

An Innovative Concept in the Natural Dyeing of Kenaf Fibres – Road to Sustainability

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ABSTRACT

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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 resulted in organic kenaf fiber containing holocellulose in the best kenaf fiber of 81.28% and the best cellulose content of 40.56%. 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 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, wall cover, 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 and more economically and cheaper. In addition, synthetic dyes, more stable, more resistant to various environmental conditions, the color is stronger and has a wider color range and not easily faded and brightly colored (Kant [1]). Synthetic dye waste can cause environmental pollution and is a dangerous substance, as some dyes can be degraded into carcinogenic and toxic compounds. Further it has been stated 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. 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. Natural dyes are non-toxic, renewable, degradable and environmentally friendly dyes alternatives. 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. In an effort to reestablish 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.

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. 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. 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 has been determined. 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 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 Anzani, et al. [2] which states that the average consumer likes rate the natural dye of soursop leaves on Mori cloth and also supported by Hidayati, et al. [3] 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 cannot 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. [2] stating that the natural dye with soursop leaves with mordant or alum fixator 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 mordant which has a function as a color generator on coloring cloth with natural dyes.

This is in line with research Prastyaningtyas 2014 penelitannya results that dye shantung cloth with dye extract soursop leaves and turmeric rhizome without using mordant 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 mordant. This is supported also by the research of Zheng, et al. [4] which states that proves that rare earth will become mordant yag because it promises environmentally friendly in the natural dyeing of hemp fabric while Pawar, et al. [5] 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 [6-8].

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. 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 has been determined there is no significant difference between the first factor, i.e., 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 [9-12]. 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 It has been observed that the percentage of panelists in the seed dye (5) as many as 10%, neutral / ordinary as much as 10%, rather like as much as 15%, likes as much as 45% and as much as 5%, neutral / ordinary as much as 5%, preferably as much as 30%, like as many as 30 % and really like 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 cannot distinguish the texture of organic kenaf fiber [13-18]. 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. [2] study which states that natural dye with soursop leaf with mordant 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.

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 everyone's preference for the smell of organic kenaf fiber with natural dye of young betel nut and betel nut. It has been found that the percentage of panelists on dumplings of young betel nut which choose dislike is 10%, slightly dislike as much as 15%, neutral / common as much as, rather like as much as 15% , likes as much as 35% and really likes as much as 5% while those who choose old pinang seeds rather not like as much as 5%, neutral / ordinary as much as 30%, rather like 20%, like as much as 30% and very like 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 cannot 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.

Conclusion

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.

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