Characteristics and Quality of Oleoresin Based on Different Stimulant Treatments

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Abstract

The quality of the oleoresin determines the selling value of exports and imports. The quality of pine resin is determined by its colour, moisture content, and impurities. The research method uses Independent T-tests to compare organic stimulants and sulfuric acid stimulants in pine resin tapping and refers to SNI 7837:2016 to determine the quality of oleoresin. The results showed that trees treated with organic stimulants produced bright white oleoresin with an average production of 24 g/month compared to trees treated with sulfuric acid stimulants which produced cloudy white oleoresin with an average production of 40 g/month. However, both trees produced low levels of impurities and moisture content of <5%, thus belonging to the super-premium quality class.

Keywords: Production, Oleoresin Quality, Oleoresin Characteristics, Stimulants.

Introduction

The role of oleoresin from year to year can be seen from the value of the sap (Supriyono and Prehaten, 2013). Pine sap quality and Gondorukem quality are influenced by where it grows (Samosir *et al*., 2015), age (Evayanti *et al*., 2018), diameter (Suhartati and Attoric, 2021), genetic traits (Azka *et al*., 2018), altitude (Hasibuan *et al*., 2013), quality and quantity of tapping power (Syahputra and Sibuea, 2021), tapping method (Sukadaryati, 2014) and the concentration of sulfuric acid which affects how much/little the sap comes out (Prasista *et al*., 2020).

Efforts to increase sap production by using stimulants need to pay attention to the acid concentration. If the concentration is too low the production is less effective and vice versa if the concentration is too high it will make the pine tree dry (Surbakti *et al*., 2014). The concentration of stimulant acid that can be used is 30% (Samosir *et al*., 2015). In line with previous research Lempang (2017), reported the highest productivity was obtained at a concentration of H2SO4 stimulant 30%.

The color quality of oleoresin, moisture content, and dirt content are affected by different tapping methods (Sukadaryati, 2014). Different methods produce different latex colors because they are influenced by the latex container used (Weasono *et al.,* 2022). Gondorukem quality is affected by the content of impurities or minerals in the sap (Historian, 2005). The color indicates the clarity of the gondorukem, even though the color of the gondorukem is clear if the dirt content is high, the grade will decrease (Stephanie *et al*., 2021).

Oleoresin in Konggamea Village is produced through a tapping process using the quarry method using a plastic container, with organic stimulants and sulfuric acid stimulants. Pine resin collected by farmers is then sent to factories or oleoresin processing industries to be processed into a product. Delivery of oleoresin in raw form or has not gone through any sap washing process at all. To achieve the standard of oleoresin quality required by the industry, it is necessary to know the quality of oleoresin. The oleoresin processing industry determines the quality of oleoresin by its impurities and color (Hidayat *et al*., 2021).

This study aims to determine the characteristics and quality of oleoresin in Konggamea Village by looking at the suitability of the quality of SNI 7837: 2016, based on the comparison of two different types of stimulants.

Materials and Methods

1. Materials

The research sample was 18 pine trees located in the Pine Forest Area in Konggamea Village, Sampara District, Konawe Regency, Southeast Sulawesi. The age of the sampled trees ranged from 18 years (planted since 2004). The trees were then given two different stimulant treatments, 9 trees each with organic stimulant treatment with carbohydrate content and weak acid, and 9 trees with sulfuric acid stimulant, with a total of 6 tapping farmers, each farmer tapping three different trees. The sampling technique was purposive sampling.

2. Methods

The research procedure for tapping pine resin in the Pine Forest Area of Konggamea Village, Kec. Sampara, Kab. Konawe analyzed differences in pine resin tapping based on different stimulant treatments. The procedure for tapping pine sap using the quarre method carried out by tappers as presented at Figure 1.

