

The Effect of Fortification of Moringa Leaf Extract (*Moringa Oleifera*) on Organoleptic Tempe Product

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Abstract— This research aims to determine the influence of adding Moringa leaf extract to Tempe product on panelists' acceptance. This study was an experimental study which applied Randomized Block Design by using 4 treatments; T1 control, T2 the additional of 2% Moringa leaf extract, T3 the additional of 5% Moringa leaf extract and T4 the additional of 10% Moringa leaf extract. Determination of the sample applied Simple Random Sampling Technique which was consist of 30 respondents, hereinafter referred to as panelists with certain criteria. Data analysis used variance analysis (ANOVA) and if there was a significant difference effect, it would be further tested using Duncan Multiple Range Test (DMRT) with 5% confidence level. The panelist's preference/ hedonic test were carried out on color, texture, taste, and aroma. The results showed that the most preferred treatment by the panelists was the T1 control treatment in terms of color, texture, taste and aroma, while the least preferred treatment was shown in T4 treatment with the addition of 10% Moringa leaf extract.

Keywords— *Fortification, Moringa oleifera, Organoleptic, Tempe*

I. INTRODUCTION

Organoleptic test called as a measurement of sensory is the science that uses the human senses to measure texture, appearance, aroma and flavor of food products. Consumer acceptance of a product is starting from its assessment of the appearance, flavor and texture. The object being measured or judged is actually the reaction of the psychological (mental reactions) in the form of one's consciousness after being given stimuli, then it is called also the assessment of sensory.

Tempe is an affordable traditional food of Indonesian. It contains various nutrients that are needed by our body such as protein, fat, carbohydrates and minerals [1].

Moringa leaf is a part of moringa plant that has been widely studied on nutrient content and its usefulness. Moringa leaves contain high nutrients, namely beta-carotene, vitamin C, protein, iron and calcium. Moringa leaf is usually processed into vegetable soup, tea, powder and others. Moringa leaves have no added value. Whereas moringa leaf has a lot of nutrients and it is scientifically proven as the source of drug substance exceeds more than other plants. a study states, fresh moringa leaves contain vitamins A 6.80 mg four times more than carrots, vitamin C 220 mg seven times more that orange, vitamin B 423 mg per 100 grams, calcium 440 mg four times more than milk (without lactose),,

potassium 259 mg three times more than banana, iron 0.7 mg twenty-five times more than spinach and protein 2711.8 mg two times more than yogurt which is easily digested and assimilated by human body [2]. This study aims: 1) to determine the effect of fortification moringa leaf extract on the organoleptic tempe product and b) to analyze the assessment of organoleptic test result from 4 the most to the least preferred treatment by panelists.

II. LITERATURE REVIEW

2.1 Characteristics of Soybean Plants

Soy bean content low saturated fat. Soy Fat containing 15% saturated fat acids, whereas 60%

unsaturated fat contains linolenic acid and linoleic, both are known to help heart health and reduce cancer risk. Soy beans are also rich of vitamins (vitamins A, E, K and types of vitamin B) and minerals (K, Fe, Zn and P). Some products of soybean is also a source of dietary fiber [3].

Soybean produces high oil. Soy oil content low saturated fat which is about 15 %, and high unsaturated fatty acid which is divided to 61 % multiple unsaturated fat (PUFA) and 24 % mono unsaturated fatty acid. Soybean oil is the source of good linoleic acid which both are the essential fatty acids. More than 50% of the fatty acid in soybean is linoleic acid, while about 7 % is linolenic acid. The classification of soybean plants as follows:

Devison	: Spermatophyta
Classis	: Dicotyledoneae
Ordo	: Rosales
Familia	: Papilionaceae
Genus	: Glycine
Species	: Glycine max (L.) Merrill

2.2 Moringa Plants

Moringa plant is a shrub with height up to 10 meters, soft and fragile trunked, a leaf as big as a fingertip, round-shaped eggs and compound. This plant blooms white colour along the years, the fruit shapes a triangle 30cm length, thrives in the lowlands up to highland about 700 m above sea level. Historically, the plant moringa or *Moringa oleifera*, is derived from Himalayas and India, and then spread around to Africa continent and Western Asia [4].

Moringa (*Moringa oleifera*) is a plant that easily to find and grow in Java, Sunda, Bali, Lampung, Flores, Madura and Sulawesi. Moringa has high nutrient because the leaves contain vitamin A which is equivalent to 10 times of carrots, equivalent to 17 times calcium of milk, equivalent to 15 times calcium of banana, equivalent to 9 times protein of yogurt and equivalent to 25 times iron of spinach [5].

III. RESEARCH METHODS

3.1 Types of Research

This research is quantitative research using Randomized Block Design (RBD) with 4 treatments and 3 replications. Treatment consists of T1 control, T2 2% addition moringa leaf extract, T3 5% addition of moringa leaf extract and T4 10 % addition of moringa leaf extract. Hedonic test is applied to 30 panelists that will test the color, texture, taste and aroma/aroma.

