE

Research Method

The researchers made use of the experimental method of research [1] by direct application of the extracted citrus fruits juices with the mixture of bread ingredients before baking the bread. With the fruit juices mixed with the bread mixture, the solutions prepared in five set-ups were baked. This was done to gather information on the direct effect of the citrus fruit juice on the bread. Data gathering was done through observation that is taking into account the observed effects on the bread after specified days of observations.

Materials

1 table spoon of fruit juice extracts from each of the sample local Philippine citrus fruits namely Calamansi, Dalandan, Pomelo, Lemom, and Orange

3 $\frac{3}{4}$ cups of all purpose flour, 1 $\frac{1}{2}$ cups milk, 2 pieces eggs, 1 $\frac{1}{3}$ cups margarine, $\frac{1}{2}$ tsp. salt, and 3 tsp. baking soda, baking molder, tray, packaging materials, oven and mixing utensils

Procedure in Extracting the Citrus Fruit Juice

1. Prepare all the citrus fruits including calamansi, dalandan, pomelo, orange, and lemon.
2. Cut every fruit into the center, then squeeze to obtain pure juice of each of the citrus fruits.
3. Measure 1 table spoon of each sample citrus fruit and set aside

Procedure in Baking Bread with Citrus Fruit Extracts

1. Pre-heat the oven to 350°C.
2. Combine 3 $\frac{3}{4}$ cups flour, 3 tsp. baking powder, and $\frac{1}{2}$ tsp. salt. Mix until well blended.
3. Measure 1 $\frac{1}{3}$ cups margarine and mixed with the blended flour, until the mixture resembles course meal.
4. Combine 1 $\frac{1}{2}$ cups milk and 2 eggs. Mixed just enough to produced and moisten the dough.
5. Pour each of the five citrus juices in every designated mixture to make five different sample mixture of bread with citrus fruit extracts. A sixth mixture was prepared but without any of the five citrus juices thus it was referred to as the control mixture. Each sample bread mixture with each juice extract was tagged as follows:

- T₁ for bread mixture with Calamansi extract
- T₂ for bread mixture with Dalandan extract
- T₃ for bread mixture with Orange extract
- T₄ for bread mixture with Pomelo extract
- T₅ for bread mixture with Lemon extract
- T₆ for bread mixture without any fruit extract at all

6. Apply margarine into each molder before putting in the produce dough.
7. Set into the oven until it is done, remove from the molder and set aside to cool.

Method of Comparing the Baked Bread with Citrus Extracts and the Control Treatment

1. Once the baked bread was cooled, the six bread were secured into similar container separately.
2. Observation started during the first day when the sample breads were baked and marked it as day 1. Observation continued up to five days.
3. In recording the observation, matrix was used to clearly show the everyday observations of each of the six treatments. The matrix is a table where columns for color of molds, count of molds through color, rate of reproduction of molds, and shelf life were provided to easily find the differences in the observations made within 5 days

RESULTS AND DISCUSSION

Table 1: Observed Color of Molds from day 1 to Day 5

Number of observation	T ₁ Calamansi	T ₂ Dalandan	T ₃ Orange	T ₄ Pomelo	T ₅ Lemon	T ₆ (Control)
Day 1	No reaction	No reaction	No reaction	No reaction	No reaction	No reaction
Day 2	Yellowish	Yellowish	Yellowish	Yellowish	Yellowish	Yellowish
Day 3	White	White	White	White	White	White with tiny Black spot
Day 4	White with tiny Black spot	White with tiny Black spot	White with tiny Black spot	White with tiny Black spot	White with tiny Black spot	Black
Day 5	Black	Black	Black	Black	Black	Black

Table 1 shows the observed color of molds on the surfaces of the sample baked breads. Results showed that at day 1, there was no observed reaction on the baked pieces of bread with citrus fruit extracts and the treatment without. On the second day, the surfaces of all the bread samples representing treatments 1-6 became yellowish while on the third day the colors all turned white except treatment six with tiny black spots. On day 4, the surfaces of all the five treatments with citrus fruit extracts were still white but with tiny black spot while the control treatment turned black. On the fifth day, all of the surfaces of the six treatments were colored black.

Data revealed that the treatments with citrus fruit extracts lasted up to five days before it totally spoiled as manifested by the black molds on the surfaces of the treatments. However, the treatment without citrus fruit extract started showing black mold on day 3.

