EQUILIBRIUM JOURNAL OF CHEMICAL ENGINEERING
*Homepage:*https://jurnal.uns.ac.id/equilibrium

The Effect of Concentration And Type of Soaking Media (Water, Alcohol, Salt, and Vinegar) on Decreasing Oxalate Levels (Washability) in Porang

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DOI: *https://dx.doi.org/10.20961/equilibrium.v7i1.65677*

Article History
Received: 23-09-2022, Accepted: 11-01-2023, Published: 28-02-2023

Keywords:
Porang, Calcium oxalate, Permanganometric

ABSTRACT. Porang tubers (*Amorphophallus muelleri*) contain very high rates of glucomannan and have many benefits in various fields of health, pharmaceutical, industrial, and food fields. Besides having great benefits, porang tubers contain calcium oxalate which causes itching if consumed directly, irritation and kidney stones. The purpose of this study was to make porang tubers free from oxalate content by using various concentrations and types of immersion media on porang. The types of immersion media are water, salt, alcohol, and vinegar. Oxalate rates were analyzed by permanganometric titration method. The results of the diced porang immersion in this study showed that water with a temperature of 70°C with an immersion time of 120 minutes, salt solution at a concentration of 14% with an immersion time of 90 minutes, alcohol with a concentration of 40% with a soaking time of 30 minutes, and vinegar with a concentration of 30% with an immersion time of 150 minutes is the optimal result. While the porang immersion with long slices obtained optimal results in water with a temperature of 50°C with an immersion time of 150 minutes, salt solution at a concentration of 14% with an immersion time of 150 minutes, alcohol with a concentration of 60% with an immersion time of 150 minutes, and vinegar acid with a concentration of 20% with an immersion time of 150 minutes. In the optimal results of the dice, the oxalate content in water immersion decreased by 2.4 %, salt solution decreased by 68.4%, alcohol decreased by 24.6%, and vinegar decreased by 11.8%. In the optimal results of the spring roll filling, the oxalate content in water immersion decreased by 2.4 %, salt solution decreased by 7.3%, alcohol decreased by 19.7%, and vinegar decreased by 11.8%.

1. INTRODUCTION

Porang (*Amorphophallus muelleri*) is a tuber-producing plant with the Araceae group native to Indonesia which grows wildly in the forest or the yard and grows sporadically (Yuzammi, 2000). At this time porang tubers have started to be cultivated because they have the potential and prospects to be developed in Indonesia. In addition, this plant is also able to produce carbohydrates and a high yield index. Through proper handling and application, porang tubers can become assets that have high usability and selling value. However, knowledge regarding the processing of porang tubers is still limited. In general, porang tubers are exported in the form of fresh tubers or cassava or chips. Whereas porang tubers can be processed to produce porang flour which of course has a higher selling price tall.

This porang chip has not been widely used because it still contains calcium oxalate (Ardhian, 2013). The main problem faced in processing porang tubers is that many people do not know the benefits of porang tubers and some consider porang tubers as a weed plant that has no benefits. In addition, the problem in processing porang tubers as food is the itching caused by the high oxalate content in porang tubers (Aldera, 2010). Oxalate compounds in tubers can be removed by several simple steps, including boiling and drying. Oxalate can also be removed by washing and soaking several times properly (Wardani and Handrianto, 2019).

2. MATERIALS AND METHODS

2.1 Equipment and Materials

The equipment used in this study include knives, signoras, balances analytics, pumpkin measure, glass measuring, burette, stative, funnel, erlenmeyer, glass beaker, thermometer, pipette drip, heater electricity, oven, pH meters. Meanwhile, the materials used include porang tubers, water, aquadest, alcohol (20, 30, 40, 50, and

60%), NaCl (6, 8, 10, 12, and 14%), vinegar (10, 15, 15, and 15). 20, 25, and 30%), $KMnO_4$ 0.1 N, and H_2SO_4 1 N.

2.2 Immersion Process

At this immersion stage, you must prepare several concentrations and the type of media to be used as much as 1000 ml. First, prepare water with various temperature variations, namely 30, 40, 50, 60, and 70 0 C by heating the water first and then transferring it to a container with porang tubers in it. Second, preparing alcohol with various type variant concentration that is 20, 30, 40, 50, and 60% by diluting the available alcohol. Third, prepare solution salt with various concentration variants, namely 6, 8, 10, 12, and 14% by weighing the salt and aquadest first and then the salt is dissolved with the previously weighed aquadest. Fourth, prepare vinegar with various concentrations of 10, 15, 20, 25, and 30% with method dilute sour vinegar which available is 96% by using aquadest.