3.2 Data Collection Method

The collecting data methods of this research are divided into several steps, such as:

1. Documentation
Documentation is data collecting technique by analyzing the data that has been collected from the object of research. In this case, the researcher will analyze data that has been collected from the Tempe Home Industry in Banyuwangi.
2. Observation.
Observation is data collecting technique by observing the research object; in this case the researcher will observe the level scale of hedonic moringa tempe product.
3. Interview.
Interview is used to know the tempe production process.

3.3 Time and Place of Research

This research was conducted at Laboratorium of Agribusiness Study Program Politeknik Negeri Banyuwangi. Timeline for this research is May – November 2021.

IV. RESEARCH RESULT

4.1 The Implementation of Organoleptic Test

The Organoleptic test was conducted to 30 panelists consisting of 19 men and 11 women, who addressed in the origin or boarding house around of Rogojampi subdistrict. The panelists are student, college students, and public societies, with the range of age are 18 years up to 23 years old. The panelists willing to be the judges with the requirements that have been specified, such as fill out the form of panelist, physically and mentally healthy, Tempe consumption and comply health protocols. The sample organoleptic test consisting of 4 treatments. Treatment consists of T1 control, T2 2% addition moringa leaf extract, T3 5% addition of moringa leaf extract and T4 10 % addition of moringa leaf extract. The implementation phases of the organoleptic test shown in Fig.1.

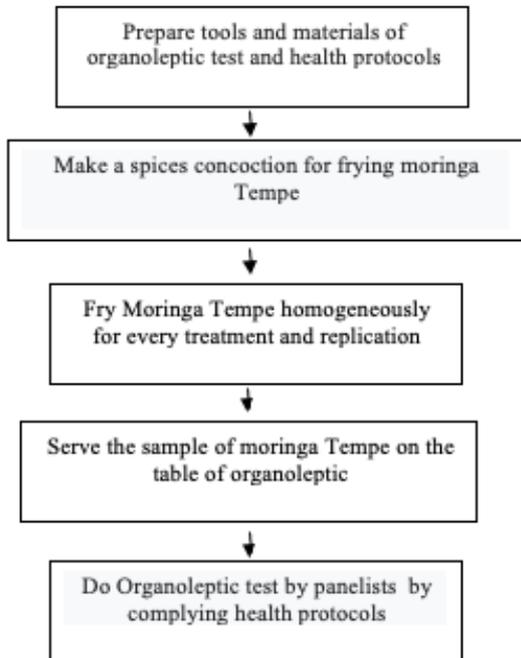


Fig 1. The implementation phase of the organoleptic test

The process of making moringa leaf extract can be shown in Fig.2.



Fig 2. The process of making moringa leaf extract

The process of making Moringa Tempe can be shown in Fig.3.



Fig 3. The Process of making Moringa Tempe

The preparation of Organoleptic Test can be shown in Fig.4.



Fig 4. The Preparation of Organoleptic Test

The Implementation of Organoleptic Test by complying health Protocol can be shown in Fig.



Fig 5. The preparation of Organoleptic Test

4.2 The recapitulation of Organoleptic Test

The overall recapitulation of Organoleptic Test Result with 4 treatments and 3 times replications for 30 panelists can be shown in Fig.6.

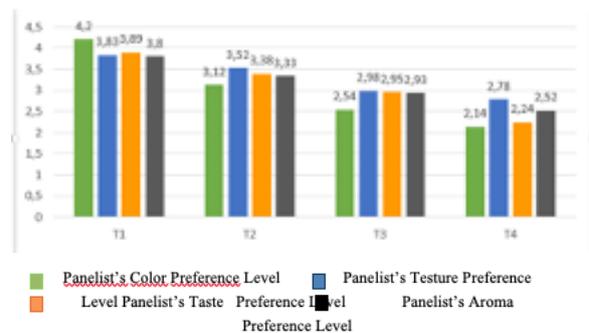


Fig 6. The Recapitulation of Organoleptic Result

The preference level test on Moringa Tempe Product in terms of color, texture, flavor, and aroma of 30 panelists shown in Fig 6 followed by the explanation as below:

1. Treatment T1 (0%) panelists prefer Tempe in terms of its colour with the highest average value 4,2, followed by the taste 3,89, and the texture 3,83. While the lowest average value in terms of the aroma is 3,8.
2. Treatment T2 (2%) of panelists prefer Tempe in terms of the texture with the average value is 3,52, followed by the taste 3,38, the aroma

3.33, and While the lowest average value in term of the colour is 3.12.

3. Treatment T3 (5%) of panelists prefer Tempe in terms of the texture with the average value 2,98, followed by the taste 2.95, the aroma 2.93, and While the lowest average value in term of the colour is 2.54.
4. Treatment T4 (10%) of panelists prefer the sample in terms of texture with the highest value 2,78, followed by the aroma 2.52, the taste 2,246, and while the lowest average value in term of the colour is 2,14.

V. CONCLUSION

From the research that has been done, it can be concluded that The additional of moringa leaf extract on Tempe product affects the level of panelists preference in each treatment sample Panelists prefer tempe of T1 (0%) treatment with no additional moringa leaf extract and the closest is T2 with the addition of moringa leaf extract (2%), followed by T3 (5%), and the least preferred is treatment T4 with the addition of moringa leaf extract (10%).

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