The Areca Nut (Areca Catechu L.) As A Natural Dye On Organic Kenaf Fiber

Rusmini, Dwinita Aquastini, Riama Rita Manulang, Daryono, Ali Sadikin

Abstract: Production of kenaf fiber for industry mostly uses chemical fertilizers with synthetic dyes that will also cause health and environmental problems and adversely affect all life forms. Increased health and environmental concern make organic kenaf fiber production with natural dyes highly recommended for both handicrafts and for industrial scale because natural fertilizers and dyes are non-toxic, decomposable, and environmentally friendly. The purpose of this study is to determine the level of consumer preference to organic kenaf fiber with natural dye of pinang seeds. The study used a two-factor group randomized design with the first factor of organic kenaf fiber and a second factor of natural dye consisting of 2 levels. The study was repeated as many as 2 replications so that there were 4 experimental units. Variables observed by consumer's level of craft product from organic kenaf fiber with natural dyes covering color, texture and odor tested .. This test is done by Hedonic Test method, using questionnaire with untrained panelist (consumer) as many as 20 people with data obtained based on a panelist response using a hedonic scale was analyzed by Kruskal-Wallis test. The results showed that there was no significant difference in consumer preferences for the color, texture and odor of organic kenaf fibers with a variety of natural dyes of pinang seed but from the percentage of consumers' favorite level stated that the average panelist liked the color, texture and odor of the kenaf fiber organic with natural dye of young betel nut and old betel nut.

Index Terms: kenaf, organic, natural dyes, betel nuts.

1 INTRODUCTION

KENAF is a type of plant that is easily cultivated in tropical regions such as Indonesia. Kenaf is very potential for the industry globally because of its high cellulose content. Natural fiber content generally consists of cellulose, hemicellulose, and lignin. Cellulose from natural fibers has structures arranged in micro-fibrils enclosed by two main components, namely: hemicellulose and lignin. Rusmini et.al 2017 resulted in organic kenaf fiber containing holocellulose in the best kenaf fiber of 81.2800% and the best cellulose content of 40.5695%. Organic kenaf fiber is a kenaf fiber produced from the stems of kenaf plants that have been through various stages both in terms of fertilization and pest control are done organically as well as in terms of the activities of penyeratan, generally kenaf fiber yellowish white and used as raw materials in diversified products, such as : paper, wallcover, car interior, geotextile, soil safer, fiber drain, particle board, and plastic reinforcement as well as biofuel industry raw materials. Kenaf is a type of plant that is easily cultivated in tropical regions such as Indonesia. Kenaf is very potential for the industry globally because of its high cellulose content. Natural fiber content generally consists of cellulose, hemicellulose, and lignin. Cellulose from natural fibers has structures arranged in micro-fibrils enclosed by two main components, namely: hemicellulose and lignin. Rusmini et.al 2017 resulted in organic kenaf fiber containing holocellulose in the best kenaf fiber of 81.2800% and the best cellulose content of 40.5695%.

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Organic kenaf fiber is a kenaf fiber produced from the stems of kenaf plants that have been through various stages both in terms of fertilization and pest control are done organically as well as in terms of the activities of penyeratan, generally kenaf fiber yellowish white and used as raw materials in diversified products, such as : paper, wallcover, car interior, geotextile, soil safer, fiber drain, particle board, and plastic reinforcement as well as biofuel industry raw materials. The coloring process is needed to make the organic kenaf fiber look more attractive to consumers and to high selling power. Synthetic dyes are commonly used in fiber dyeing because it is easier to use. Synthetic dyes have several advantages compared to natural dyes, among others, easy to obtain in the market, the availability of color is assured, color types are diverse and more practical and easier to use (Suarsa et.al., 2011; Kartina et.al., 2013) and more economically (Purnomo, 2004) and cheaper (Paryanto at.al., 2012; Kartina et.al., 2013). In addition, synthetic dyes, more stable, more resistant to various environmental conditions, the color is stronger and has a wider color range (Kartina et.al., 2013) and not easily faded and brightly colored (Kant, 2012). Synthetic dye waste can cause environmental pollution and is a dangerous substance, as some dyes can be degraded into carcinogenic and toxic compounds (Widjajanti et al., 2011; Kant, 2012). Further Kant (2012) states that the waste textile industry is full of color and organic chemicals from synthetic dyes. Mixing of colloidal material with dye waste, can increase turbidity and make water look bad, smelly, prevent the penetration of sunlight. The impacts are soluble oxygen depletion, decreased water quality and death living creatures living in it due to lack of oxygen or contaminated toxic compounds (Widjajanti et.al., 2011). In addition, when waste allowed to flow will clog the soil pores that result in loss soil productivity, hardened soil texture and prevent root plant penetration (Kant, 2012). Natural dyes are non-toxic, renewable, degradable and environmentally friendly dyes alternatives (Yernisa, et.al., 2013). The advantage of using natural dye is because it has economic value and high selling value and environmentally friendly. Textile colors that use natural colors are more distinctive and softer than color synthetic so it has a high aesthetic value. Despite the use of substances Natural colors have some disadvantages compared to substances synthetic colors, but is still in use today (Samanta and Agarwal, 2009). In an effort to re-