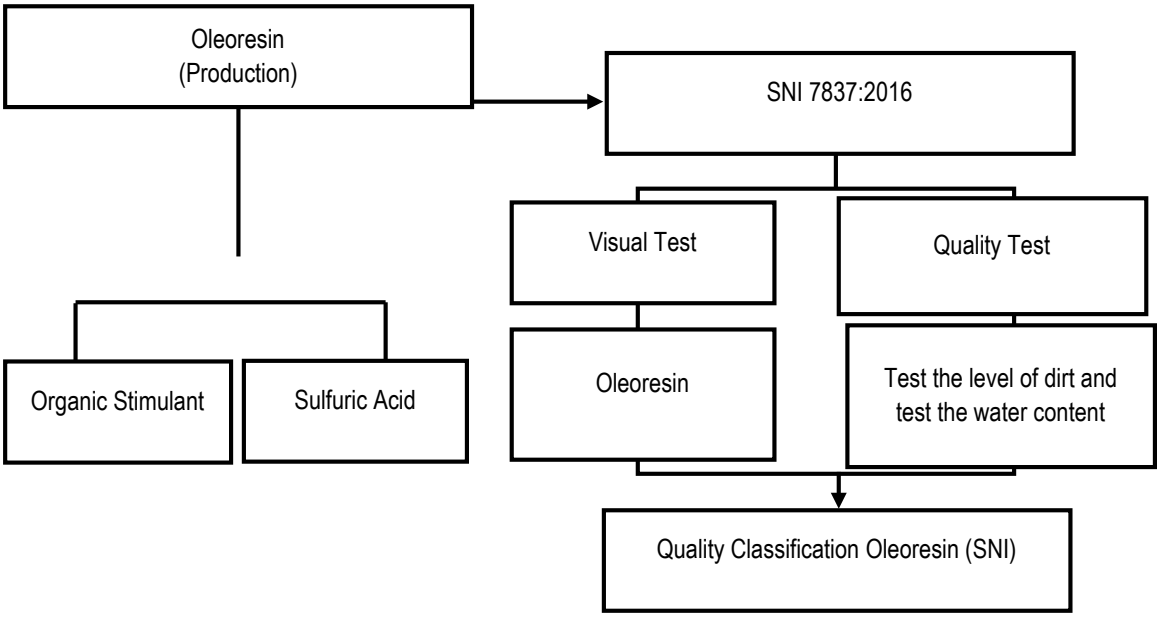

Figure 1. Research Procedure

3. Data Analysis

The results of statistical tests between organic stimulants and sulfuric acid stimulants were analyzed with an independent T-test, and then the quality of oleoresin was tested based on SNI 7837: 2016 through the laboratory by looking at visual test parameters, dirt content test, and water content test.

Results and Discussion

1. Stimulants for Oleoresin Production

The stimulant in this study was an aid in the form of a warm treatment effect on tree trunks, to make the resin channels open longer, to increase productivity. The results of the statistical analysis of stimulant treatment on pine resin productivity, are presented in **Table 1.**

Table 1. Oleoresin Production Based on 2020 Tapping SOP Compliance

Production	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
				Lower
Equal variances assumed	.014	-16.52222	5.96128	-29.15958
Equal variances not assumed	.014	-16.52222	5.96128	-29.25171

The statistical test results showed the analysis of oleoresin production values on the suitability of tapping SOPs obtained a significant value of 0.014 < α (0.05). This means that stimulants affect pine resin production. This is in line with previous research that stimulants have a warming effect on tree trunks so stimulants help open wood oleoresin line (Sukadaryati *et al*., 2014). Using stimulant drugs or liquids aims to stimulate the release of sap or facilitate the descent of sap that has been tapped from pine trees (Gampito *et al*., 2022a).

Previous research also stated that pine resin production in the provision of stimulants with a certain time interval after the wounding was higher than the provision of stimulants directly after the wounding. This is because after wound renewal in the morning, the condition of the tree is not yet stable and is still in the process of adjusting from cold temperatures at night (Sari *et al*., 2020). Sap production can be reduced due to excessive stimulant application and spraying that is too fast/slow, the maximum spraying is done 3 days after the tapping process (Gampito *et al*., 2022b).

However, this is not in line with the effect received by pine sap in terms of sap quality, because there are differences in treatment between organic stimulants and sulfuric acid stimulants. Although in terms of productivity, sap productivity with sulfuric acid stimulants is higher than with organic stimulants as presented in the graph, the sap treated with organic stimulants produces a whiter and brighter sap color than the sulfuric acid stimulant treatment which produces a cloudy and yellowish-white sap color.

Table 2. Oleoresin Production by Stimulant Type

Test	Handling	$\bar{X}$ /Tree/Month (gr)
A1	Organic	18
B1		34
C1		20
		24
D1	Sulfuric Acid	32
E1		31
F1		59
		40

2. Visual Testing

The production obtained from tapping oleoresin can indirectly affect the quality of oleoresin. The average tapped production obtained from tapping oleoresin in Konggamea Village is 35 grams/month. The results of tapping can affect quality through external factors, internal factors, and tapping treatment factors in the field. The most visible thing that can be directly seen in the field is the color produced by oleoresin. Apart from being influenced by temperature, the color of the sap produced is also greatly influenced by several factors such as the level of impurities, the moisture content in it, and the stimulants used. The following is the color of oleoresin based on in-depth visual observation in Figure 2.

