

# ANALYSIS OF CUSTOMER PREFERENCE ON THE COWPEA TEMPE

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## Abstract

The aim of this research are to analyze the customer preference on cowpea tempe, to know the proportion substitution of cowpea on soybean in making tempe that as a favorite food by costumer, and to know the nutritions of cowpea tempe. The research is done in Laboratory of Food and Nutrition, Agriculture Faculty of Sebelas Maret University. The research steps were in making tempe by using soybean which is substituted by cowpea with comparison 0: 20: 40: 60: 80: 100. Testing of organoleptic includes: color, texture, aromatic, and taste. Testing of proximate includes: the content of protein, fat, carbohydrate, water, and ashes. The method which is used is Non Probability Sampling. The participants who are joined in this research are untrainer. They are 60 people in Jombor Village, Bendosari, Sukoharjo. The data analyze uses analysis variant 5% and there is a real difference to continue the Duncan Multiple Range Test (DMRT). The result of this research shows that the customer preference on tempe which is substituted by cowpea about 20% just consist of color and taste eventhough the texture and aromatic the customer preference still depends on soybean tempe. Based on organoleptic test, it is gained result that people didn't like tempe with a lot of cowpea substitution. It is because the color is brownish, the texture is not compact, the aromatic is sour and the taste is unpleasant. Cowpea tempe consists of less protein and fat than soybean tempe which has the highest carbohydrate than soybean tempe, and also has water and ashes content which similar with soybean tempe.

**Keywords:** customer preference, tempe, cowpea

## 1. Introductions

Tempe is the favorite food of Indonesian and one source of vegetable protein derived from soybean. Nutrient content of tempe able to compete with non- vegetable foods such as meat, eggs, and fish, good content protein, vitamin, minerals and carbohydrates.

At this time, the most material for making tempe is made from soybean, but in recent years the national production of soybean has decreased, even still rely on soybean imports to 1.2 million tons per year while the national production soybean is 800 tons per year [4]. To overcome the dependence on soybean, it is necessary to find an alternative the soybean. Substitution of soybean is expected to reduce the use of soybean large enough in Indonesia and provide an alternative to the people to choose local food commodities that have the quality of nutrition, taste, and the image is not inferior to soybean.

Based on the research Center for Post-Harvest Research and Development of Agriculture, there are several types of beans (except soybean) can be processed into tempe, namely cow-

pea, fava, and pigeon pea. The local beans have the potential to substitute soybeans.

Cowpea has a nutrient content that is similar with soybean. In terms of nutritional content, each 100 grams of cowpea contains 22.9 grams of protein, 1.1 grams of fat and 61.6 grams of carbohydrates, while each 100 grams of soybean contains 30.2 grams of protein, 15.6 grams of fat, and 30.1 grams of carbohydrates. Cowpea yield potential is high enough, reaching 1.5-2.0 tons per ha, depending on the variety, location, growing season, and cultivation technology applied [4].

Cowpea (*Vigna unguiculata* L.) belongs to plants that used as food, feed, and industrial raw materials [10]. In Indonesia, cowpea is generally grown on dry land in the dry season, but most farmers cultivate the wetland after paddy. This is related to the plant traits of cowpea are more tolerant of drought than with the plant traits of other legumes. Many of cowpea intercropping with other food crops such as sorghum, maize, and cassava [10].

Cowpea is one kind of beans that are relatively high in protein, besides the affordable prices. From various researches, it showed that cowpea can be processed into tempe [9]. The content of protein and carbohy-

drates in cowpea is equivalent with green beans and pigeon pea. The content of essential amino acids (amino acids that the body cannot be synthesized) on cowpea is relatively similar to soybean. The advantages of cowpea are have a lower fat content so as to minimize the negative effects of fatty food products [5]. According to research, substitution of soy beans with 30 % pigeon pea still produce tempe that can be accepted by costumers. Cowpea without mixed soybeans can produce tempe with good quality [6].

### Research and Method

Organoleptic testing is conducted in the Bendosari District of Sukoharjo, while the proximate test conducted at the Laboratory of Food and Nutrition, Faculty of Agriculture, Sebelas Maret University.

The experimental design used was completely randomized design (CRD) with 6 treatments, each treatment was repeated three times.