establish the use of natural dyes for textiles then the necessary source of dyestuff from the potential of local natural resources that exist, continuous and continuous availability, stable raw material production, and not seasonal products, including suji leaf, turmeric and dragon fruit skin. Thus, researchers are interested to examine the use of natural dyes against organic kenaf fiber to the level of consumer preferences.

2 Material And Method

The research was conducted at the Laboratory of Agricultural Production and Chemical Analysis of Forestry Plantation State Polytechnic of Samarinda from February to May 2018.

2.1 Instruments and Materials

The tool used is 10 l of 10 l jar, knife, cutting board, scissors, scales, blender and sieve cloth, glass funnel, measuring cylinder, collision of stone, grated coconut and stirrer while the material used organic kenaf fiber as much as 4 kg, old betel nut, filter paper, rope and water .

2.2 Experimental Design

This experiment is a factorial research consisting of 2 factors, implemented by using Randomized Block Design. The first factor of the best compost in 2017 from shrimp + pesnab (K) consisting of 1 level namely:
k1 = Composting of 30 ton ha-1 or 3 kg / plot and giving of vegetable pesticide as much as 100 ml / plant.
The second factor is natural dye consisting of 3 levels namely:
p1 = young areca nut
p2 = old betel nut
Each study was repeated as many as 2 replications so that there were 4 experimental units.

2.3 Making Natural Dye Extracts

The process of making natural dye extract refers to Pringgenie, et al (2012) and has been modified.

2.4 Making Extract of Natural Young Areca Dye Extract

Peeled fruit peeled clean and then the seeds weighed as much as 4 kg, then washed thoroughly then clean seeds pounded until smooth and then blend gradually with the included water taken from water as much as 20 l gradually then filtered with a filter cloth followed by boiling extract young betel nut boiled for 2 hours with medium stove fire then cooled. The decoction has been cooled can be used for kenaf fiber dye. The decoction is then filtered again using a filter paper so the dye solution is completely homogeneous, for repeat 1 and for repeat 2 is performed as repeated 1 each of which is each doled into a jar as a young betel nut color for repeat 1 and 2

2.5 Making Extract of Natural Old Areca Dye Extract

Peeled fruit peeled clean and then the seeds weighed as much as 4 kg, then washed thoroughly then clean seeds pounded until smooth and then blend gradually with the included water taken from water as much as 20 l gradually then filtered with a filter cloth followed by boiling extract old betel nut boiled for 2 hours with medium heat and then cooled. The decoction has been cooled can be used for kenaf fiber dye. The decoction is then filtered again using filter paper to make the dye solution completely homogeneous, for repeat 1 and for repeating 2 to be performed as repeat 1, respectively, each of which is inserted into the jar as an old betel nut color for repeat 1 and 2. Immersion of organic kenaf fiber with natural dye of young betel nut The organic kenaf fiber is weighed as much as 1 kg for 1 and 1 kg replication as well for repeat 2, then organic kenaf fiber is immersed in the natural dye of young betel nut which has been inserted into the jar. To avoid the kenaf fiber arise surface / not submerged then given the weight of a stone that has been cleaned given a white plastic to keep the plastic does not affect the results of immersion. Then the jar closed for 3 days.