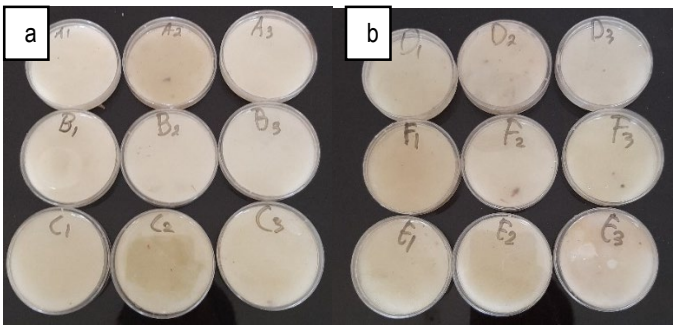

Figure 2. Appearance of Oleoresin Color. a – According to SOP with organic stimulant; b – Not According to SOP with sulfuric acid stimulant

The observation of oleoresin showed several color variations, ranging from white, cloudy white to brownish. The average color of the oleoresin produced was white, but some replicate samples produced cloudy white and brownish colors. In line with previous research proven by (Evayanti *et al*., 2018), states that the content of impurities and water content in oleoresin affects the color produced. In addition, different types of stimulants can also affect the color of the oleoresin. In Figure 2, the average visual appearance of treatments using organic stimulants is whiter than the average visual appearance of treatments using sulfuric acid stimulants, which results in the color of oleoresin tending to be yellowish cloudy white. this is triggered by the nature of sulfuric acid which easily becomes hot/burns when exposed to sunlight so the oleoresin produced in the sulfuric acid stimulant treatment tends to be yellowish cloudy white. Previous research states that the use of sulfuric acid stimulants can provide changes in wood color to a depth of ¾ of the wood axis (Sukadaryati *et al*., 2014).

Table 3. Quality of Oleoresin

Farmers	Color	Moisture Content (MC) (%)	Impurity Content (IC) (%)	MC + IC (%)	Quality Label
A	White	1.195	2.00	3.195	SP
B	White	1.287	2.09	3.377	SP
C	Cloudy White	0.849	2.1	2.949	P
D	Cloudy White	0.716	1.45	2.166	P
E	Cloudy White	0.594	1.55	2.144	P
F	White	0.044	0.75	0.794	SP

Description = SP (Super Premium); P (Premium).

2. Impurity and Moisture Content Test

The high content of impurities in this study was because some samples contained tree bark flakes that entered the oleoresin collection tool. This condition cannot be avoided due to the situation in the field. The second condition that resulted in differences in dirt content and water content was the different positions of the trees. Trees located near shrubs tended to have higher levels of impurities due to insect activity around the quarre that could be trapped into the container, fallen leaves, and fragments of bark weathered by friction.

On the other hand, some tree samples were located in the center, there were no shrubs around the tree and there was less microorganism activity around the quarre. Previous research suggested that the high levels of fecal matter could be due to insects attracted by the scent of pine sap and trapped inside the container (Andila *et al*., 2022).

The water content in pine sap is because during the tapping and harvesting process, there is quite high rainfall for about two weeks, so a lot of rainwater is accommodated in the pine sap container during harvesting.

3. Quality of Oleoresin

The results of the visual test, Impuritys content, and water content obtained by the average sample show the value of MC + IC is lower than 5, meaning that if it refers to SNI 7837: 2016 (BSNI, 2016), it is included in the super-premium quality class, but visually the average control using organic stimulants, showed a white color while the average nitric acid stimulant treatment tended to be cloudy to brownish. The results of this sap quality qualification provide information that the use of stimulants has a visual effect on the quality of oleoresin.

The results of the visual observation test of pine resin showed several variations in the colour of the resin, ranging from white (Super Premium), cloudy white (Premium) to brownish (Quality II). Clean sap does not require a filtering and washing process in its management (Sukarno *et al*., 2012). In line with previous research that has been proven by Evayanti *et al*. (2019), stating that the content of impurities and water content in the sap has an influence on the colour of the resulting sap.

Conclusion

The quality of oleoresin obtained from trees that comply with the Tapping SOP produces a white and bright resin colour characteristic, compared to trees that do not comply with the Tapping SOP that produce a cloudy white resin colour characteristic. However, the quality of both produces low levels of impurities and moisture content <5%. Thus, it can be included in the super-premium quality class**.**

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