Physical and Organoleptic Quality of Mayonnaise With Different Acidifying Ingredients

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Abstract

This study aims to determine the appropriate acidifying materials between vinegar, lime and pineapple in order to produce mayonnaise with good quality in terms of physical quality (pH and emulsion stability) and organoleptic (taste, aroma and color). The results showed that the use of different acidifying materials vinegar, lime and pineapple, showed significant differences in the physical quality of mayonnaise, both pH and emulsion stability and had no effect on organoleptic tests in this case the taste, aroma and color of mayonnaise. The use of different acidifying materials did not show a significant difference. For the physical quality of mayonnaise, the best treatment was obtained by using lime.

Keywords: Physical Quality, Organoleptic, Mayonnaise, Acidifier Material

Introduction

Mayonnaise is a food ingredient in the form of a dressing made from vegetable oil, egg yolks and acidifying ingredients and is used for salads or sandwiches. Products derived from vegetable oil emulsions are very popular in the community because of their use in a variety of food products in the world today, very rich in benefits for both health and beauty. The taste of mayonnaise can be enriched by adding sugar, salt and spices, and one of the acidifying ingredients such as lemon, vinegar and tamarind.

In general, mayonnaise is made of 3 main components, namely disperse and dispersing materials in the form of vegetable oils and acidifying agents, as well as emulsifier materials in the form of egg yolks. The three main ingredients must be mixed evenly, but the problem of breakage of the emulsion which causes the separation of oil and water particles (Jaya et al, 2013) is often encountered during storage.

Many factors affect the quality of mayonnaise, one of which is an acidifying agent. Packaged mayonnaise sold in the market mostly uses vinegar which is a chemical acidifier and is dangerous for prolonged consumption. Acids can affect pH, viscosity, emulsion stability (Syukriya, 2020), and can inhibit the growth of bacteria during storage so that the use of appropriate acidifying agents is necessary to improve the physical and organoleptic qualities of mayonnaise.

Materials and methods

The materials used include chicken egg yolks aged 1-2 weeks, coroil type vegetable oil, vinegar, lime, pineapple, sugar, salt and mustard, as well as Mayumi brand commercial mayonnaise. The equipment used consisted of spoons, basins, stoves, pans, glass stirrers, glass jars, digital scales, Miyako brand mixers, and aluminum foil, centrifuge, centrifuge tube, and pH meter.

Formula Mayonnaise Dough

The dough formula used in this study follows the formulation of Rusalim (2017) which is presented in table 1 below:
Table 1. Composition Formula for Making Mayonnaise

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P1 (Vinegar Acid)</td>
</tr>
<tr>
<td>Egg yolk</td>
<td>25</td>
</tr>
<tr>
<td>Oil (ml)</td>
<td>75</td>
</tr>
<tr>
<td>Acidifying agent (ml)</td>
<td>7,5</td>
</tr>
<tr>
<td>Sugar (g)</td>
<td>5</td>
</tr>
<tr>
<td>Salt (g)</td>
<td>1</td>
</tr>
</tbody>
</table>

Mayonnaise Making

Following the modification of Rusalim et al., (2017), 130 grams of egg yolk was prepared in the manufacture of mayonnaise which had been separated from the egg white, then 270 ml of corn oil mazolla was prepared. After that, a seasoning was prepared which consisted of 30 ml of acidifying agent (according to the treatment), 20 grams of sugar, 4 grams of fine salt and 2 grams of mustard. After the material has been prepared based on the treatment, then the mixer is carried out perfectly and stirred using a 3 speed mixer for 2 minutes. Furthermore, observations of physical properties (emulsion stability, pH) and organoleptic tests (taste, aroma, and color) were observed.

Research design

The experimental design used in this study consisted of 4 treatments. The types of treatment in question are:
- P0 = Mayumi brand commercial mayonnaise
- P1 = acetic acid acidifier
- P2 = lime acidifier
- P3 = pineapple acidifier

Each treatment was repeated 4 times, so there were 16 experimental units. The research design for the physical and organoleptic properties of mayonnaise used RAL (Completely Randomized Design). The mathematical model used is Completely Randomized Design (CRD). The mathematical model of the design used is as follows (Sudibya, 2013):

\[ \text{Yij} = \mu + \alpha_i + \varepsilon_{ij} \]

Information:
- \( \text{Yij} \) = The value of observations on the treatment of various types of acidifying materials different i-th and j repetition
- \( \mu \) = Expected value (general average value)
- \( \alpha_i \) = The effect of various types of acidifying agents
- \( \varepsilon_{ij} \) = Effect of trial error
- \( I = 1, 2, 3, \) and 4 (multiple treatments)
- \( J = 1, 2, 3 \) and 4 (many repetitions)

Research variable

Mayonnaise pH measurement is done by using a tool, namely a pH meter. The pH meter was standardized beforehand with a buffer for normal mayonnaise pH of 3.70. This pH test was carried out on mayonnaise with different treatments. pH is a function of the hydrogen ion concentration in the food:

\[ \text{pH} = -\log 10[\text{H}^+] \] (Paundrianagari, 2011).