2.6 Immersion of organic kenaf fiber with natural dye of old areca nut

The organic kenaf fiber is weighed as much as 1 kg for 1 and 1 kg replication as well for repeat 2, then organic kenaf fiber is immersed in the natural dye of old areca nut that has been inserted into the jar. To avoid the kenaf fiber arise surface / not submerged then given the weight of a stone that has been cleaned given a white plastic to keep the plastic does not affect the results of immersion. Then the jar closed for 3 days.

2.7 Drying of Kenaf Fiber

After immersion for 3 days, the organic kenaf fiber soaked with natural dyes according to the treatment is directly removed and drained, then organic kenaf fiber is categorized with raffia rope to be hung and dried for 10 days indoors without exposure to sunlight to avoid the effects of ultraviolet rays violet from the sun.

2.8 Observation

The parameters observed include the level of consumer preference for handicraft products from organic kenaf fibers with natural dyes which include the color, texture and odor of the fiber products tested.

2.9 Data Analysis

Data were tested using the Hedonic Test method, using questionnaires with untrained panelists (consumers) of 20 people. Data obtained based on panelist responses using hedonic scale were analyzed by Kruskal-Wallis test. Questionnaire with the rating scale really likes: 7, likes: 6, kinda likes: 5, neutral / ordinary: 4, kinda dislike: 3, dislikes: 2 and strongly dislikes: 1

3 Results And Discussion

Organoleptic Level of Preference Against Color, Texture and odor

Color

Color is a perception that arises in the human brain when viewing the reflection of light on an object. Color is influenced by the physical and chemical composition of an object, reflected light, and the sensitivity of one's eyes (Lawless & Heymann, 2010). Color is the first impression the panelists capture before recognizing other stimuli. Color is very important for every food so the attractive color will affect consumer acceptance (De Man, 1997). Based on the result of Kruskal-Wallis analysis to consumer's level of satisfaction on color showed no significant effect. The level of consumer preference on color can be seen in Table 1 below:

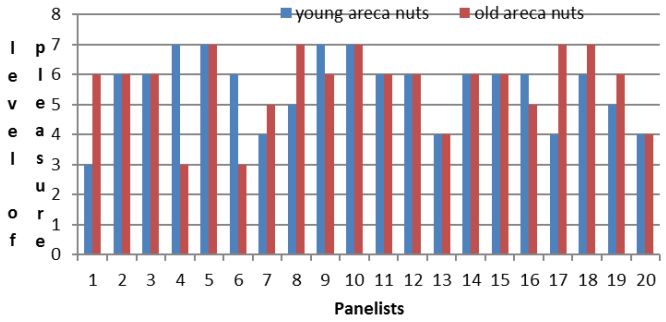

Table 1. *The level of consumer's preference for the color of organic kenaf fiber with areca nut color*

