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DISTRIBUTION OF CERTIFIED WOOD TEAK WOOD MACHINING PROPERTIES AS EXPORT FURNITURE MATERIALS

(Sebaran Sifat Pemesinan Kayu Jati Hutan Rakyat Bersertifikasi Sebagai Bahan Mebel Ekspor)

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ABSTRAK

Pengujian sifat pemesinan kayu jati hutan rakyat menjadi sangat penting untuk mendapatkan informasi penggunaannya sebagai bahan baku mebel kualitas ekspor. Penelitian bertujuan mengetahui pengaruh perbedaan lokasi dan umur tanaman terhadap sifat pemesinan kayu jati hutan rakyat. Penelitian dilaksanakan di hutan rakyat jati tersertifikasi pada umur 6, 8 dan 10 tahun. Pengujian sifat pemesinan dilakukan menurut metode ASTM D1666-87. Penelitian menggunakan analisis varian program SPSS 20.0 dengan uji lanjut Tukey. Hasil penelitian menunjukan jati hutan rakyat di lokasi Nglipar, Playen dan Dlingo dan umur pohon 6, 8 dan 10 tahun menghasilkan sifat pemesinan yang berbeda sangat nyata, dengan kualitas kelas mutu I dan sifat pemesinan sangat baik, kecuali di lokasi Dlingo dan umur 6 tahun dengan kelas mutu II dan sifat pemesinan baik. Sifat pemesinan jati hutan rakyat mempunyai nilai bebas cacat penyerutan 79.86 – 87.97 %, pembentukan 80.96 - 90.06 %, pemboran 80.34 -89.85 % dan pengampelasan 80.19-94.47 %.

Kata kunci : Hutan jati rakyat, pemesinan, penyerutan, pembentukan, pemboran, pengampelasan

INTRODUCTION

Industrial development - The modern forestry industry has demanded raw material requirements and controlled production processes for wood products (Ioannidou et al., 2019; Kumi et al., 2021; Tsiotas & Kungolos, 2017). The furniture industry is one of the potentials that is highly relied on because production is mostly export-oriented (Ioannidou et al., 2019; Irfan & Husain,

2015). Indonesia, which has the potential of natural wealth for the production of new furniture, is able to contribute 1% of the total world production (Salim & Munadi, 2017). Furniture industry products mostly use raw materials from people's forests, so that its existence is increasingly important (Pramono et al., 2010; Salim & Munadi, 2017). Comparative advantages owned by Indonesia in the form of the potential of a typical type of teak wood have not been utilized with optimal added value (Irfan & Husain, 2015).

The furniture industry in Indonesia already uses about 80% of its raw materials from teak wood forest people, where the tree has been cut down at a young age (Basri et al.,2012; Lukmandaru et.al., 2010; Marsoem et al., 2016a; Pramono et al., 2010; Prayitno et al., 2013). Some industries in Yogyakarta, Klaten, and surrounding areas make teak wood in people's forests with a harvest age of about 6 to l0 years. It needs to get attention, one of which is by knowing the spread of wood quality and the age of teak forest people.

The spread of quality and age of the wood can know the classification of the quality of teak wood forest people so that the industry can choose quality wood based on the origin and age of the wood. Distribution of wood quality can also be done by knowing the quality of wood-based on the nature of wood machining to support the export quality furniture industry. Heterogeneous conditions in the people's forest itself are assumed to affect the quality of the wood produced, which will ultimately affect the nature of the final product. A thorough understanding of the basic properties will help in the maximum utilization of wood as well as the improvement of the quality of its wood (Ketut et al., 2011; Lukmandaru et al.,2010; Marsoem et al., 2016a; Sulistyo et al., 2010; Supriadi & Abdurachman, 2018).

Knowledge of the basic properties can direct the purpose of utilization of a type of wood in order to obtain the efficiency of the use of this type of wood so as to replace or complement the use of commercial types of wood (Lukmandaru et al., 2015; Marsoem et al., 2016 b; Siska et al., 2018; Yustinus Suranto et al., 2008). Important basic properties for export furniture raw materials include machining properties (Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015). Machining properties are one of the parameters to determine the quality of wood. The easier the wood is done and the greater the proportion of smooth surfaces after the work process, the higher the class of woodworking (Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Suranto et al., 2008).

