

# Analisa Kekuatan Tarik dan Tekan pada Paraserianthes Falcataria dengan Finite Element Method = Analysis of Paraserianthes falcataria s Tension and Compression Strength Using Finite Element Method

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## Abstrak

Pohon memiliki kerentanan tumbang terutama di musim tertentu. Seperti pohon Sengon (*P.Falcataria*) di lingkungan kampus Universitas Indonesia yang sangat rentan tumbang. Kayu dibagi menjadi 2 kategori berdasarkan kandungan air di dalamnya, yaitu kayu segar (Green Wood) dan kayu kering (Dried Wood). Masing – masing kayu memiliki kelebihan dan kekurangan dalam fungsi penggunaannya. Kayu segar (Green Wood) sendiri diartikan sebagai kayu yang baru saja dipotong dari pohon tanpa dilakukan pengeringan dengan moisture content-nya diatas 50%. Sedangkan kayu kering (Dried Wood) diartikan sebagai kayu dari pohon yang telah dipotong dan telah diberikan perlakuan pengeringan kayu. Berdasarkan sifat kayu diatas ketahanan pohon terhadap gaya-gaya mekanik berpengaruh terhadap perubahan kadar air di dalam pohon tersebut. Sayangnya data kerentanan dan kekuatan pohon dengan kadar kelembapan diatas 12% masih sangat langka dan menggunakan data mechanical properties dari kayu yang telah melalui proses pengeringan sebagai dasar untuk mencari kapasitas kerentanan tumbang pohon hidup akan berujung kepada suatu kekeliruan. Penelitian ini memiliki tujuan untuk mencari dan menganalisis kerentanan dan kekuatan pohon sengon dalam keadaan hidup dengan simulasi uji tarik dan tekan menggunakan software finite element analysis. Pada simulasi pohon dianggap sebagai material ortotropik dengan simplifikasi pada material data dan modelling. Model dari pohon mempunyai dimensi panjang 12 meter dan diameter 25 cm. Setelah dilakukan simulasi ditemukan bahwa pohon Sengon paling rentan terhadap beban kantilever dengan beban maksimum mencapai 2256 N. Sedangkan pada pembebanan tarik dan tekan beban maksimum mencapai 650000 N dan 900000 N secara berurutan.

.....Trees have collapsing vulnerability especially in certain seasons. Such as the Sengon tree (*P. Falcataria*) in the University of Indonesia campus environment that is very vulnerable to collapse. Wood are divided into 2 categories based on its moisture content, which are fresh wood (Green Wood) and dry wood (Dried Wood). Each wood has advantages and disadvantages in the function of its use. Fresh wood (Green Wood) itself is defined as wood that has just been cut from a tree without undergoing any drying process, where its moisture content is higher than 50%. Whereas dry wood (Dried Wood) is defined as wood from trees that have been cut and have been given wood drying treatment with moisture content below 12%. Based on the nature of the wood above the resistance of trees to mechanical forces fluctuating in response to moisture content in the tree. Unfortunately the data and research of tress vulnerability with moisture content above 12% is still scarce and using mechanical data properties from wood that has been through the process of drying as a basis for finding the vulnerability capacity of fallen live trees will lead to a mistake. This study aims to find and analyse the strength and vulnerability of green wood through tension and compression test simulation by using finite element analysis software. In the simulation, the tree is considered as an orthotropic material with few simplification on the material data and modelling. The model of the tree has the dimension of 12 m in length and 25 cm in diameter. After the model has been simulated through cantilever, tensile and compression test the it has been found that Sengon tree is mostly vulnerable with

canliver load, with its maximum load at 2256 N. Whereas in tension and compression load the tree was able to hold until maximum load at 650000 N and 900000 N, respectively