P1 : Soybean 0 % , 100 % cowpea

Implementation of the research include the following steps, those are:

Treatment	Score			
	Color	Texture	Aromatic	Taste
P1	3.47 a	3.77 a	3.67 a	3.70 b
P2	3.7 a	3.45 a	3.80 a	3.75 b
P3	3.6 a	3.67 a	3.62 a	3.42 ab
P4	3.7 a	3.65 a	3.42 a	3.35 a
P5	4.27 b	3.85 a	3.88 a	4.17 c
P6	4.57 b	4.32 b	4.42 b	4.43 c

## 3. Result and Discussion

### 3.1. Characteristics of Respondents

Characteristics of respondents in this research include gender, age, education and employment. Characteristics of respondents by gender that is obtained from the data of male respondents are about 26 people (43.33 %) and female respondents are 34 people (56.67 %).

Based on the age, it can be divided into three groups, namely age < 15 years , belongs to groups who have not been productive, aged 15-64 years, included the productive class, and age 65 years and over, included the class of unproductive. Respondents in this research which included the unproductive group is 0 %, productive group is 54 people (90 %), and that is not productive is 6 people (10 %).

Based on the education, the elementary/ equivalent education's respondent is 4 people

(6.67%), junior school/equivalent is 7 people (11.67 %), high school/equivalent is 22 people (36.67 %), and university is 27 people (45 %).

Based on the job, the respondents as a housewife is 13 people ( 21.67 % ), civil servants is 5 people ( 8.33% ), self-employed is 9 people (15 %), private is 24 people (40 %) and student 9 people (15 %).

### 3.2. The result of organoleptic test

#### 3.2.1. The results of the organoleptic attributes of color

Tabel 1. The result of organoleptic test to six tempe products

Test of consumer acceptance to tempe products with six hedonic test P6 treatment (100 % soybean) was not significantly different from the P5 ( 80 % soybean , cowpea 20 % ), but significantly different from P1 treatment (cowpea 100 % ) , P2 (20 % soybean , cowpea 80 % ) , P3 ( 40 % soybean, cowpea 60 % ), and P4 ( 60 % soybean , cowpea 40 % ).

Consumers prefer soybean tempe (P6) which are substituted by cowpea 20 % (P5) to tempe products that are substituted by cowpea with high percentage. This is due to the substitution of cowpea is more and more , the color of tempe produced tends to be brown and even white chocolate and not as white as the color of tempe is made from soybean. This is presumably because the epidermis of cowpea relatively thicker and more difficult to separate than epidermis of soybean so cowpea husk still attached to the seeds of cowpea.

#### 3.3. The results of the organoleptic attributes of texture

Based on the further Duncan Test showed that treatment of P6 (100% soybean) is significantly different from other treatments. Consumers liked the tempe that is made from soybeans because of compact texture. Epidermis contained in the seeds of cowpea makes the texture of cowpea tempe is as not compact as soybeans tempe, because the epidermis of cowpea able to inhibit the growth of fungal mycelial of tempe. The more epidermis is still attached to the seeds of cowpea will make the cowpea tempe increasing is not compact. This is consistent with research [9], where the treatment of cowpea tempe 100% indicates that the compactness result the lowest compared to other treatment.

### The results of the organoleptic attributes of aromatic

Based on further Duncan test (Table 1) showed that treatment of P6 (100 % soybean) significantly different from other treatments. Consumers preferred the aromatic of soybeans tempe, because cowpea tempe has sour aromatic. This is due to the fermentation process that produces lactic acid and ethanol. Cowpea tempe fermentation produced improving of temperatures. It is warmer than on fermentation of soybeans tempe thus suspected fungal metabolic process faster [8]

### The results of the organoleptic attributes of taste

Based on further test Duncan (Table 1) showed that treatment of P6 (soybean 100 %) was not significantly different treatment P5 (80 % soybean and cowpea 20 %), but significantly different from other treatments. In terms of taste acquired the best comparison between soybean and cowpea by 80 %: 20 %, it can be concluded that cowpea able to substitute soybean by 20 %. Cowpea tempe flavors are more savory is preferred by consumers is an excess that needs to be highlighted to cover existing sensory deficiencies.