2.3 Analysis of Oxalate Rates

This permanganometric titration uses potassium permanganate ($KMnO_4$) with a concentration of 0.1N. The $KMnO_4$ solution was first diluted from 1N to 0.1N using aquadest and then put into the burette. In this permanganometri titration assisted with 1N sulfuric acid as a catalyst.

3. RESULTS AND DISCUSSION

3.1 Effect of Various Temperature Variations of Water Immersion Media on Porang on Dice Shapes and Long Slices

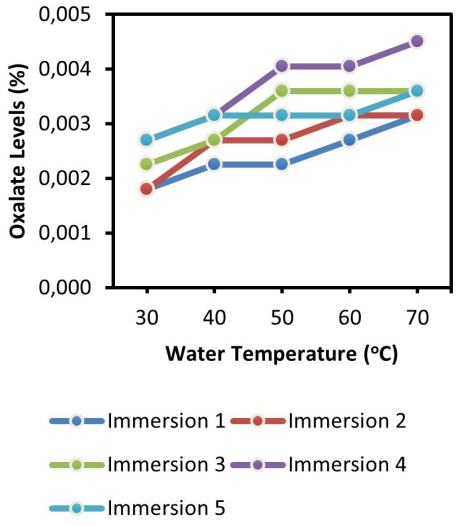

Fig 1. Graph of the relationship between decreased levels of oxalate in porang dice form with water temperature variations.

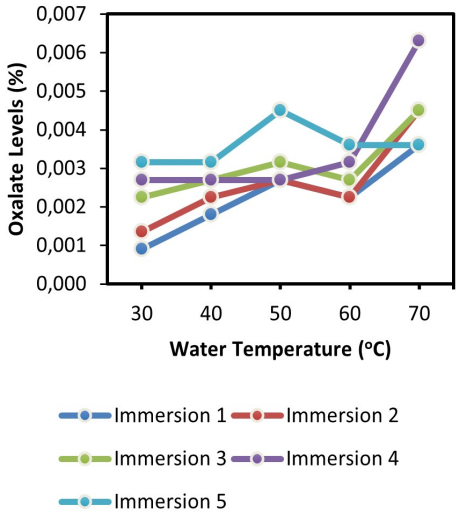

Fig 2. Graph of the relationship between decreased levels of oxalate in porang long slice with water temperature variations.

Based on the graph above, it was obtained that the oxalate content in diced porang in water immersion with various temperature variations was the largest, namely at a temperature of 70°C in the 4th immersion. This is because the greater the temperature and contact time, the greater the reduced oxalate. For the 4th immersion or for 120 minutes, it means that the reducedoxalate is maximal. Then obtained a decrease in oxalate rates by 2.37%.

While the acquisition of oxalate ratescontained in porang in the form of long slices in water immersion with various temperature variations was the largest, namely at 50 °C the 5thimmersion. This is because the greater the temperature and contact time, the greater the reduced oxalate. Then obtained a decrease in oxalate rates by 2.37%.

We compared based on the shape of the soaked porang, the dice form is easier and faster to release the oxalate content in the porang. This is because the dice form has a small surface area so that in the waterimmersion treatment with varioustemperature variations, the 4th immersion temperature of 70°C gives the best effect.

3.2 The Effect of Various Concentrations of Alcoholic Solution Immersion Media on Porang on Dice Shapes and Long Slices

In the alcohol immersion of porang in dice and elongated shapes, experiments were carried out with variations in temperature of 20, 30, 40, 50, and 60 % for 2.5 hours and every 30 minutes a sample was taken.treatment with various variations of this concentration, the concentration of 40% of the 1st immersion gives the best influence.

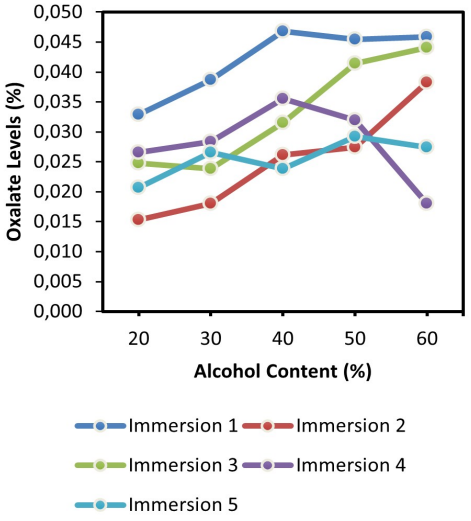

Fig 3. Graph of the relationship between decreased levels oxalate in porang dice form with alcohol solution concentration variations.

