

## INTISARI

### SIFAT PEREKATAN DAN EMISI FORMALDEHIDA EMPAT JENIS KAYU

Penggunaan jenis-jenis kayu sebagai bahan baku industri harus disesuaikan dengan sifat dasar kayu agar dapat menghasilkan produk hasil hutan dengan kualitas yang baik. Sifat dasar kayu yang satu dapat berbeda dengan yang lainnya. Penelitian ini bertujuan 1) mempelajari hubungan perbedaan jenis kayu, bagian kayu dan perlakuan permukaan terhadap sifat perekatan dan emisi formaldehida, 2) mengetahui faktor-faktor yang paling berpengaruh terhadap sifat perekatan dan emisi formaldehida.

Rancangan yang digunakan adalah rancangan acak lengkap percobaan faktorial dengan uji lanjut menggunakan prosedur Tukey. Faktor yang digunakan adalah jenis kayu (sengon, waru gunung, sungkai dan johar), bagian kayu (dekat hati dan dekat kulit) dan perlakuan permukaan (kontrol, NaOH, etanol dan alkohol bensen). Parameter yang diamati adalah proporsi tipe sel, berat jenis, warna kayu, wetabilitas, kadar ekstraktif kayu, keteguhan rekat, persentase kerusakan kayu, keteguhan rekat terkoreksi dan emisi formaldehida. Untuk mengetahui pengaruh hubungan antara sifat dasar kayu dengan keteguhan rekat dan emisi formaldehida dilakukan analisis regresi linier sederhana.

Hasil penelitian menunjukkan interaksi jenis kayu dan bagian kayu berpengaruh sangat nyata pada sifat perekatan dan emisi formaldehida. Keteguhan rekat kering udara dan basah tertinggi pada kayu johar dekat hati ( $55,682$  ;  $30,935$   $\text{kg/cm}^2$ ), kerusakan kayu kering udara dan basah tertinggi pada kayu sengon dekat kulit ( $87,056$  ;  $48,345$  %). Interaksi jenis kayu dengan perlakuan permukaan dan bagian kayu dengan perlakuan permukaan berpengaruh sangat nyata pada emisi formaldehida. Emisi formaldehida terendah pada kayu sungkai dengan perlakuan permukaan alkohol bensen ( $0,101$  ppm) dan bagian kayu dekat hati dengan perlakuan permukaan alkohol bensen ( $0,159$  ppm). Sifat perekatan dan emisi formaldehida dipengaruhi secara nyata oleh sifat dasar kayu, dan dinyatakan dalam persamaan regresi untuk sifat perekatan dengan pembuluh ( $Y = 64,428 - 0,925 X$ ), parenkim ( $Y = 63,281 - 1,710 X$ ), jari-jari ( $Y = 62,580 - 1,212 X$ ), serabut ( $Y = 18,082 + 0,489 X$ ), berat jenis ( $Y = 34,531 + 27,321 X$ ), warna kayu ( $Y = 58,482 - 0,249 X$ ), wetabilitas ( $Y = 56,031 - 0,0034 X$ ), kadar ekstraktif larut air dingin ( $Y = 35,874 + 2,886 X$ ), air panas ( $Y = 38,222 + 1,336 X$ ) dan alkohol bensen ( $Y = 36,252 + 1,727 X$ ). Emisi formaldehida dengan pembuluh ( $Y = - 0,15 + 0,225 X$ ), parenkim ( $Y = - 0,86 + 0,525 X$ ), jari-jari ( $Y = - 0,64 + 0,371 X$ ), serabut ( $Y = 1,201 - 0,13 X$ ), berat jenis ( $Y = 0,768 - 0,781 X$ ), warna kayu ( $Y = 0,141 + 0,0579 X$ ), wetabilitas ( $Y = 0,165 + 0,000934 X$ ), kadar ekstraktif larut air dingin ( $Y = 0,652 - 0,640 X$ ), air panas ( $Y = 0,744 - 0,500 X$ ) dan alkohol bensen ( $Y = 1,083 - 0,072 X$ ).

Kata kunci : sifat perekatan, emisi formaldehida, sengon, waru gunung, sungkai, johar, sifat dasar kayu, perlakuan permukaan



## ABSTRACT

### ADHESION PROPERTIES AND FORMALDEHYDE EMISSION ON FOUR SPECIES OF WOOD

The utilisation of wood as raw material for industry must be based on the basic properties of wood. The objectives of the research were 1) To study the relationship of species, radial position and surface treatment to the adhesion properties and formaldehyde emission, 2) To know the significant factors influencing the adhesion and formaldehyde emission.

A factorial experiment arranged in completely randomized design was used in this study, followed by tukey procedure. Factors in this research were wood species (sengon, waru gunung, sungkai and johar), radial position of wood (near the pith and near the skin) and surface treatment (control, NaOH, Ethanol and alcohol benzene). Parameters observed were proportion of cell types, specific gravity, color of wood, wettability, content of wood extractives, bonding strength, wood failure, corrected bonding strength and formaldehyde emission. Correlation between basic properties of wood with adhesion strength and formaldehyde emission was detected by using simple linear regression analysis.

Result of this research showed that interaction effect were detected on wood species with radial position, wood species with surface treatment and radial position with surface treatment. The highest of air and wet bonding strength were produced by combination of johar near the pith (55,682 and 30,935 kg/cm<sup>2</sup>), the highest air and wet wood failure were produced by combination of sengon near the skin (87,056 and 48,056 %). The lowest emission were produced by combination of sungkai near the pith (0,210 ppm), combination of sungkai with surface treatment alcohol benzene (0,101 ppm) and combination of near the pith with surface treatment alcohol benzene (0,161 ppm). The adhesion properties and formaldehyde emission significantly influenced by basic properties of wood. Adhesion properties was dependent on the basic properties of wood in accord with a regression formula vessel ( $Y = 64,428 - 0,925 X$ ), parenchyma ( $Y = 63,281 - 1,710 X$ ), rays ( $Y = 62,580 - 1,212 X$ ), fibers ( $Y = 18,082 + 0,489 X$ ), specific gravity ( $Y = 34,531 + 27,321 X$ ), wood color ( $Y = 58,482 - 0,249 X$ ), wettability ( $Y = 56,031 - 0,0034 X$ ), the cool water-soluble wood extractive ( $Y = 35,874 + 2,886 X$ ), hot water-soluble extractive were ( $Y = 38,222 + 1,336 X$ ) and benzene alcohol-soluble wood extractive ( $Y = 36,252 + 1,727 X$ ). Formaldehyde emission was dependent on the basic properties of wood in accord with a regression formula vessel ( $Y = - 0,15 + 0,225 X$ ), parenchyma ( $Y = - 0,86 + 0,525 X$ ), rays ( $Y = - 0,64 + 0,371 X$ ), fibers ( $Y = 1,201 - 0,13 X$ ), specific gravity ( $Y = 0,768 - 0,781 X$ ), wood color ( $Y = 0,141 + 0,0579 X$ ), wettability ( $Y = 0,165 + 0,000934 X$ ), the cool water-soluble wood extractive ( $Y = 0,652 - 0,640 X$ ), hot water-soluble extractive were ( $Y = 0,744 - 0,500 X$ ) and benzene alcohol-soluble wood extractive ( $Y = 1,083 - 0,072 X$ ).

Key Words: adhesion properties, formaldehyde emission, sengon, waru gunung, sungkai, johar, basic properties of wood, surface treatment