The measurement of the stability of the emulsion (o/w) on the separation of the dispersing and dispersed phases was carried out by inserting 10 ml of mayonnaise sample into a centrifuge tube. Each sample was centrifuged for 15 minutes. Then the volume of separated oil is measured. Stability is calculated based on the percentage of the volume of oil separated from the volume of the mayonnaise sample. (Soekarto, 2013).

According to Rahayu (1998), the hedonic test aims to determine the response of panelists to general quality characteristics such as color, aroma, taste. The organoleptic test carried out on the manufacture of mayonnaise with different types of acidifying ingredients is a hedonic quality test from students of the Faculty of Animal Science, Halu Oleo University, Kendari. The panelists used were 20 semi-trained people. The work procedure is carried out according to Soekarto, (2013) which was modified. A total of 10 grams of mayonnaise samples were placed in a plate that had been coded. Questionnaire sheets were prepared at each panelist's table. Palenis are welcome to enter the laboratory to do the test, then the
hedonic scale data from the organoleptic test results are collected, then analyzed. SPSS 16 to determine the effect of treatment on treatment parameters. If the treatment has a significant effect, then it is continued with a different test between treatments using the Duncan Multiple Range Test.

### Data analysis

The data obtained were analyzed by Analysis of variance (Anova) using Software SPSS 16 to determine the effect of treatment on treatment parameters. If the treatment has a significant effect, then it is continued with a different test between treatments using the Duncan Multiple Range Test.

### Results and Discussion

#### Physical Quality of Mayonnaise With Different Acidic Ingredients pH

The results of the analysis showed that the use of different acidifying agents had a significant effect on the pH value. The average pH value of mayonnaise ranged from 3.86 to 5.28. The lowest pH value was shown by the P0 treatment (Control) and the highest was indicated by the P3 treatment using pineapple acidifier. The level of acidity is known to greatly affect the shelf life of mayonnaise, the more acidic it is, the longer the shelf life will be.

The physical quality of mayonnaise in the form of average pH values using different acidifying agents can be seen in table 3 below:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average pH Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td>3.86±0.00</td>
</tr>
<tr>
<td>P1</td>
<td>4.57±0.17</td>
</tr>
<tr>
<td>P2</td>
<td>4.17±0.10</td>
</tr>
<tr>
<td>P3</td>
<td>5.28±0.28</td>
</tr>
</tbody>
</table>

**Information:** Different superscripts on the same line show significant differences (P < 0.05).

The use of lime in this study resulted in a lower pH of mayonnaise compared to vinegar and pineapple, this may be due to the content of lime which is in the form of organic acids and has high antioxidant activity. (Rahardjo, 2012). Nour et al., (2010) reported that lime contains high levels of citric acid and can reduce bacterial decontamination.

The use of lime in this study resulted in a lower pH of mayonnaise compared to vinegar and pineapple, this may be due to the content of lime which is in the form of organic acids and has high antioxidant activity. (Rahardjo, 2012).

#### Emulsion Stability

The physical quality in the form of the average stability of the mayonnaise emulsion using different acidifying agents can be seen in table 4 below:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average Emulsion Stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td>100±0.00</td>
</tr>
<tr>
<td>P1</td>
<td>91.4±0.89</td>
</tr>
<tr>
<td>P2</td>
<td>95.8±0.89</td>
</tr>
<tr>
<td>P3</td>
<td>99.6±0.55</td>
</tr>
</tbody>
</table>

**Information:** Different superscripts show real impact (p<0.05)

The highest mayonnaise emulsion stability value was found in the P0 treatment and the lowest was obtained by the vinegar acidifying agent. The average value of the stability of the mayonnaise emulsion in this study ranged from 91.4 to 100. The use of pineapple as an acidifying agent could increase the stability of the mayonnaise emulsion compared to other acidifying agents. This may be due to pineapple has a lower water content of 82% (Sidi et al., 2014) compared to vinegar and lime which ranged from 88-90% (Diniyani et al., 2015). Emulsion stability is caused by the balance between the water phase and the oil phase, where
in the right proportion the oil can bind water molecules so as to produce high emulsion stability. (Mutia, 2002). However, if the water phase is higher than the oil phase, it will cause low emulsion stability due to the presence of water molecules that cannot be bound by oil (Prasetya and Evanuarini, 2019).