Therefore, testing the nature of wood machining becomes very important to get information about the machining properties of wood types that are appropriate for their use, especially as raw materials for export quality furniture. This research aims to know the influence of differences in the place of growth (plant location) and the age of plants on the nature of teak wood machining as furniture materials that grow in the forests of the people of Gunungkidul and Bantul. The parameters examined are the properties of planning, shaping, boring, and sanding.

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METHODOLOGY

The research was conducted in teak forest people are certified in 3 different locations, namely: a) Margo Mulyo Pringsurat Village District Nglipar Gunungkidul, b) Ngudi Lestari in Dengok Village Playen Gunungkidul District, c) JASEMA (Jati Sengon Mahoni) Terong Dlingo Bantul Village. The selected trees aged 6, 8, and 10 years are healthy and straight on the experimental plot according to the results of selection in the field as many as 3 trees as a replay. The tree in the cut that has a height and diameter represents the spread that is in the plot, then the division of trunks and sawmills into boards. Testing of machining properties, size, shape, and method of sampling tests conducted according to ASTM method D1666-87 (Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015).

The wooden test board measures 125 x 12.5 x 2 cm and is flaw-free. Machining tests are conducted by observing the defective form and measuring the percentage of defect area that occurs in each test instance. Observations are made visually with the help of a 10-fold magnifying glass. To assess the influence of location dan different plant age conducted variant analysis (ANOVA) univariate for different treatment conducted with SPSS 20.0 program with further tests Tukey (Lukmandaru et al., 2010; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015).

RESULTS AND DISCUSSION

Properties of Planing

Flaw-free value o f people's forest teak planing at Nglipar sites is higher by 87. 97 %, Playen 85.16 % and Dlingo 79.86 % (Fig 1). The process of planing is the most important process in woodworking because almost all components in the manufacture of products (*furniture)*must be planing to produce a surface appearance of good quality (Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Y. Suranto, 2012).

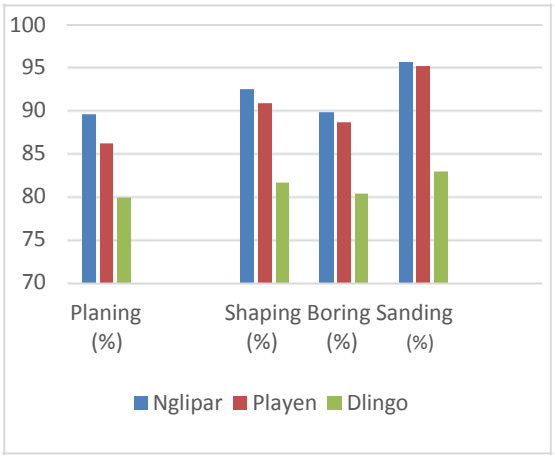

Figure 1. Histogram relationship nature of teak machining people's forest in different locations

Based on the classification of the machining properties of teak wood forest people in location Nglipar and Playen shows very good, so the quality of planing is in the class of quality I with excellent machining properties, while in the location of Dlingo is in the class of quality II with good machining properties

(Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015).

Results showed that teak wood forest people in the location of Nglipar, Playen, and Dlingo suitable as raw materials products that require a good surface display such as tables, chairs, and cabinets. Thus teak wood forest people in the location of Nglipar and Playen can be used as raw materials for export furniture (Table 1). The machining properties test, in principle, assesses a type of wood chosen as a test example by comparing the area of the blemished surface after machining the total area of the test field (Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015). Machining properties testing includes testing the properties of planing, shaping, boring, sanding to determine the quality of woodworking using commercial machinery according to methods according to ASTM method D1666-87 (Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015).