Table 2: Observations on Number of Molds Based on Appearance of Colors

Number of observation	T₁ Calamansi	T₂ Dalandan	T₃ Orange	T₄ Pomelo	T₅ Lemon	T₆ (Control)
Day 1	No reaction	No reaction	No reaction	No reaction	No reaction	No reaction
Day 2	No reaction	Yellowish	Yellowish	Yellowish	Yellowish	One type of mold (white)
Day 3	One type of white mold	One type of white mold	One type of white mold	One type of white mold	One type of white mold	Two types of mold (white, black)
Day 4	Two types of mold (white, black)	Two types of mold (white, black)	Two types of mold (white, black)	Two types of mold (white, black)	Two types of mold (white, black)	Three types of mold (white, yellow, black)
Day 5	Three types of mold (white, yellow, black)	Three types of mold (white, yellow, black)	Three types of mold (white, yellow, black)	Three types of mold (white, yellow, black)	Three types of mold (white, yellow, black)	All the bread turned black

Table 2 shows the observed appearance of various molds as indicated by the colors appeared on the surfaces of the six treatments. As can be seen from the table, there was no observed reaction on day 1. On day 2, the treatment with Calamansi extract still has no molds on the surface but the surfaces of the treatments with Dalandan, Pomelo, Orange and Lemon fruit extracts turned yellowish while the surface of the treatment without fruit extracts showed one type of white mold. On day 3, the surfaces of all of the five treatments showed one type of mold represented by white color while the sixth treatment was observed having 2 types of mold with colors

white and black. On the fourth day, all of the five treatments with citrus fruit extract developed two types of mold with colors white and black while the treatment without citrus extract developed three types of molds on the surface with colors black, white and yellow. Finally, on the fifth day, all of the five treatments with citrus fruit extracts has 3 types of molds on their surfaces with colors white, black and yellow while the surface of last treatment all turned black which is an indication of total spoilage.

Table 3: Observed Rate of Molds Reproduction

Number of observation	T ₁ Calamansi	T ₂ Dalandan	T ₃ Orange	T ₄ Pomelo	T ₅ Lemon	T ₆ (Control)
Day 1	No reaction	No reaction	No reaction	No reaction	No reaction	No reaction
Day 2	No reaction	No reaction	No reaction	No reaction	No reaction	¼ whole part of the bread
Day 3	¼ whole part of the bread	¼ whole part of the bread	¼ whole part of the bread	¼ whole part of the bread	¼ whole part of the bread	2/3 whole part of the bread
Day 4	1/2 whole part of the bread	1/2 whole part of the bread	1/2 whole part of the bread	1/2 whole part of the bread	½ whole part of the bread	2/3 whole part of the bread
Day 5	1 whole part of the bread	1 whole part of the bread	1 whole part of the bread	1 whole part of the bread	1 whole part of the bread	1 whole part of the bread

On Table 3 showed the data that defined the observed rate of mold production on the surfaces of the six prepared treatments. As expected on day, a “no reaction” observation was noted on the surfaces of all the six treatments. On day 2, the five treatments with citrus fruit extracts still showed no reaction except the treatment without citrus fruit extract in which around ¼ of the bread surface were full of mold. This observation was observed on the surfaces of the five treatments with fruit extract on day 3 while on the same day, treatment 6 has 2/3 parts full of molds. On the 4th day, the five treatments with citrus fruit extracts has ½ of surfaces with molds while the sixth treatment has 2/3 parts full of mold. On the fifth day, all of the six treatments has molds on all of the surfaces.

Table 4: Observed Shelf Life of the Baked Bread with Citrus Fruit Extracts

Number of observation	T ₁ Calamansi	T ₂ Dalandan	T ₃ Orange	T ₄ Pomelo	T ₅ Lemon	T ₆ (Control)
Day 1	No reaction	No reaction	No reaction	No reaction	No reaction	No reaction
Day 2	No reaction	No reaction	No reaction	No reaction	No reaction	Active
Day 3	Active	Active	Active	Active	Active	Active
Day 4	More active	More active	More active	More active	More active	More active
Day 5	Most active	Most active	Most active	Most active	Most active	Most active

Table 4 shows the observed shelf life of the baked breads. As can be seen on the table all of the five treatments with citrus fruit extracts showed no reaction on the first and second day of observation while treatment 6 shows no reaction on day 1 but molds began to appear on the 2nd day which indicate activeness of mold production. On the 3rd day, all of the six treatments show active appearance of molds which became more active on day 4 and most active on day 5.

CONCLUSIONS

Based from qualitative observation, the bread with different citrus fruit extracts showed no differences as to when molds appeared on surfaces, the rate of mold production, as to number of molds appeared on the surfaces and as to how long the number of days before the sample breads were totally spoiled. Results further revealed that the five baked bread with citrus fruit extracts lasted more days the sample bread without. This is surely an indication that the acid content of the citrus fruits helped in the preservation and lengthening of the shelf life of the baked bread. Thus, this implied that the experimental fruit juice extracts can be used as preservatives for baked breads.

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