The effect of addition of andaliman (Zanthoxylum acanthopodium DC) on the quality of andaliman condiment

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Abstract. The purpose of this research was to introduce the traditional food in North Sumatera and to find the effect of andaliman addition on the quality and organoleptic acceptance of condiment. The research was conducted using a non-factorial randomized block design with andaliman addition (2%, 4%, 6% and 8%) of mixture of seasoning as the factor. The results showed that the different addition of andaliman very significant different (P < 0.01) effect on organoleptic score of colour and significantly different (P < 0.05) from the moisture content, ash content, ascorbic acid, organoleptic score of bitterness, organoleptic score of taste but giving effect is not significantly different (P > 0.05) from pH value and organoleptic score of flavour.

1. Introduction

Indonesia is a country with a lot of regional cultural diversity each region has its own unique culture and food. In North Sumatra, there are andaliman (Zanthoxylum acanthopodium DC) that thrive in the area around Lake Toba, which is widely used as a cooking spice for various cuisines because it contains sanshool compound and has a spicy taste like pepper. In addition, essential oils from andaliman can also be used as antimicrobials that can be used as food preservatives [1]. Andaliman processing is often applied in addition to cooking spices in various Batak traditional ceremonies. However, traditional products have begun to be forgotten by the people themselves, so that the characteristics of each region may be extinct and unknown to the new generation.

Condiment is a mixture of spices which consists of one or more types of spices in the form of spices or spice extract which serves to strengthen flavour added directly to food not at the time of processing [2]. Andaliman condiment is a traditional cuisine of Toba, Samosir, North Sumatera. Semi-solid texture made from a mixture of ingredients, namely red chili, cayenne pepper, onion, garlic, kecombrang flower (Etlingera elatior), candlenut, lime, sugar, salt, palm oil and the addition of andaliman.

Although andaliman condiment has been consumed for years, there is only limited research on andaliman extract products as antimicrobials [3]. Wijaya [4] found that citronellan and limonen are the compounds that have the most impact on andaliman aroma, but β-myrcene, (z)-β-ocimene, linalool, β-citronellol, neral, geraniol, geranial, geranyl acetate, unknown compounds and sesquiterpene also contributes to fresh andaliman citrus and sweet spicy aroma. It has been reported to have anti-inflammatory activity, antioxidant activity [5], antimicrobial activity [6]. Based on their previous
research that if given the difference in concentration andaliman will give effect to andaliman condiment.

Andaliman play an important role for determined the right andaliman condiment formulation. The finding results are expected to help people to know the traditional food in North Sumatera. Hence, the purpose of this research was to determine the effect of addition of andaliman on the quality of andaliman condiment.

2. Materials and Methods
The research material was red chili, cayenne pepper, onion, garlic, candlenut, andaliman, kecombrang flower (*Etlingera elatior*), sugar, salt, cornstarch, palm oil and lime obtained from local market. The reagents used in the study were aquadest, C₆H₈O₆ (ascorbate acid), oxalic acid 3%, HPO₃, 2,6-Na-diklorofenol indophenol.

2.1 Research methods
The making of andaliman condiment is done by choosing red chili, cayenne pepper, onion, garlic, candlenut, andaliman and kecombrang flower (*Etlingera elatior*) with an optimal level of maturity named is mixture of spices. Condiment made with a total weight of 278 g. Weighed the ingredients with 32.5% red chili, 6% cayenne pepper, 12% onion, 6% garlic, 12% candlenut, 3% kecombrang flower (*Etlingera elatior*) and andaliman concentration as much as 2%, 4%, 6%, 8% of mixture of spices. Washing and blanching for 5 minutes and drained. Grinded of mixture of spices and andaliman concentration 2%, 4%, 6%, 8% of mixture of spices uses a blender. Added 6% lime juice, 5% sugar, 6% corn starch, 2.5% palm oil and 9% salt into the andaliman condiment.

2.2 Data analysis
This study used a non-factorial randomized block design of one factor which were andaliman: A₁ = 2%, A₂ = 4%, A₃ = 6% and A₄ = 8% of mixture of seasoning. Each treatments was made in 5 replications so the total sample size was 20 samples. Parameters analysed were moisture content, ash content, ascorbic acid, pH value, organoleptic score of bitterness, organoleptic score of taste, organoleptic score of flavour and organoleptic score of colour. The data obtained were processed using variance analysis (ANOVA). Significant treatments were tested further using the LSR (Least Significant Range) test.