Table 1. Average value of teak machining properties of people's forests in different locations

Parameters	Nglipar	Playen	Dlingo
Properties of Planing (%)	87.97 a	85.16 b	79.86 c
Properties of Shaping (%)	90.06 d	88.26 e	80.96 f
Properties of Boring (%)	89.85 k	88.69 l	80.34 m
Properties of Sanding (%)	95.68 x	92.71 x	80.19 y

Note: Numbers followed by the same letter in each factor and parameter indicate no real difference

Results of observations of the value of flaw-free planing showed that the teak wood of the people's forests aged 6, 8, and 10 years differed very markedly (Table 2). The flaw-free value of teak planing of people's forests in locations aged 10 years is higher by 87. 05 %, 8 years 85. 01% and 6 years 80. 94 % (Figure 2). Based on the classification of the machining properties of a teak wood forest, people 8 and 10 years showed very well, so the quality of sequencing is in the class of quality I with excellent machining properties, while the age of 6 years is in the class of quality II with good machining properties (Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi &Abdurachman, 2018; Yustinus Suranto et al., 2015).

Table 2. The average value of teak machining properties of people's forests at different ages

Parameters	6	8	10
Properties of Planing (%)	80.94 p	85.01 q	87.05 r
Properties of Shaping (%)	79.90 s	88.53 t	89.56 u
Properties of Boring (%)	80.84 k	85.29 l	89.43 m
Properties of Sanding (%)	80.79 x	93.31 y	94.47 z

Note: Numbers followed by the same letter in each factor and parameter indicate no real difference

The requirements of wood for a particular purpose of use depend on the nature of the wood in question as well as the necessary technical requirements. For raw materials, wooden furniture must be strong enough, in the sense of being able

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to shoulder the burden either continuously or occasionally. For raw materials, wooden furniture must be strong enough, in the sense of being able to shoulder the burden either continuously or occasionally, which is intended to bear the burden of its strength must be higher than that which does not receive the burden (Basri et al., 2012; Y. Suranto, 2012; Yustinus Suranto et al., 2008). The results showed that teak wood forest people aged 6, 8, and 10 years are suitable as raw materials for products that require a good surface display, such as tables, chairs, and cabinets. Thus teak wood forest people aged 8 and 10 years can be used as raw materials for export furniture.

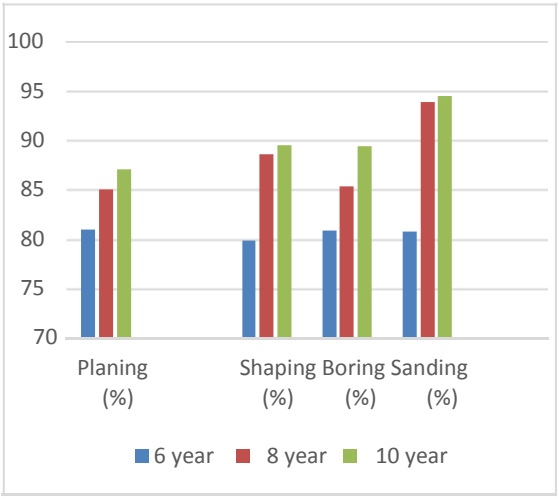

Figure 2. Teak machining people's forest at different tree age in different locations

Properties of Shaping

Results of observations of the flaw-free value of shaping show the teak wood of the people's forest in the location of Nglipar, Playen, and Dlingo differs very markedly (Table 1). The flaw-free value of people's forest teak shaping at Nglipar sites was higher by 90.06 %, Playen 88.26%, and Dlingo 80.96% (Figure 1). Based on the classification of the machining properties of teak wood forest people in location Nglipar and Playen shows very good, so the quality of the predetermined is in the class of quality I with excellent machining properties, while in the location of Dlingo is in the class of quality II with good machining properties (Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015).

Good wood for furniture is wood that has high strength and durability, has a smooth texture, and beautiful pattern (Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015). Thus teak wood forest people in the location of Nglipar and Playen can be used as raw materials for export furniture. The machining properties test, in principle, assesses a type of wood chosen as a test example by comparing the area of the blemished surface after machining the total area of the test field (Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015).

