

## SHORT TERM CHANGES IN LIVE CROWN RATIO OF YOUNG ACACIA MANGIUM IN EVENAGED PURE STANDS

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A tree's crown size and the extent to which it is exposed to full sunlight are important indicators of vigour and assimilatory capacity. Crown size can easily be measured and therefore is frequently recommended as an indicator for the timing of thinnings. Evans (1982) and Smith (1986) proposed that thinnings should be carried out latest when live crown ratio is going to decline to below 30 to 40%. Live crown ratio is the ratio between crown length and total tree height expressed in per cent.

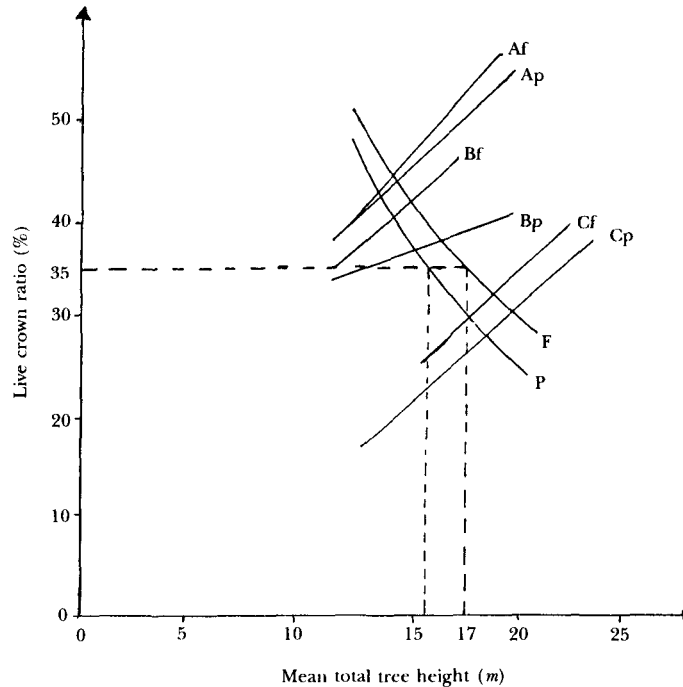
The objectives of this study are to obtain information on short term changes of live crown ratio in young pure evenaged *Acacia mangium* stands and to determine first thinning age of the stands. For this purpose random samples of 40 to 50 trees each from 3, 3.5 and 5-y-old *A. mangium* stands in the Kemasul Forest Reserve, Pahang, Peninsular Malaysia, were taken. The stands were established at a planting spacing of  $3 \times 3$  m. The samples comprised multiple as well as single stem trees. Additional samples of another 25 single stem trees were selected from each age group to represent potential crop trees (PCT). These trees are of above average form and have at least size of the mean diameter of the stand. Another constraint was that only those single stem trees were to be chosen as PCT which had at least three other single stem trees as immediate neighbours. PCT represent trees that are given proper singling treatment early. For each tree diameter, total height and crown point were measured and the crown length and live crown ratio were calculated.

The results of the study are shown in Figure 1. The six straight lines represent the relationship between live crown ratio and individual tree height. The lines are grouped in three pairs. In each group the upper line represents the relationship for the PCT (Af, Bf, Cf) and the bottom line represents the relationship for the mixed population containing multiple stem trees as well as single stem trees (Ap, Bp, Cp). The lines for the youngest stand are at the top and for the oldest stand at the bottom. The declining curved lines connect the mean values of live crown ratio with the line for the mixed population at a lower level.

In all stands for both the PCT and the mixed population, the live crown ratio of the taller trees is larger than that of the shorter trees. The mean live crown ratio of both the PCT and the mixed populations is still at about 50% when stand height is 13 m. A live crown ratio of 35% is reached by the mixed population at a stand height of 15.5 m and by the PCT at a stand height of 17 m.

Figure 1 demonstrates the rapid decline of live crown ratio with increasing stand height. The most intensive reduction in crown size takes place when stands (initial

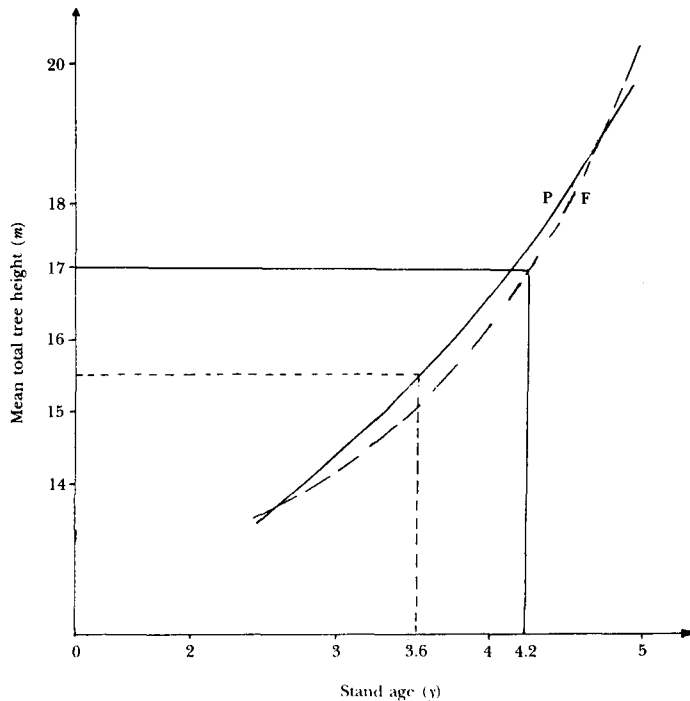
spacing  $3 \times 3$  m) have a height between 13 and 17 m. This happened in the sampled stands between age 2 and 4 y (see Figure 2).



- Af: potential crop trees (PCT) at stand age 3 y
- Ap: mixed population at stand age 3 y
- Bf: PCT at stand age 3.5 y
- Bp: mixed population of stand age 3.5 y
- Cf: PCT at stand age 5 y
- Cp: mixed population at stand age 5 y
- F: mean live crown ratio for PCT
- P: mean live crown ratio for mixed population

Figure 2. Relationship between live crown ratio and mean total tree height for potential crop trees (PCT) and mixed population of multiple and single stem trees (P) in young evenaged pure *A. mangium* stands

To maintain live crown ratio at 35% for *A. mangium* stands on comparable sites, thinning should be carried out at an average stand height of 15.5 m for mixed population and 17.0 m for PCT (Figure 1). This would be 3.6 y stand age for the mixed population and 4.2 y stand age for the PCT (Figure 2). Our results indicate that the proposal of Johari and Chin (1987) who suggested that first thinning of *A. mangium* stands should be carried out at a stand age of 4 y is only suitable if *A. mangium* stand is made up of PCT. Besides that, fixing a specific first thinning age for all *A. mangium* stands is rather dubious because it varies with site conditions and initial stand density. Therefore the first thinning age should be determined using the live crown ratio of the stand.



**Figure 2.** Relationship between mean height and age for potential crop trees (F) and for mixed population (P)

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## ABNORMAL ROOTING IN ACACIA MANGIUM TREES

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*Acacia mangium* is one of the main species used in the Compensatory plantation project in Peninsular Malaysia. The species shows good performance in the early growth. Nevertheless, the species is prone to heart rot infection when wounded (Lee *et al.* 1988). During a field study in the Kemasul plantations in Pahang, Peninsular Malaysia, I observed a peculiar rooting habit inside the stem. Even though this phenomenon has