Pineapple is a tropical fruit with complete nutritional content and has a higher acidity of 3.46 than lime with a pH of 2.48. The high acid content in the manufacture of mayonnaise is known to denature the protein contained in the egg yolk which functions as an emulsifier. Protein denaturation will have an impact on decreasing the stability of the emulsion in mayonnaise. This is in accordance with what was stated by Winarno (2002) that egg yolk is a better emulsifier than egg white because it contains protein lecithin in complex form.

Mayonnaise Organoleptic Quality With The Use Of Different Acids

The results of organoleptic testing based on the panelists' preference level or hedonic test on the color, aroma and taste of mayonnaise are presented in Table 3.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment</th>
<th>P0</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P0</td>
<td>3.47±0.83&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.73±0.96&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.53±0.83&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.40±1.55&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Scent</td>
<td>P1</td>
<td>4.13±1.72</td>
<td>3.80±1.89</td>
<td>4.47±1.88</td>
<td>3.53±1.84</td>
</tr>
<tr>
<td>Flavor</td>
<td>P2</td>
<td>5.93±1.48&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>5.80±1.69&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>5.00±1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.53±1.12&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Information: Different superscripts showed no significant effect (p<0.05) Color: (1) white, (2) yellowish white, (3) pale yellow, and (4) yellow. Aroma: (1) very fishy, (2) fishy, (3) slightly fishy, (4) slightly fishy, (5) not fishy. Taste: (1) very bitter, (2) bitter, (3) slightly bitter, (4) slightly bitter, (5) bland, (6) slightly sour, (7) sour

The organoleptic test aims to determine the quality of the mayonnaise produced and to determine the level of acceptance of the mayonnaise product.

Color

The panelists' level of preference for mayonnaise varies with a score of 1.40-3.73, which ranges from white to pale yellow. The color of mayonnaise that uses pineapple as an acidifier is paler than mayonnaise that uses vinegar and lime as an acidifier. The color of mayonnaise is strongly influenced by the color of the egg yolk used, while the color of the yolk depends on the carotenoid content in the feed. The more concentrated the carotenoid content, the lighter the egg yolk color (Gaonkar et al., 2010) so that it can make the mayonnaise more yellow.

On the other hand, Campbell (1999) reported that carotenoids will be very easily oxidized by acidic conditions and easily soluble in oil, so it is possible to produce a pale color in mayonnaise.

Scent

The organoleptic quality of mayonnaise produced from the use of different acidifying agents can be presented in table 3 above. The average value of the aroma of mayonnaise ranges from 3.53-4.47. The aroma that is close to not fishy is shown in the P2 treatment which uses lime as an acidifying agent, while a slightly fishy aroma is indicated by the treatment using pineapple as an acidifier. This is presumably due to the high acid content of each acidifying agent.

Hasanna (2018) states that the fishy aroma is caused by trimethylamine (TMA) compounds, in very concentrated acid conditions, TMA compounds will bind more water so it is difficult to evaporate and can reduce the fishy aroma in certain foods. On the other hand, Setyaningsih dkk, (2010) suggested that the assessment of aroma is a subjective assessment that requires sensitivity in feeling and smelling smells or smells showing the most difficult sensory properties to explain and explain because the variety is so large.

Flavor

The results of the analysis showed that the use of different acidifying agents did not show a significant effect on the sensory quality of taste in mayonnaise. The taste value of mayonnaise ranges from 5.00 to 6.53 with a bland description to sour taste. The bland taste is obtained from mayonnaise which is given a lime
acidifier while the sour taste is obtained from mayonnaise which is given a pineapple acidifier. Mayonnaise is a semi-solid emulsion resulting from a mixture of vegetable oil, eggs and acidifying ingredients and spices (Chukwu dan Sadiq, 2008). Therefore, the organoleptic characteristics of the resulting mayonnaise depend on the ingredients used. Gavahian et al., (2011) stated that the sensory test of color, scent, taste will indicate the quality of the mayonnaise produced.

References


