

Philippine Citrus Fruit Extracts On Baked Breads: A Qualitative Observation

Gabutin, Daryll R.

Dueñas, Ramon S.

Zabala, Bernardo Jr. A.

Nueva Ecija University of Science and Technology,
College of Industrial Technology, Instructor 1, Philippines

Abstract: *The study was conducted to determine the effect of native citrus fruit extract on the growth of molds in bread. Native citrus pods were extracted from calamansi (*Citrofortunella macrocarpa*), dayap (*Citrus aurantiifolia*), dalanghita (*Citrus reticulata*), pomelo (*Citrus maxima*), and Ponkan (*Citrus reticulata*) were applied in five (5) mixtures of bread separately and one (1) serves as the control. The native citrus fruit extract significantly affected the color, smell, taste, and texture of the bread. They serve as an inhibitor and it helps delay the growth of molds in the bread. It was observed to determine the most effective native citrus fruit extract, to prolonged the shelf life of bread.*

Keywords: *native citrus fruit, breads, molds*

I. 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. At present generation when man was 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, dough and baking.

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. Thus, labeling on food package became a requirement in bread industry to inform the public of the types of preservatives used. 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, 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 molds. 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.

Muhammad Shahnawaz, Dileep Kumar Lohano and Saghir Ahmed Sheikh (2012) stated that in spite of multipurpose uses of bread, its shelf-life extension is still a challenge. Deterioration of bread includes staling, moisture loss or gain and microbial spoilage. Thus, various ingredients or processes are used to extend the shelf life of bread aiming at to food legislations, ingredients availability, cost, consumer acceptance, and social trends.

The primary cause of spoilage is oxidization when oxygen

in the air causes chemical reactions that alter the molecular structure of a substance and cause its various components to break down. It is the reason why many preservatives function as antioxidants.

According to the International Journal of Food Science and Technology finding that the antioxidant-rich extracts were found to inhibit the growth of a range of bacteria. Citrus fruits have these properties that could be mixed with baking ingredients that would serve as natural preservatives in baked breads.

OBJECTIVE OF THE STUDY

This study described the effects of Philippine native citrus fruit extracts on the growth of molds on baked breads. Specifically, this study aims to:

- ✓ To prepare baked bread using five native citrus fruit extract, calamansi (*Citrofortunella macrocarpa*), dayap (*Citrus aurantiifolia*), dalanghita (*Citrus reticulata*), pomelo (*Citrus maxima*), and Ponkan (*Citrus reticulata*).
- ✓ To compare the quality of baked bread with and without citrus fruit extracts. We compared using color of molds, number of molds identified through colors, rate of mold reproduction, and shelf life of bread.
- ✓ To determine the most effective native citrus fruit extract, to prolong the shelf life of bread.

HYPOTHESIS

Based from the above stated objectives, 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.

II. MATERIALS AND METHODS

MATERIALS

Native citrus fruit extract (75 ml) calamansi, dayap (*Citrus aurantiifolia*), dalanghita (*Citrus reticulata*), pomelo (*Citrus maxima*), and Ponkan (*Citrus reticulata*) and 480 gram of all-purpose flour, 350 ml milk, 2 pieces eggs, 296-gram butter, 2.84 tsp. salt, 15-gram active dry yeast, 30-gram sugar, and 300 ml warm water.

PREPARATION OF SAMPLES

- ✓ Prepare all the citrus fruits including calamansi, Dalandan, Dayap, Pomelo, and Ponkan
- ✓ Cut every fruit into the center, then squeeze to obtain pure juice of each of the citrus fruits.
- ✓ Measure 75 ml of each sample citrus fruit and set aside
- ✓ Pre-heat the oven to 350°C.
- ✓ Combine 480-gram flour, and 2.84-gram salt. Mix until well blended.
- ✓ Measure 296-gram butter and mixed with the blended flour, until the mixture resembles coarse meal.
- ✓ Combine 350 ml milk, 300ml water, and 2 eggs. Mixed

just enough to produce and moisten the dough.

- ✓ Pour each of the five citrus juices in every designated mixture to make five different sample mixtures 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 Dalanghita extract
 - T₃ for bread mixture with Dayap extract
 - T₄ for bread mixture with Pomelo extract
 - T₅ for bread mixture with Ponkan extract
 - T₆ for bread mixture without Control Sample
- 1. Apply margarine into each mold before putting in the produce dough.
- ✓ Set into the oven until it is done, remove from the mold and set aside to cool.