Machining properties testing includes testing the properties of planning, shaping, boring, and sanding to determine the quality of woodworking using commercial machinery according to methods according to ASTM method D1666-87 (Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et

al., 2015). The machining properties of wood relate to two things, namely (1) the degree of difficulty or ease of wood to be worked in various cutting processes, and (2) the degree of roughness (surface defects) or smoothness of the surface of the new cutting plane on the wood produced after the wood has undergone the cutting process using a sharp cutting tool (Balfas, 2011; Supriadi & Abdurachman, 2018; Y. Suranto, 2012).

Observation of the flaw-free value of shaping shows that the teak wood of the people's forest aged 6, 8, and 10 years is very real (Table 2). The flaw-free value of shaping people's forest teak in locations aged 10 years is higher by 89. 56 %, 8 years 88. 53% and 6 years 79. 90 % (Figure 2). The classification of the name of teak wood machining of the people's forest 8 and 10 years is very good, so that the quality of formation is in the class of quality I with excellent machining properties, age 6 years in the second quality with good machining properties (Lukmandaru, 2018; Salim & Munadi, 2017; Y. Suranto, 2012).

The nature of machining is what else easy wood and the larger the smooth surface after cutting the process, the higher the class of wood machining (Balfas, 2011; Supriadi & Abdurachman, 2018; Yustinus Suranto et al. For raw materials wooden furniture times are still strong, in being able to shoulder the load either continuously or continuously or occasionally. Who has carried the burden of his strength again high against the burden (Basri et al., 2012; Lukmandaru et al., 2015; Y. Suranto, 2012; Yustinus Suranto et al., 2015). With teak wood, people aged 8 and 10 years can be the raw material of export furniture.

Properties of Boring

Observation of the flaw-free value of boring shows that the teak wood of the people's forest in the location of Nglipar, Playen, and Dlingo is very real (Table 1). The flaw-free value boring of people's forest teak boring in Nglipar location is higher by 89. 85 %, Playen 88.69 %, and Dlingo 80. 34 % (Fig 1). Based on the classification of the machining properties of teak wood forest people in location Nglipar and Playen shows very good, so the quality of boring is in the class of quality I with excellent machining properties, while in the location of Dlingo is in the class of quality II with good machining properties (Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015). In accordance with its purpose, the machining process includes eight cutting operations, namely sawmilling, sorting, planning, shaping, engraving, turning, boring, and brewing (Balfas, 2011; Rianawati et al., 2015; Y. Suranto, 2012).

The machining properties test, in principle, assesses a type of wood chosen as a test example by comparing the area of the blemished surface after machining the total area of the test field (Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015). With excellent boring properties, teak wood forest people can be connected, for example, pegs and adhesives on wood products to be realized (Rianawati et al., 2015; Supriadi & Abdurachman, 2018). Radial boring defect-free surface value on KPH Kendal teak wood, Perum Perhutani Regio I Central Java age 25, 35, and 45 years is 94.71 %, 96.43 %, and 100 %, then the value of this flaw-free surface is included in the class of quality

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1, this means that teak wood belongs to the quality class with an excellent predicate (Yustinus Suranto et al., 2008, 2015). The flaw-free value of people's forest teak boring in Nglipar location is higher by 89. 85 %, Playen 88.69 %, and Dlingo 80. 34 %, the result shows that teak wood forest people in Nglipar and Playen can be used as raw materials for export furniture.

Observation of the flaw-free value of boring shows that the teak wood of the people's forests aged 6, 8, and 10 years is very real (Table 2). The flaw-free value of boring people's forest teak in locations aged 10 years is higher by 89. 43 %, 8 years 85. 29% and 6 years 80. 84 % (Figure 2). Based on the classification of the machining properties of teak wood forest people 8 and 10 years showed very well, so the quality of boring is in the class of quality I with excellent machining properties, while the age of 6 years is in the class of quality II with good machining properties (Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015).