Nutrient Content of cowpea tempe

Table 2. Duncan Test of Protein, Fat, Water, Ash and Carbohydrate Content

Treatment	Protein	Fat	Water	Ash	Carbohydrate
P1	15.80 <sup>a</sup>	0.99 <sup>a</sup>	58.16abc	1.50c	23.54 <sup>f</sup>
P2	16.93 <sup>b</sup>	2.81 <sup>b</sup>	57.54a	1.37bc	21.34 <sup>e</sup>
P3	18.50 <sup>c</sup>	4.29 <sup>c</sup>	57.81ab	1.25abc	18.15 <sup>d</sup>
P4	19.78 <sup>d</sup>	6.98 <sup>d</sup>	59.95d	1.12ab	12.18 <sup>c</sup>
P5	20.27 <sup>e</sup>	9.30 <sup>e</sup>	59.38cd	1.02a	10.04 <sup>b</sup>
P6	24.38 <sup>f</sup>	11.43 <sup>f</sup>	59.06bcd	1.46c	3.67 <sup>a</sup>

#### 3.3.1. Determination of protein content

Duncan test result showed that P1 significantly different from the P2, P3, P4, P5, and P6. The highest protein content of 24.38 obtained in the treatment P6 (soybean 100 %), while the lowest protein content of 15.8 obtained in treatment P1 (cowpea 100 %). The protein content of cowpea was lower than in soybeans with protein per 100 grams of soybeans at 34.9 while the cowpea is about 22.9.

#### 3.3.2. Determination of fat content

Duncan test result showed the levels of fat tempe substituted with cowpea (P1, P2, P3, P4, P5) varies the range of 0.99 to 9.3 lower than the fat content of soybean tempe is 11.43. Based on the nutrient composition per 100 grams of material, the fat content in cowpea and soybean is about 1.4 grams whereas soybean is higher at 18.1 grams. During the fermentation process of soybeans, there is an increase in unsaturated fatty acids. Unsaturated fatty acids have a lowering effect on serum cholesterol content, so able to neutralize the negative effects of sterols in the body [8]

#### 3.3.3. Determination of water content

Water is needed by microbes, especially fungi tempe to grow optimally. Changes in water during fermentation can be used to find out more water that is needed by the tempe fungus to metabolize. Duncan test results showed that the water content in soybean cowpea has variety from 57 % to 59 %, almost the same level of water in soybean tempe (59 %), but the treatment of cowpea tempe is substituted about 20 % (P5) and the substitution of 40% (P4) has a higher water content than soybean tempe. On treatment with cowpea substitution of 40% (P4), it is a condition of optimum water content. This is supported also by the temperature of the cowpea tempe is warmer than the temperature on soybean tempe. The high water content causes the sour aroma the cowpea tempe as a result of lactic acid fermentation

#### 3.3.4. Determination of ash content

Duncan test result showed that the ash content in soybean tempe and cowpea tempe are not significantly different, but significantly different substituted cowpea tempe 20 % (P5) and the substitution about 40 % (P4). The ash content is the analysis which can show the many minerals contained in the materials. High levels of ash showed that the fermentation process in the cowpea tempe only slightly reduce the mineral content [8]

#### 3.3.5. Determination of Carbohydrate Content

Based on Duncan test, it is known that high levels of carbohydrates contained about 23.54 % in the treatment of cowpea tempe 100 % (P1) and the lowest about 3.67% found in the treatment of 100 % soybean tempe (P6). High levels of carbohydrates in cowpea tempe is caused basic material in cowpea has a higher carbohydrate content than

soybeans, also caused by a large husk still attached to the seeds of cowpea and also because it uses a by different method which means the epidermis in seeds of cowpea also counted.

#### 4. Conclusions

The level of consumer acceptance of the cowpea tempe that substituted 20 % only includes attributes of color and taste, whereas for texture and flavor attributes of consumer acceptance rate is still at soybean tempe.

Based on organoleptic testn it is obtained result that more substitution of cowpea, so tempe products are not preferred by consumers because the colors tend to be brownish, texture is not compact, sour flavor and taste rather unpleasant.

Cowpea tempe has the levels of protein and fat content is lower than soybean tempe, has a higher carbohydrate content than soybean tempe, and ithas a water content and ash content that resembles soybean tempe.

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