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LIST OF PAPER

A. Wood Based Properties

No	The Title	Code
1	The Effect of Six Months Girdling on the Physical Properties of Teak Wood Growing on the Community Forest *Sri Nugroho Marsoem, Joko Sulistyo, Ganis Lukmandaru, Soekmana Wedatama, and Dwi Sukma Rini*	IS – A
2	Samama (*Anthocephallus macrophyllus*) Wood Quality at 8 and 10 Years Old *Tekat Dwi Cahyono, Imam Wahyudi, Trisna Priadi, Fauzi Febrianto, Wayan Darmawan, Effendi Tri Bahtiar, and Syarif Ohorella*	A – 01
3	Hyperspectral Imaging for The Knot Detection of Solid Wood Surface *Hikaru Kobori, Kouch Kato, Satoru Tsuchikawa, Yoichi Kojima and Shigehiko Suzuki*	A – 02
4	The Effects of Tar Treatment on *Falcataria moluccana* Wood Anatomical Properties Infected by Gall Rust Fungus *Hairi Cipta, Widyanto Dwi Nugroho, and Sri Rahayu*	A – 03
5	Variations in Moisture Content and Shrinkage of *Gigantochloa scortechinii* and *Bambusa vulgaris* at Different Height of Bamboo Culm *Rogerson Anokye, Regina Maria Kalong, Edi Suhaimi Bakar, Jegathewaran Ratnasingam, Mohammad Jawaid, and Khairul Awang*	A – 04
6	The Permeability of Some Tropical Hardwoods in Green and Dry Conditions *Adrian Choo Cheng Yong, Alinaghi Karimi, Paridah Md Tahir, Mohd Khairun Anwar Uyub, and Edi Suhaimi Bakar*	A – 05
7	Total Utilization of Oil Palm Stem *Wahyu Dwianto, Fitria, and Teguh Darmawan*	A – 06
8	Characteristics Variation of Surian Woods (*Toona Sinensis* Roem.) in West Java, Indonesia *Yoyo Suhaya, Aos M. Akyas, Titin Supriatun, and Imam Wahyudi*	A – 07
9	Differences in The Timing of Disappearance Among Cellular Contents During Cell Death of Ray Parenchyma in Abies sachalinensis *Satoshi Nakaba, Izumi Arakawa, Hikaru Morimoto Yuzou Sano, and Ryo Funada*	A – 08
10	Effect of Heating Temperature on The Physical and Mechanical Properties of Okan Wood (*Cylicodiscus gabunensis*(Taub.) Harms) *Wahyu Hidayat, Jae-Hyuk Jang, Se-Hwi Park, and Nam-Hun Kim*	A – 09
11	Characteristics of Several Wood from Community Forest as Potential Application for Raw Material for Composite Board *Andi Detti Yunianti, Suhasman, and Sahriyanti Saad*	A – 10

A-09

Effect of Heating Temperature on the Physical and Mechanical Properties of Okan Wood (*Cylicodiscus gabunensis*(Taub.) Harms)

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ABSTRACT

The objective of this research was to evaluate the physical properties and mechanical properties of Okan wood (*Cylicodiscus gabunensis* (Taub.) Harms) after heat-treated at different temperatures. Sapwood and heartwood specimens of Okan wood with small grain orientation and variation in density, and free of defect were prepared. The boards dimensions were 300 mm x 90 mm x 20 mm in length, width and thicknes respectively. The boards were heat-treated at 160°C, 180°C, 200°C, and 220°C for 2 hours in an electric furnace (L-Series, JEIO TECH Ltd., Korea) under oxygen atmosphere.The results showed that weight loss of sapwood and heartwood samples after heat-treated at different temperature ranged between 6.04-10.39% and 5.59-11.26%, respectively. The density reduction of sapwood and heartwood samples after heat-treated at different temperature ranged between 3.52-4.52% and 1.45-4.52%, respectively. The results revealed that increasing heating temperature significantly reduced weight and density of samples. Scanning electron microscope (SEM) observation of the heat-treated samples showed that that high temperature treatment caused shrinkage and certain damage on cell wall.Color changes after heat-treated (ΔE^*) ranged between 4.76-33.80 and 4.39-20.00 for sapwood and heartwood boards, respectively. The results revealed that increasing heating temperatures result in darker wood color. Furthermore the effect of treatment temperature on color change in sapwood is more obvious than that in heartwood. Mechanical properties evaluation showed that the shear strength of sapwood and heartwood samples after heat-treated at different temperature ranged between 16.15 - 20.15 N/mm^{2}and 35.75–48.27 N/mm^2, respectively.The results of bending strength (modulus of rupture and modulus of elasticity)evaluation showed similar trend to shear strength, an increase in heating temperature tend to decrease the mechanical properties.

Keywords: Heat-treatment, heating temperature, Okan wood, physical and mechanical properties

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