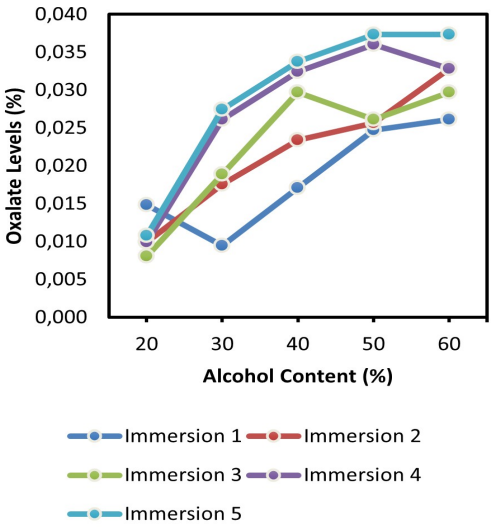

Fig 4. Graph of the relationship between decreased levels oxalate in porang long slice with alcohol solution concentration variations.

Based on the graph above, it was found that the oxalate content contained in diced porang in various concentrations of alcohol solution immersion with the greatest variation, namely at a concentration of 40% of the 1st immersion. This is because the greater the concentration and contact time, the greater the reduced oxalate. For the 1st immersion (30 minutes), it means that the reduced oxalate is maximal. Then obtained a decrease in oxalate rates by 24.6%.

While the acquisition of oxalate rates contained in porang in the form of long slices on immersion in an alcohol solution of various variations in concentration was greatest, namely at 60% of the 5th immersion. This is because the greater the concentration and contact time, the greater the reduced oxalate. Then obtained a decrease in oxalate rates by 19.65%

We compared based on the shape of the soaked porang, the dice form is easier and faster to release the oxalate content in the porang. This is because the dice form has a small surface area so in the water immersion treatment with various variations of this concentration, the concentration of 40% of the 1st immersion gives the best influence.

3.3 Effect of Various Concentrations of Salt Solution Soaking Media on Porang on Dice Shapes and Long Slices

In the immersion of salt solution on porang in dice and elongated shapes, experiments were carried out with temperature variations of 6, 8, 10, 12, and 14% for 2.5 hours and every 30 minutes a sample was taken

Based on the graph above, it was found that the oxalate content contained in diced porang in salt solution immersion in various concentrations was the largest, namely at a concentration of 14% in the 3rd immersion. This is because the greater the concentration and contact time, the greater the reduced oxalate. For the 3rd immersion or for 90 minutes, it means that the reduced oxalate is maximal. Then obtained a decrease in oxalate rates by 68.45%. Meanwhile, in the acquisition of oxalate rates contained in porang in the form of long slices in the salt solution immersion, the concentration variations were greatest, namely at 14% of the 5th immersion. This is because the greater the concentration and contact time, the greater the reduced oxalate. Then obtained a decrease in oxalate rates by 7.34%.

We also compared based on the shape of the soaked porang, the dice form is easier and faster to release the oxalate content in the porang. This is because the dice form has a small surface area so in the water immersion

treatment, various variations of this concentration, the concentration of 14%, the 3rd immersion has an effect the best.

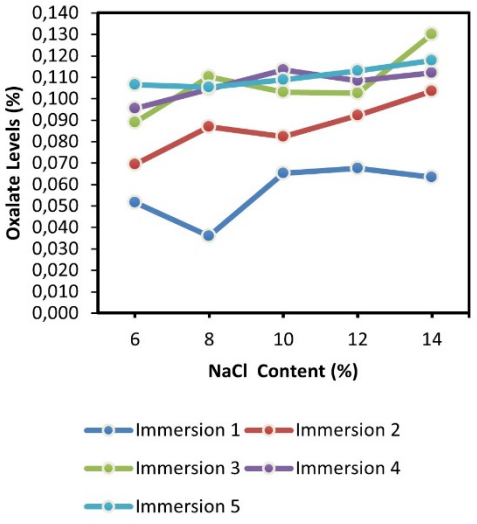

Fig 5. Graph of the relationship between decreased levels oxalate in porang dice form with salt solution concentration variations.