METHOD OF COMPARING THE BAKED BREAD WITH CITRUS EXTRACTS AND THE CONTROL TREATMENT

- ✓ Once the baked bread was cooled, the six bread were secured into similar container separately.
- ✓ Observation started during the first day when the sample breads were baked and marked it as day one observation continued up to five days.
- ✓ In recording the observation, matrix was used to clearly show the everyday observations of each six sample. The result was presented in table form, 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

III. RESULTS AND DISCUSSION

Days	T1 Calamansi	T2 Dalandan	T3 Dayap	T4 Pomelo	T5 Ponkan	T6 Control
1	No Growth	No	No	No	No	No
2	Yellowish	Growth	Growth	Growth	Growth	Growth
3	White	White	White	White	White	White
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
5	Black	Black	Black	Black	Black	Black

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

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 the 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 treatment 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.

Days	T1 Calamansi	T2 Dalandan	T3 Dayap	T4 Pomelo	T5 Ponkan	T6 Control
1	No Growth	No Growth	No Growth	No Growth	No Growth	No Growth
2	No Growth	Yellowish	Yellowish	Yellowish	Yellowish	One type of mold (white)
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 type of white mold (white and black)
4	Two type of white mold (white and black)	Two type of white mold (white and black)	Two type of white mold (white and black)	Two type of white mold (white and black)	Two type of white mold (white and black)	Three types of mold (white, black, and yellow)
5	Three types of mold (white, black, and yellow)	Three types of mold (white, black, and yellow)	Three types of mold (white, black, and yellow)	Three types of mold (white, black, and yellow)	Three types of mold (white, black, and yellow)	All the bread turn black

Table 2: Observation on number of molds based on Appearance of Colors

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 surface of the treatments with Dalandan, Pomelo, Orange, and Lemon fruit extracts showed one type of white mold. On the day 3, the surfaces of all the five treatments showed one type of mold represented by white color while the sixth treatment was observed having 2 types of molds with colors white and black. On the fourth day, all of the five treatments with citrus fruit extract developed two types of molds with colors white and black while the treatment without citrus extract developed three types of molds on the surface with color 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 color white, black and yellow while the surface of last treatment all turned black which is an indication of total spoilage.

Days	T1 Calamansi	T2 Dalandan	T3 Dayap	T4 Pomelo	T5 Ponkan	T6 Control
1	No Growth	No Growth	No Growth	No Growth	No Growth	No Growth
2	No Growth	No Growth	No Growth	No Growth	No Growth	¼ whole part of the bread
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
4	½ whole part of the bread	½ whole part of the bread	½ whole part of the bread	½ whole part of the bread	½ whole part of the bread	whole part of the bread
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

Table 3: Observed Rate of Molds Reproduction

On the table 3 showed the data 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 surface of all the six treatments. On day, 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 have ½ of the surfaces with molds, while the sixth treatment has 2/3 parts full of molds. On the fifth day, all of the six treatments have molds on all of the surfaces.

Days	T1 Calamansi	T2 Dalandan	T3 Dayap	T4 Pomelo	T5 Ponkan	T6 Control
1	No Growth	No Growth	No Growth	No Growth	No Growth	No Growth
2	No Growth	No Growth	No Growth	No Growth	No Growth	No Growth
3	Active	Active	Active	Active	Active	Active
4	More Active	More Active	More Active	More Active	More Active	More Active
5	More Active	More Active	More Active	More Active	More Active	More Active

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

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 the day 4 and most active on day 5.

IV. CONCLUSION

Based from 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 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 prolong the shelf life of the baked bread. Thus, this implied that the experimental fruit juice extracts can be used as preservatives for baked breads.

REFERENCES

- [1] Daniells, S. (2010, April 20). Onion Extracts could be Natural Food Preservation: Study.
- [2] Johathan Santas, M. P. (2010). Antimicrobial and Antioxidant Activity of Crude Onion (*Allium Cepa*,L.) Extracts. International Journal of Food Science and Technology/ Volume 45, Issue 2/, p. 403-409.
- [3] Shanawaz, M., Lohano, D. K., & Ahmed, S. (2012, February 09). A Study on the Impact of Chemical Preservatives on Sensorial Excellence of Bread at Various Temperatures.

- [4] Wikipedia.org. (2021, September 03). Retrieved from https://en.wikipedia.org/wiki/Descriptive_research

IJIRAS