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Study of the Possibility of Utilized Cowpea (*Vignaunguiculata*) on Tempe Making Process

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Abstract:
The purpose of this research was to knowing the possibility of adding cowpea on the quality of tempeh produced and the level of panelist acceptance of the resulting cowpea tempe.
This research is an experimental study using a completely randomized design with 4 (four) levels of treatment namely A treatment is making 75% soybean with the addition of 25% cowpea, B treatment is making 50% soybean by adding 50% cowpea, and C treatment is making 25% soybean by adding 75% cowpea and K treatment, namely making tempe with soybean ingredients without the addition of cowpea. Data collection techniques used in this study include objective assessment and subjective assessment, and data analysis used is descriptive analysis.
The results showed that making tempe mixed with cowpeafor proximate tests specifically water content, then the best treatment is A treatment which is 59.05%,related to protein content contained in tempe, the best treatment is A treatment which is 16.69%, to the fat content, then the best treatment is the K treatment which is 4.24%,while the organoleptic test results for testing aroma, color, texture and taste, the panelists preferred the K treatment that is the treatment in which all the ingredients for making tempe are made from soybeans. Making tempe made from cowpea makes it possible to be used as a material for making tempe with a ratio of 25% cowpea and 75% soybeans.

Keywords: Possible, cowpea, soybean, tempe

1. Introduction

Soybeans are generally processed into tempe or tofu as food. The nutritional value of tempe is very good because of the nutrients found in tempe has experienced decomposition and simplification of nutrients by moldduring the fermentation process, especially protein and carbohydrates,so it is easily digested and absorbed by the body.Various studies continue to be conducted on tempeh (Syarif *et al*. 1999).

One of the products produced from soybeans is tempe. According to Susanto (1994) tempeh is one of the fermentation products from traditional soybean which is quite famous,by using the Rhizopus oligosporus mushroom.

However, tempeh has limited storability,if it is stored too long the tempe will rot.This is because the fermentation process is too longwill cause further protein degradationso that ammonia is formed, this ammonia which causes a foul odor(Astawan, 2004 *in* Setyowati *et al*. 2008).

So far, the making of tempe is derived from raw materials in the form of soybeans. However, making tempe is thought to be done from a variety of nuts. One type of beans that has the potential to be the main ingredient in making tempeh is cowpea. Making tempe from cowpea,in addition to reducing imports, it also plays a role in launching a food diversification programthe raw materials come from within Indonesia.

Cowpea is a nutritious component in the human diet. Composition of cowpea seeds, especially protein content, starch and B vitamin, vary greatly depending on cultivar and seed origin (Kay, 1979).

2. Research Purposes

The purpose of this research was to determine the possibility of adding cowpea to the quality of tempe and the level of panelist acceptance of the resulting cowpea tempe.

3. Method

This research is an experimental study using a completely randomized design with 4 levels of treatmentnamely K Treatment in the form of making tempeh from soybeans without the addition of cowpea (0%) as a control,A treatment is making tempe from soybean 75% with the addition of 25% cowpea, B treatment, namely making tempe consisting of 50%

soybeans with the addition of 50% cowpea,and C treatment which is making tempe consisting of 25% soybeans with 75% addition of cowpea.Each treatment was carried out three times.

The main ingredients used in this research were 1000 g cowpea,1000 g of soybeans, 4 g of yeast and chemicals for various analyzes.The tools used in this research are trash, plastic containers, packaging containers, wooden spoons, oven dryers, knives, Hammer Mill grinders, containers, plastic wrappers, aluminum plates, porcelain cups, analytical balance, desiccators, boiling stones, soxlets, micro kjeldahl flask, pH meter, furnace, burette, spatula, chroma meter, centrifuge tube, sifter, centrifuge, whiteness meter, aw meter, pH meter, balance sheet, separator flask, reflux apparatus, freeze dryer, extraction apparatus, flask, centrifuge pH meters, grinding devices, spectrophotometers, vortex devices and glassware.

The research procedure was sorting and cleaning the seeds and weighing 500 gr for each treatment.Weigh the cowpea according to the addition of 25%, 50%, 75%, 0% and yeast 0.5% of the initial weight of 500 gr soybeans.Boil the ingredients for 30 minutes after the water boils. Cooling soybeans by aerating.Soaking soybeans that have been boiled for 24 hours in a plastic basin using ± 1000 ml of water.Skinning or peeling soybeans that have been soaked and washed. Steaming for 10 minutes after boiling water with rice bran added according to the addition.Drain the soybeans after steaming using a sieve. Cooling the soybean seeds by aerating.Doing inoculation or fermentation that is sprinkling yeast as much as 0.5% of the basic ingredients in soybean seeds by mixing it with a spoon.Giving yeast must be even. Packaging or wrapping soybeans that have been inoculated with 1 kg plastic size of rice that has been perforated with a distance of 1 cm.Put the wrapper on a plastic tray then cover with newspaper for 30 hours (Setyowati *et al.* 2008).

