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STUDY ON VARIATION OF MODULUS OF RUPTURE AND MODULUS OF ELASTICITY WITHIN *Eucalyptus grandis* TREES GROWING IN DIFFERENT SITE CLASSES.

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Only few studies have been done on the relationship of mechanical properties with growth rate of *Eucalyptus grandis*. Increase in growth rate and reduction in the harvesting age can be achieved by silvicultural and management practices. However these management practices may affect wood quality by reducing technical performance and commercial acceptance of timber. One of the main objectives here was to determine whether wood mechanical properties such as, Modulus of rupture (MOR) and Modulus of elasticity (MOE) are primarily affected by growth rates. Another objective of this study was to collect MOR and MOE values in a systematic manner, which are essential in commercial utilization of this species.

In this study, diameter of breast height (dbh) and total height of the trees of 30 years-old *Eucalyptus grandis* at plantations in Nuwara-Eliya district were compared. Based on height and age, trees in the respective plantations were categorized into "Slow Growth Site" (SGS), "Medium Growth Site" (MGS) and "Fast Growth Site" (FGS). Tree height difference between SGS (33.8 meters) and FGS (45 meters) was significantly different at ($P \leq 0.05$) level but not between SGS and MGS (38.7). Five trees with straight and non-leaned boles were selected from each site for sampling. Five stem bolts (about 40 cm length) were cut and removed at breast height, 20%, 40%, 60% and 80% of the total tree height of each sample tree. Four sides of the stem bolts were marked as north, south, east and west respectively. Two linear sections were cut across the diameter of every sample disc, from north to south and east to west respectively, avoiding compression or distorted grain around the knots. 30cmx2cmx2cm size of samples was cut from this linear section. 399 samples were tested by a Huns field universal testing machine and Load-Deflection diagrams were used to calculate the MOE and MOR values.

It was found that variation of modulus of rupture and modulus of elasticity increased from pith outwards at different height levels in the three growth sites. Mean MOR values at Breast height, 20%, 40%, 60% and 80% height levels in SGS were 51.48 ,42.48, 48.08, 54.77, 57.46 (Nmm^{-2}) respectively. MOR values for these levels in MGS were 58.29, 53.01, 59.06, 60.78, 65.19 and MOR values were 62.7, 59.24, 59.03, 58.96, 56.67 for FGS respectively. Mean site MOR values increased with growth rate (slow: 50.85, medium: 59.27, fast: 59.32). These values were significantly different between the sites except at medium and fast growth sites. Mean MOE values at Breast height, 20%, 40%, 60% and 80% height levels in SGS were 7200 ,7040, 7680, 8696, 7865 (Nmm^{-2}) respectively. MOE values for these levels in MGS were 8407, 8760, 8826, 9208, 8886 and MOE values for same height levels were 8437, 8614, 8954, 9649, 9330 for FGS respectively.

Mean site MOE values increased with growth rate (slow:7696, medium:8817, fast:8997) and these values were significantly different between sites except between medium and fast growth sites at $P \leq 0.05$ level.

it can be concluded that fast growth trees produced wood with higher mechanical properties (MOR and MOE) compared with slow growth trees. Therefore silvicultural practices aiming to accelerate growth rate of *Eucalyptus grandis* do not affect MOR and MOE values negatively.