

Chapter 1 Introduction

1.1 Problem Background

Gnetum gnemon (Melinjo) is a type of small to medium size tree which found in Indonesia. Melinjo tree is producing fruit consisting of skins and large seed like nuts with long from 2 to 4 cm (Lim & Lim, 2012). Melinjo seeds contain essential nutrients such as fats, proteins, carbohydrates and fibers, and also minor nutrition such as vitamin C, minerals which sodium, potassium, phosphorus, and magnesium. Melinjo seed is also known to have a bitter taste when consumed. In 2016 from Badan Pusat Statistika (BPS, n.d.), the production of melinjo in West Java was reported up to 18 tons. Melinjo seeds can be used for consumption, and it can be used as ingredients for making "*Sayur Asam*" (Indonesia Dishes), and chips or called in Indonesia as "*emping*." Another use of melinjo seeds can be processed into flour. From the study of Yanti (2013), melinjo flour can be used in substituting of flour in making cookies.

There are many types of flour, and each has different properties and uses. Flour also categorized into wheat flour and non-wheat flour. For the wheat flour, it is made from wheat and processed into different flour, dividing it into three main categories, high protein, medium protein, and low proteins. In the other hand, the non-wheat flour made from using other grains or other plant sources. Melinjo flour is also categorized in non-wheat flour. The product known made by non-wheat flour and have unique taste is macarons. Macarons is a type of cookies that well known as French pastries, and it is famous even in Indonesia. It is a small type of cookies which is bite-size, and it could be eaten as snacks. Macarons mainly made from sweet meringue and almond flour (Wu, n.d.).

Almond flour made by blanched almond, then crushed using a food processor. Almond flour is known to contain high protein, fat, and fiber. Several gluten-free flours that can substitute the almond flour in making macarons as it lists in **Table 1**, the list of flour with their nutritional value.

Table 1 Comparison of Nutrition Content some flour

Type of flour	Fat g/100g	Carbohydrate g/100g	Fiber g/100g	Proteins g/100g	Vitamins	Minerals
Almond flour	50.00	21.43	10.7	21.43	Vitamin C Vitamins A Vitamin B2 Vitamin E	Calcium, Iron, Sodium Potassium, Copper, Magnesium, Zinc
All-purpose flour	1.00	76.67	3.3	10.00	Vitamin C Vitamin B1, B2 B3 and B9 Vitamin A	Calcium, Iron, Sodium
Hazelnut flour	42.86	28.57	14.3	14.29	Vitamins D	Calcium, Iron, Sodium Potassium,
Melinjo Flour	2.4	71	17	13	Vitamin C	Calcium, Iron, Sodium Potassium, Phosphorus, Magnesium, Zinc, Copper
Soybean Flour	20.65	31.92	9.6	37.81	Vitamin C Vitamin B1, B2,B3, B6, B9, and B12 Vitamin A, D, E, and K	Calcium, Iron, Sodium Potassium, Zinc, Phosphorus, Magnesium

The substitutions of almond flour into melinjo flour in making macarons are possible with several formulations. The formulations are made by trying substitute partly of the almond flour with melinjo flour. The advantages are that the availability of melinjo is more available in Indonesia, and it has a lower price than the almond flour.

1.2 Problem Formulation

The focus in this research is to investigate the effect of partial substitution of almond to the melinjo formula in making macarons. According to Grace Ratnasari Tenggara (n.d.), macarons made by combining almond flour and sweet meringue, and the substitution of almond flour could be done with soybean flour.

In this research, the substitution done is partly substituting the almond flour with melinjo flour. Thus the problem formulations of this research are constructed to answer those following question:

- How many percentages of almond flour can be substituted with melinjo flour without affecting the physical and sensorial properties of macarons?
- Is there any physical impact of substitution the almond flour?
- Is there any sensorial impact of substitution the almond flour effects in term of the liking to the macarons?

1.3 Research Objectives

- To investigate the effect of partial substitution almond flour by using melinjo flour in the making of macarons
- To investigate the physical and sensorial properties of macarons made by partial substitution of almond flour with melinjo flour

1.4 Hypothesis

H0: The partial substitution does not give an effect on the physical and sensorial properties of macarons made by melinjo flour.

H1: The partial substitution of almond flour in macarons by using melinjo flour give a significant effect on its physical and sensorial properties.

1.1 Importance of Research

This research will benefit various beneficiaries, including:

- The significance of this research is to provide the product properties of macarons made by using all almond flour compared to melinjo flour in the density of batter, moisture analysis, texture analysis, physical analysis (width, weight, and height) and also sensorial properties.
- This research can give a value-added of melinjo flour in the application of the baking product, in this case, macarons