Data collection techniques used in this research include objective assessment and subjective assessment.Objective methods include testing water content, protein content and fat content.While the subjective assessment method is subjective testing to determine the level of preference of the panelists on the tempe results of research conducted by means, a test of preference.The panelists used were semi-trained panelists consisting of 25 people. Testing is done without practice before testing, testing is done in a closed room.The assessment criteria in this preference test use a scoring technique.The range of favorite scores used is 1-5, that is from dislike to very fond.

Analysis of the data used to determine the effect of the addition of cowpea on the quality of the tempe producedand the level of panelist acceptance of the resulting cowpea tempeh is descriptive analysis.

4. Results and Discussion

4.1. Proximate Test

4.1.1. Water Content

Water content parameter is a measurement of the water content inside the material which aims to provide a minimum limit or range of the amount of water content in food. The method of determining the water content using destination toluene, the water content in the ingredients expressed in% v / b of the extract weight. The water content of the material affects the shelf life. High water content causes susceptibility to microbial activity (Guntarti, 2015).
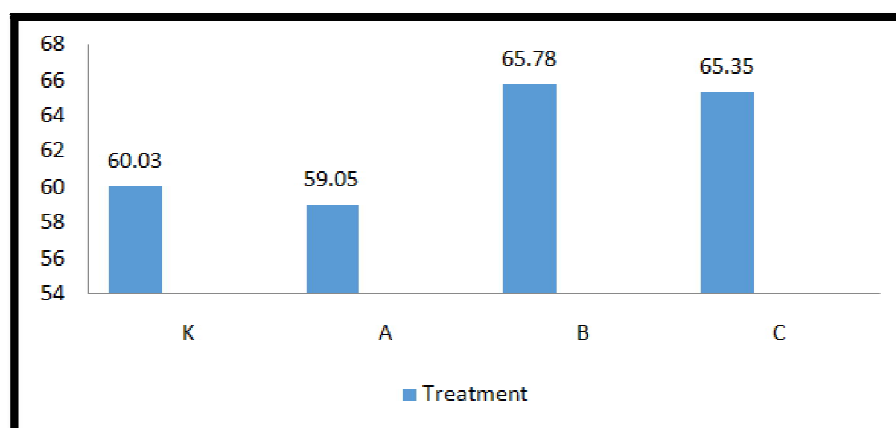

Figure 1: Water Content of Tempe Making Research

In Figure 1 shows that the highest water content of tempe produced in this research is B treatment, which is the treatment of making tempe with a mixture of 50% soybeans and 50% addition of cowpea which is 65.79%,followed by C treatment which is the treatment of making 25% soybeans with the addition of 75% cowpea,the K treatment (all from soybeans) is 60.04%,and the lowest value in A treatment is the treatment of making soybean 75% with the addition of 25% cowpea which is 59.05%.Thus, the treatment that is suspected to be more quickly damaged is B treatment because it has a high-water content, which according to Guntarti (2015),the water content in the extract is the growth media of molds and fungi.

4.1.2. Protein

Protein is one of the important human needs in maintaining body stability.Protein can be used as an energy source equivalent to carbohydrates because it produces 4 kcal/g protein.The advantages and disadvantages of protein can cause

various health problems.As a result of lack of protein can cause several diseases, namely quaskior (hungry edema), marasmus (poor nutrition). Advantages protein in the body can also cause weight gain, cholesterol, liver damage, brain damage and kidney damage (Sarwono, 2005).

In Figure 2 shows that the highest protein content of tempeh produced in A treatment namely the treatment of making tempe from 75% soybean ingredients with the addition of 25% cowpea is 16.69%,followed by K treatment, all soybean-making tempe ingredients amounted is 15.64%, B treatment, namely treatment of making soybean tempe from 50% with the addition of 50% cowpea was 14.32%,and the lowest in C treatment is the treatment of making tempe with 25% soybean material with the addition of 75% cowpea with a protein content is 13.24%.Based on the results of this study it can be stated that the addition of cowpea in making tempe can be recommended that is as much as 25%.
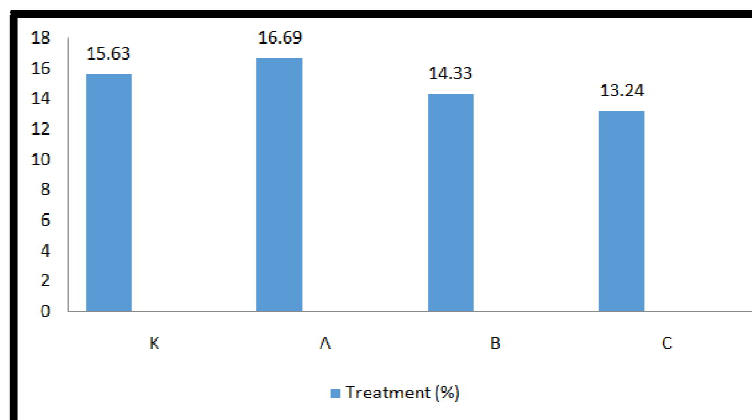

