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Gluability Variation of Dendrocalamus asper for Bamboo Composites

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Introduction





Figure Culm characteristic of D. asper



Figure Microstructure of D. asper



Figure Variation of microstructure of bamboo culm

Table Variation of chemical composition of *D. asper*

Chemical compositions	Тор		Middle		Bottom	
	Node	Internode	Node	Internode	Node	Internode
Holocellulose	75.65	76.72	76.36	77.36	75.59	76.31
Alphacellulose	67.07	67.33	68.53	67.67	68.59	69.64
Lignin	30.08	26.47	30.86	27.19	30.41	27.21
Ash	2.29	1.07	1.95	0.95	1.59	0.92
Alco.+Benzene Solubility	5.55	7.44	6.67	6.18	3.75	5.85
Hot Water Solubility	7.39	9.63	7.51	8.36	6.47	8.86
Cold Water Solubility	5.10	6.87	5.43	14.05	4.23	6.50
1% NaOH Solubility	26.78	25.82	24.38	23.40	24.99	24.07

Source: Kamthai, S. 2003. Alkaline sulfite pulping and ECF- bleaching of sweet bamboo (*Dendrocalamus asper* Backer). M.S. Thesis, Kasetsart University, Thailand

Objectives

- * To determine the pH value and buffer capacity in each location of bamboo culms
- * To investigate the surface wettability through contact angle measurement
- * To measure the effective penetration of liquid adhesive into bamboo in different locations and surfaces of the culms.

Materials



D. apser culms were cut from plantation in Thailand.



Methods and Results





<u>Figure</u> The initial pH value of *D. asper* in relation to the culm location



<u>Figure</u> The pH changes of *D. asper*, in relation to the culm location, during the acid and alkaline addition.





<u>Figure</u> Average value of contact angle of *D. asper*, separated by culm location and surface





<u>Figure</u> Average value of adhesive penetration on the surface of *D. asper*, separated by culm location and surface

Conclusions

The pH value of *D. asper* is on acid side. It does not vary along the location of the culm.

- Buffer capacity of *D. asper* is more stable toward alkaline rather than acid. There are slightly differences in the values along the culm location.
- ✤ Wettability of *D. asper* decreases from the bottom to the top part of the culm. Furthermore, wettability of bamboo culm outer surface is found to be lower than inner part.
- The adhesive penetration of *D. asper* at different culm location and surface is signification different from one other.
 The penetration also decreases from the bottom to the top part of the culm. Moreover, the penetration on culm inner surface is greater than that of outer and the culm wall surface.

Further forecasts

* The appropriate layer structure for production of Laminated Bamboo Lumber and Plybamboo









Type 1

Type 2

Type 2

<u>Figure</u> The possibility of layered structure on laminated bamboo lumber and plybamboo manufacture The further study of the density varitaion of bamboo strand that influence on physical and mechanical properties of Oriented Strand Board and Oriented Strand Lumber



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Thank you for your attention