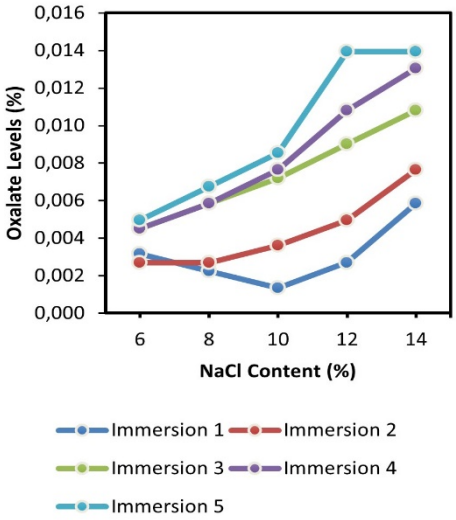

Fig 6. Graph of the relationship between decreased levels oxalate in porang log slices with salt solution concentration variations.

3.4 The Effect of Various Concentrations of Soaking Vinegar Acid Solutions on Porang on Dice Shapes and Long Slices

In the immersion of acetic acidsolution on porang in dice and elongated shapes, experiments were carried out with temperature variations of 10, 15, 20, 25, and 30 %for 2.5 hours and every 30 minutes a sample was taken.

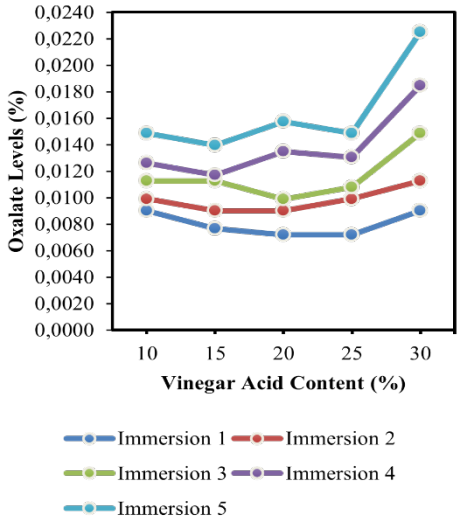

Fig 7. Graph of the relationship between decreased levels of oxalate in porang dice form with acid solution concentration variations.

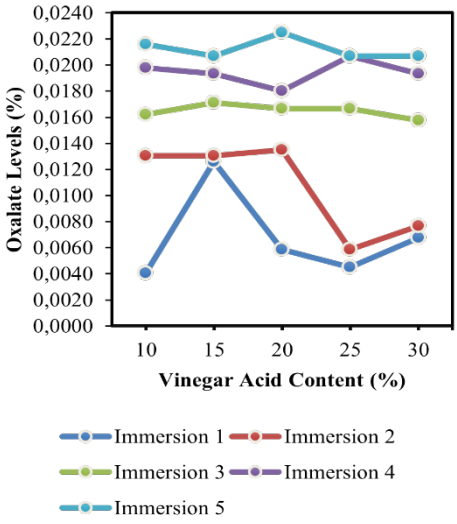

Fig 8. Graph of the relationship between decreased levels of oxalate in porang long slices with acid solution concentration variations.

Based on the graph above, it was found that the oxalate content contained in diced porang in vinegar solution was soaked with the greatest variation in concentration, namely at a concentration of 30% of the 5th immersion. This is because the greater the concentration and contact time, the greater the reduced oxalate. Then obtained a decrease in oxalate rates by 11.84%. While the acquisition of oxalate rate contained in porang in the form of long slices in salt solution immersion in various concentrations was the largest, namely at 20% of the 5th immersion.

This is because the greater the concentration and contact time, the greater the reduced oxalate. Then obtained a decrease in oxalate rates by 11.84%.

We compared based on the shape of the soaked porang the dice form is easier and faster to release the oxalate content in the porang. This is because the dice form has a small surface area so that in the various water immersion treatments, the concentration of 30% of the 5th immersion has an effect the best.

4. CONCLUSION

Based on the results of the research and discussion that we have done, thefollowing conclusions are obtained :

1. In water immersion with variationsin temperature, the best results were obtained at a temperature of 70C for the 4th immersion (120 minutes) in the form of diced pieces. Then obtained a decrease in oxalate rates by2 .37%
2. In the alcohol immersion withvarious concentrations, the bestresults were obtained at a concentration of 40% of the 1st immersion (30 minutes) in the form ofdiced pieces. Then obtained adecrease in oxalate rates by 24.63%.
3. In the immersion of saline solutionwith variations in concentration, the best results were obtained at a concentration of 14% of the 3rd immersion (90 minutes) in the form of diced pieces. Then obtained adecrease in oxalate rates by 68.45%
4. In acetic acid immersion with various concentrations, the bestresults were obtained at a concentration of 30% of the 5th immersion (150 minutes) in the form of diced pieces. Then obtained a decrease in oxalate rates by 11.84%

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