Figure 2: Protein Content (%) of Tempe Making Research

4.1.3. Fat

According to Astuti *et al.,* (2000), tempe fat content would be lower than soybeans,because during fermentation the mold will synthesize the lipase enzyme which will hydrolyze triacylglycerol become free fatty acids. Furthermore, fatty acids will be a source of energy for mold to growso the fat content decreases up to 26%.
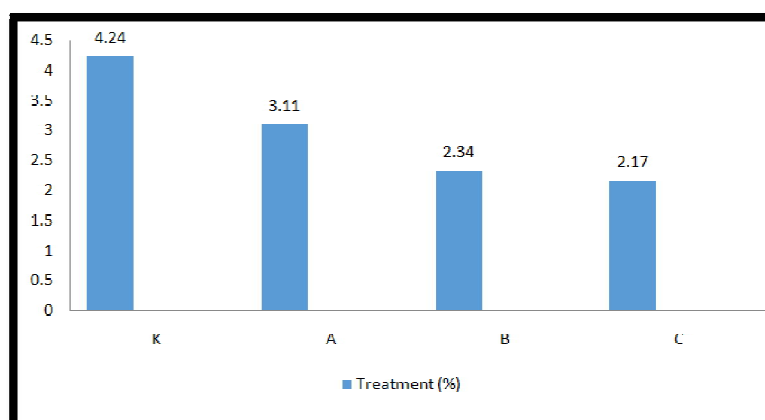

Figure 3: Fat Content (%) of Tempe Making Research

In Figure 3 shows that fat content produced in this research making tempe the highest in K treatment, namely treatment with all ingredients consisting of soybean is 4.24%, followed by A treatment namely the treatment of making tempe from 75% soybean ingredients with the addition of 25% cowpea is 3.11%, B treatment, namely treatment of making tempe from 50% soybean ingredients with the addition of 50% cowpea is 2.34%and the lowest yield in treatment C was the treatment of making soybean tempe from 25% with the addition of 75% cowpea is 2.17%.

4.2. Organoleptic Test

4.2.1. Flavour

In Figure 4 shows the flavour of tempe most preferred by panelistsis the highest in K treatment, namely treatment with all ingredients consisting of soybean ingredients is 2.8,followed by A treatment namely the treatment of making tempe from 75% soybean ingredients and the addition of 25% cowpea is 2.5, B treatment, namely treatment of making tempe from 50% soybean ingredients with the addition of 50% cowpea is 1.9and lowest in C treatment namely treatment of making tempe from soybean 25% with the addition of 75% cowpea is 1.6%.
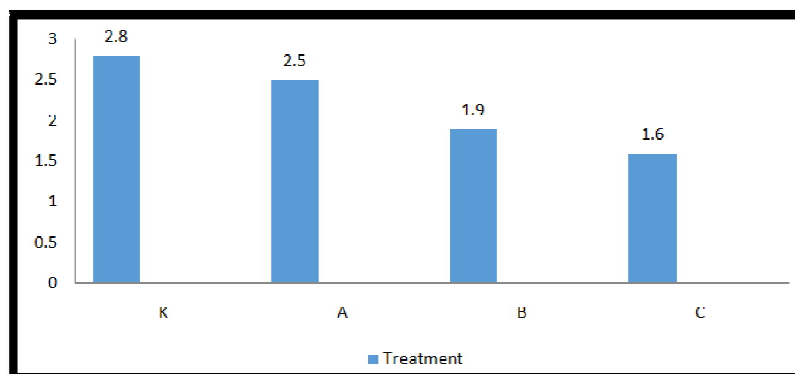
Figure 4: Organoleptic Test Results for Flavour