The approach taken to evaluate machining properties is to measure the resulting defects (Balfas, 2011; Lukmandaru et al., 2015; Yustinus Suranto et al., 2015). The requirements of wood for a particular purpose of use depend on the nature of the wood in question as well as the necessary technical requirements. Types of wood for furniture and handicraft materials must meet certain conditions. These requirements are related to product quality, quantity (yield), and ease of workmanship (Basri et al., 2012; Lukmandaru et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015). For wood furniture, raw materials must be strong enough, in the sense of being able to shoulder the burden either continuously or occasionally. The part intended to bear the burden of its strength must be higher than that which does not receive the burden (Basri et al., 2012; Y. Suranto, 2012; Yustinus Suranto et al., 2008). Thus teak wood forest people aged 8 and 10 years can be used as raw materials for export furniture.

Properties of Sanding

Results of observations of defect-free value of sanding showed that the teak wood of the people's forest in the locations of Nglipar, Playen, and Dlingo differed very markedly (Table 1). The defect-free value of sanding teak of people's forests at Nglipar sites was higher by 95.68 %, Playen 92.71 %, and Dlingo 80.19 % (Fig 1). Based on the classification of the machining properties of teak wood forest people in location Nglipar and Playen shows very well, so the quality of sanding is in the class of quality I with excellent machining properties, while in the location of Dlingo is in the class ii quality with good machining properties (Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015).

The machining properties test in principle assesses a type of wood chosen as a test example by comparing the area of the blemished surface after machining the total area of the test field (Rianawati et al., 2015; Supriadi & Abdurachman,

2018; Yustinus Suranto et al., 2015). At the sanding of defects, hairy fibers dominate more on the type of wood studied. Hairy fiber defects more often appear in the process of sanding because the wood fibers at the time of sanding are torn, resulting in fine feathers (Rianawati et al., 2015; Supriadi, 2017; Yustinus Suranto et al., 2015). The results showed that teak wood forest people in the location of Nglipar, Playen, and Dlingo suitable as raw materials products that require a good surface display such as tables, chairs, and cabinets. Thus teak wood forest people in the location of Nglipar and Playen can be used as raw materials for export furniture.

The results of observations of the value of defect-free sanding showed that the teak wood of the people's forests aged 6, 8, and 10 years differed very markedly (Table 2). The flaw-free value of teak sanding of people's forests in locations aged 10 years is higher by 94. 47 %, 8 years 93. 31% and 6 years 80. 79 % (Figure 2). Based on the classification of the machining properties of the teak wood forest, people 8 and 10 years showed very well, so the quality of sequencing is in the class of quality I with excellent machining properties, while the age of 6 years is in the class of quality II with good machining properties (Lukmandaru et al., 2015; Rianawati et al., 2015; Supriadi & Abdurachman, 2018; Yustinus Suranto et al., 2015).

The requirements of wood for a particular purpose of use depend on the nature of the wood in question as well as the necessary technical requirements. For raw materials, wooden furniture must be strong enough, in the sense of being able to shoulder the burden either continuously or occasionally, the part intended to carry the burden of its strength must be higher than that which does not receive the burden (Basri et al., 2012; Y. Suranto, 2012; Yustinus Suranto et al., 2008). The results showed that teak wood forest people aged 6, 8, and 10 years are suitable as raw materials for products that require a good surface display, such as tables, chairs, and cabinets. Thus teak wood forest people aged 8 and 10 years can be used as raw materials for export furniture.

CONCLUSIONS AND SUGGESTIONS

Conclusion

A people's forest at the location of Nglipar, Playen, and Dlingo produces different machining properties very noticeably with quality grade I and machining properties are very good, except in Dlingo locations with grade II quality and good machining properties. Teak forest people tree age 6, 8, and 10 years produce different machining properties are very real with quality class I and machining properties are very good, except age 6 years with quality class II and good machining properties. The machining properties people's forest teak has a decent-free of value planing 79.86 - 87.97 %, shaping of 80.96 - 90.06 %, boring 80.34 -89.85 % and sanding 80.19- 94.47 %. Teak wood people's forest in the location of Nglipar and Playen age 8 and 10 years have machining properties very good with quality class I so that it can be used as export furniture materials.

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Suggestion

The export furniture industry should use raw materials teak forest people from the location of Nglipar and Playen because it has quality class I and machining properties are very good. Export furniture industry can use raw materials teak forest people aged 8 and 10 years because it has quality class I and machining properties are very good.

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