There is no significant difference between the first factor, ie the combination between (composting and pesticide administration) with the second factor is the natural dye of pinang seed (young betel nuts and old betel nut) against kenaf fiber color. Based on the results of the analysis that has been obtained in terms of kenaf fiber color, there is no difference in the level of consumer preferences between the first factor combination (composting and pesticide administration) with the second factor (natural dye of pinang seed, ie young and old pinang seed). This means that each type of natural dye gives the same effect to everyone's preference for organic kenaf fiber color. There is no significant difference between the first factor, ie the combination between (composting and pesticide administration) with the second factor is the natural dye of pinang seed (betel nut and old betel nut) against the color of kenaf fiber but Table 1 shows that the percentage of panelists on the dye (5) as many as 10%, like (6) as much as 45% and very like (7) as much as 20% while (3) as much as 10%, neutral / ordinary (4) as much as 10%, rather like (5) as much as 10%, likes (6) as much as 45% and likes (7) as much as 25 %. From the results of the average percentage of 45% like the dye of young betel nut and old betel nut. The percentage of natural dye from young betel nut and old grape seeds averaged 45%, indicating that panelists like natural dyes on organic kenaf fibers although they do not use morgan as a material to enhance color brightness because researchers want it to be completely natural or organic. This is in line with the research of Anjani et.al (2016) which states that the average consumer likes rate the natural dye of soursop leaves on Mori cloth and also supported by Hidayati, et.al (2016) study which stated that the natural dye of Rhizophora mangrove leaves mucronata preferred by consumers (46.67 %) on batik cloth and also in line with Surbakti (2018) research which stated that panelists like pinang seed as natural dye for hair. The organic kenaf fiber color is not statistically different because in the organoleptic test the natural dye is relatively the same so that the panelist can not distinguish the color of organic kenaf fiber. This is allegedly because panelists are not familiar with organic kenaf fibers with natural dyes compared to synthetic dyes this is different from the research of Anzani et.al (2016/stating that the natural dye with soursop leaves with mordan or alum fiksator showed significantly different results with the fixator another with the best fixator is the alum fixator. The resulting color of young betel nut and betel nut belong to the medium category because in this study do not use mordan which has a function as a color generator on coloring cloth with natural dyes. This is in line with research Prastyaningtyas (2014) penelitinnya results that dye shantung cloth with dye extract soursop leaves and turmeric rhizome without using mordan also produce color with the category of being. The use of mordants may also add chromophores groups in the fibers that cause the color of the dye to be older when compared to the cloth dye without mordan. This is supported also by the research of Zheng et.al., (2011) which states that proves that rare earth will become mordan yag because it promises environmentally friendly in the natural dyeing of hemp fabric while Pawar, et. al (2017) states that natural chemical modification of natural dyes from betel nuts can be used to overcome the limitations of natural dyes such as poor tinctorial strength, lack of reproducibility due to varying purity and inferior fastness properties for large-scale applications in the absence of mordants.

Texture

Texture in a food is very important to the consumer. Unlike color and odor that is usually used as a benchmark for food safety, texture is more used as a benchmark for the quality of a food (Lawless & Heymann, 2010). Based on result of Kruskal-Wallis analysis to consumer's level of satisfaction on texture showed no significant different effect. The level of consumer preference on texture can be seen in Table 2 below:

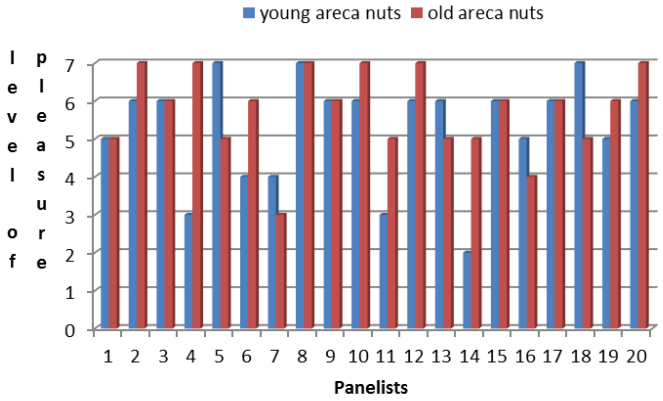

Table 2. *The level of consumer preference on the texture of organic kenaf fiber with the dye of areca nut*

There is no significant difference between the first factor, ie the combination between (composting and pesticide administration) with the second factor is the natural dye of pinang seed (young betel nut and old betel nut) against the texture of kenaf fiber. Based on the results of the analysis that has been obtained in terms of texture of kenaf fiber, there is no difference in the level of consumer preferences between the first factor combinations (composting and pesticide administration) with the second factor (natural dye of pinang seeds, (young betel nut and old betel nut). means, every type of natural dye gives the same effect to everyone's preference for the texture of organic kenaf fiber with natural dyes. There is no significant difference between the first factor, ie the combination between (composting and pesticide administration) with the second factor is the natural dye of pinang seed (betel nut and the old betel nut) against the texture of kenaf fiber but Table 2 shows that the percentage of panelists in the seed dye (5) as many as 10%, neutral / ordinary (4) as much as 10%, rather like (5) as much as 15%, likes (6) as much as 45% and (7) as much as 5%, neutral / ordinary (4) as much as 5%, preferably (5) as much as 30%,