4.2.2. Color

In Figure 5 shows thatthe color of tempe most favored by panelists in this research was highest in the K treatment is 3.8, followed by A treatment which is the treatment of making tempe from 75% soybean material and 25% cowpea is 3.2. B treatment, namely treatment of making tempe from 50% soybean material and 50% cowpea is 2.6and the lowest yield was C treatment, which was the treatment of making tempe from soybean 25% and cowpea 75% is 2.1.
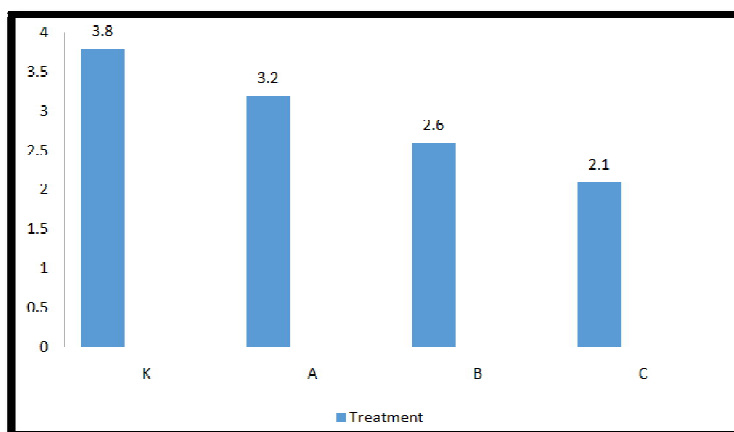

Figure 5: Organoleptic Test Results for Color

4.2.3. Texture

The results showed the highest value was found in the K treatment which is making tempe with the whole ingredients from soybeans is 3.5,followed by A treatment namely treatment with the addition of soybean by 75% and 25% for cowpea by 3.3,and the lowest values for each B and C treatment (Figure 6).Thus it can be stated that the more giving the cowpea, then the texture value according to panelists is getting less good.
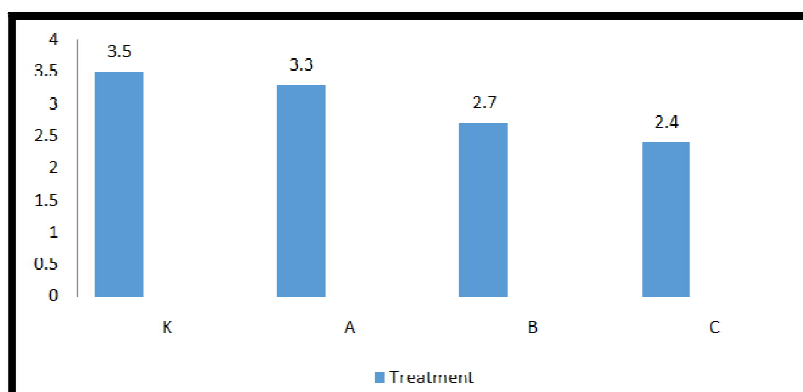

Figure 6: Organoleptic Test Results for Texture

Based on the results of research shows that tempe made from soybeans shows the best texture, followed by the addition of 25% of cowpea. According to (Ferreira, 2011) the difference in texture is influenced by the development of different seeds in each soybean due to water penetration into the seed matrix and mold growth are not the same.In addition, the soft texture of tempe was obtained from the overhaul of the intercellular matrix in the soybean tissue by *R. oligosporus* mold.

4.2.4. Taste

Taste is a response to the presence of chemical stimuli that reach the taste buds of the tongue, especially the basic types of flavors namely sweet, salty, sour, and bitter (Meilgaard *et al.* 2000).
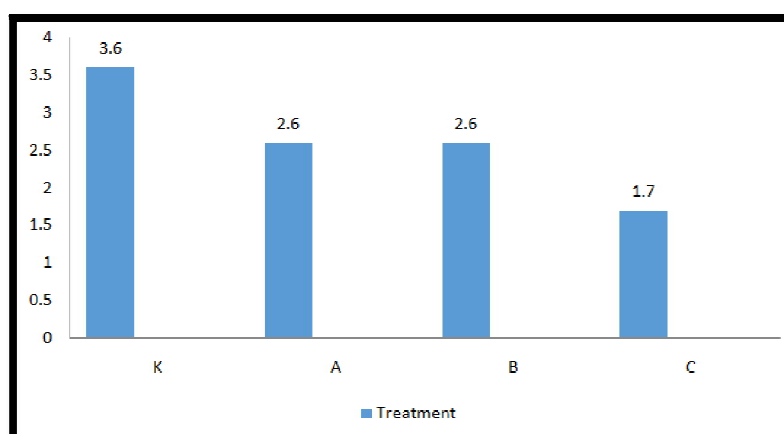

Figure 7: Organoleptic Test Results for Taste

5. Conclusion

Making tempe using cowpea raw material is possible with a ratio of 25% cowpea and 75% soybeans and this is indicated by A treatment with the best water content of 59.05%,related to protein content contained in tempe, the best treatment is also A treatment namely the treatment of making soy tempeh 75% with the addition of 25% cowpearelated to fat content, the best treatment is the K treatment, while the organoleptic test results for testing the Flavour, color, texture and taste, then the panelists prefer the K treatment which is a treatment where all the ingredients for making tempe are made from soybean.

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