3. Results and Discussions

3.1. Moisture content
Figure 1 shows that moisture content of andaliman condiment has a significant effect (P<0.05). The highest moisture content was obtained in A₄ (8%) treatment at 54.18% and the lowest moisture content was obtained in A₁ (2%) treatment at 46.03%. This happens because andaliman has a high moisture content, so the more andaliman addition, the moisture content increase [7].
Figure 1. Relation of percentage of andaliman to moisture content of andaliman condiment (A1 = 2%, A2 = 4%, A3 = 6%, A4 = 8%)

3.2. Ash Content
Figure 2 shows that ash content of andaliman condiment has a significant effect (P<0.05). The highest ash content was obtained in A4 (8%) treatment at 19.88% and the lowest ash content was obtained in A1 (2%) treatment at 16.69%. This happens because andaliman has a high mineral content, the more andaliman addition, the higher the ash content. Ash is an inorganic substance remaining from the combustion of an organic material. The ash content and composition depend on the type of material and how it is treated. In general this inorganic residue consists of oxides and salts containing anions such as phosphate, chloride, sulfate and other halides and also cations such as sodium, potassium, calcium, magnesium, iron and manganese [8].

Figure 2. Relation of percentage of andaliman to ash content of andaliman condiment (A1 = 2%, A2 = 4%, A3 = 6%, A4 = 8%)

3.3. Ascorbic Acid
Figure 3 shows that ascorbic acid of andaliman condiment has a significant effect (P<0.05). The highest ascorbic acid was obtained in A4 (8%) treatment at 16.71 (mg/100g samples) and the lowest
ascorbic acid was obtained in A1 (2%) treatment at 10.79 (mg/100g samples). This happens because andaliman has a high ascorbic acid, so the more andaliman is added the ascorbic acid increase [9].

![Figure 3](image)

**Figure 3.** Relation of percentage of andaliman to ascorbic acid of andaliman condiment (A1 = 2%, A2 = 4%, A3 = 6%, A4 = 8%)

### 3.4. pH value

Figure 4 shows that the comparison of andaliman gives no significant effect (P > 0.05) on the pH value of andaliman condiment, so the LSR (Least Significant Range) test is not continued. The highest pH value was obtained in A4 (8%) treatment at 5.11 and the lowest ash content was obtained in A1 (2%) treatment at 4.99.

![Figure 4](image)

**Figure 4.** Relation of percentage of andaliman to pH value of andaliman condiment (A1 = 2%, A2 = 4%, A3 = 6%, A4 = 8%)

### 3.5. Organoleptic

Figure 5A shows that organoleptic score of bitterness of andaliman condiment has a significant effect (P < 0.05). The highest organoleptic score of bitterness was obtained in A4 (8%) treatment at 4.31 and the lowest organoleptic score of bitterness was obtained in A1 (2%) treatment at 1.73. This happens because andaliman has a bitter taste, so the higher the addition of Andaliman, the resulting andaliman condiment powder is getting bitter. Andaliman has a distinctive taste which is a bitter taste derived from the 2-methylpropyl-dodecatetraenamide compound called sanshool [10].
Figure 5B shows that organoleptic score of colour of andaliman condiment has a very significant effect (P<0.01). The highest organoleptic score of colour was obtained in A1 (2%) treatment at 3.65 and the lowest organoleptic score of colour was obtained in A4 (8%) treatment at 2.97. This happens because andaliman has a dark colour of darkness, so the higher the addition of andaliman, the darker andaliman condiment [11].

Figure 5C shows that organoleptic score of taste of andaliman condiment has a significant effect (P<0.05). The highest organoleptic score of taste was obtained in A4 (8%) treatment at 4.59 and the lowest organoleptic score of taste was obtained in A1 (2%) treatment at 2.95. This happens because condiment andaliman has a bitterness and spicy taste from the sanshool content which gives a numbing effect on the tongue. Andaliman contains 2-methylpropyl-dodecatetraenamide compounds called sanshool to produce bitter taste and spicy effect [12].

Figure 5D shows that the percentage of andaliman had no significant effect (P> 0.05) on organoleptic score of flavour of andaliman condiment, so that LSR (Least Significant Range) test was discontinued. The highest organoleptic score of flavour was obtained in A1 (2%) treatment at 3.46 and the lowest organoleptic score of flavour was obtained in A4 (8%) treatment at 3.21.

![Graphs showing the relation of percentage of andaliman to organoleptic scores](image)

**Figure 5.** Relation of percentage of andaliman to organoleptic score of bitterness (A), organoleptic score of colour (B), organoleptic score of taste (C), organoleptic score of flavour (D) of andaliman condiment (A₁ = 2 %, A₂ = 4 %, A₃ = 6 %, A₄ = 8 %)

4. **Conclusion**

It was found that the effect of andaliman addition has a very significant different effect on organoleptic score of colour and significantly different from the moisture content, ash content, ascorbic acid, organoleptic score of bitterness, organoleptic score of taste but giving effect is not significantly different from pH value and organoleptic score of flavour.
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