like (6) as many as 30 % and really like (7) as much as 30%. From the results of the average percentage of 45% like the dye of young betel nut and 30% are very fond of old betel nuts. The level of consumer preferences on average like the texture of organic kenaf fiber either with natural dye of young betel nut or old pinang seed. The texture of organic kenaf fiber with natural dyes is not statistically different this is because in the organoleptic test of natural dye to the organic fiber kenaf texture is relatively the same so that the panelist can not distinguish the texture of organic kenaf fiber. This is allegedly because panelists are not familiar with the texture of organic kenaf fiber with natural dyes compared to synthetic dyes and types other fibers such as batik cloth, mori cloth and others. This is presumably because panelists are not familiar with the texture of organic kenaf fibers with natural dyes compared to synthetic dyes in other fibers such as batik cloth. This is in contrast to Anzani et.al (2016) study which states that natural dye with soursop leaf with mordan or alum fixer with concentration of 10% shows significantly different result with other fixator with best fixator is alum fixator.

Smell

Odor is one of the factors that determines one's fondness for a food. Odor can give a perception of a particular taste in a food (Kartika, 1988). The odor is one of the test standards in organic kenaf fibers dyed with natural dyes because the odor of dye from natural dyes has a distinctive odor of each natural dye. Based on the result of Kruskal-Wallis analysis on consumer's level of taste on the smell showed no significant effect. The level of consumer preferences in odors can be seen in Table 3 below:

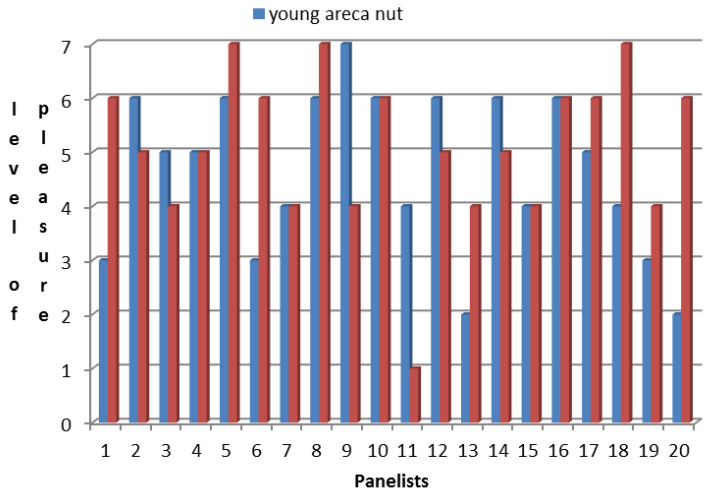

Table 3. *The level of consumer preference on the smell of organic kenaf fiber with betel nut color*

There is no significant difference between the first factor, ie the combination between (composting and pesticide administration) with the second factor is the natural dye of pinang seed (young betel nut and old betel nut) against the smell of kenaf fiber. Based on the results of the analysis that has been obtained in terms of smell of kenaf fiber, there is no difference in the level of consumer preferences between the first factor combination (composting and pesticide administration) with the second factor (natural dye of pinang seed, ie young pinang seed and old pinang seed). This means that each type of natural dye gives the same effect to everyone's preference for the smell of organic kenaf fiber with natural dye of young betel nut and betel nut. Table 3 shows that the percentage of panelists on dumplings of young betel nut which choose dislike (2) is 10%, slightly dislike (3) as much as 15%, neutral / common (4) as much as 20%, rather like (5) as much as 15% , likes (6) as much as 35% and really likes (7) as much as 5% while those who choose old pinang seeds rather not like (3) as much as 5%, neutral / ordinary (4) as much as 30%, rather like (5) 20%, like (6) as much as 30% and very like (7) as much as 15%. From the results of the average percentage of 35% like the dye and young betel nut 30% like the old pinang seed. The smell of organic kenaf fiber with natural dyes is not statistically different this is because in the organoleptic test the natural dye to the smell of organic kenaf fiber is relatively the same so that the panelist can not distinguish the smell of organic kenaf fiber. This is allegedly because panelists are not familiar with the smell of organic kenaf fiber with natural dye of young betel nut and old pinang seeds compared to synthetic dyes and other types of fibers such as shantung, mori and batik.

4 Conclusion

The results showed that there was no significant difference in consumer preferences for the color, texture and odor of organic kenaf fibers with a variety of natural dyes of pinang seed but from the percentage of consumers' favorite level stated that the average panelist liked the color, texture and odor of the kenaf fiber organic with natural dye of young betel nut and old betel nut.

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