For the purpose of collecting quantitative data on the occurrence of coppicing by *S. teysmanniana* seedlings, a plot 50 × 50 *m* was established at the peat swamp forest in Kuala Langat. All seedlings < 1 *cm* diameter were examined for evidence of coppicing. The results of the census are shown in Table 1. Coppicing was noted in almost 94% of the total seedlings enumerated. About 52% of the seedlings coppiced only once while 35% coppiced twice or thrice. Greater coppicing was observed in only 7% of the seedlings.

Table 1. Coppicing of *S. teysmanniana* at Kuala Langat peat swamp forest

Frequency of coppicing	0	1	2	3	4	5	6	Total
Number of individuals	5	44	18	12	4	1	1	85

The plot will be monitored to obtain further information on coppicing. Such information could include time of high incidence of die-back and the emergance of new coppice shoots. These processes may be closely related to changes in environmental conditions within the area.

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A NOTE ON GROWTH BEHAVIOUR OF BRANCH CUTTINGS OF *HOPEA ODORATA*

Aminah Hamzah

Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur, Malaysia

Propagation by cutting is now used in forestry as an alternative method of obtaining plantlets, especially in species which have irregular seed production. In some plant species, sources of cutting material are restricted to the stem cuttings or cuttings from orthotropic shoot of coppice. This is due to the irreversible fixation of growth form of their branch cuttings as observed in *Abies* species (Kleinschmit 1977) *Araucaria hunsteinii* (Darus 1982) and *Agathis dammara* (Smits 1983). However, such phenomenon does not occur in species like *Picea abies* (Kleinschmit 1977); *Fagus sylvatica, Sorbus aucuparia* and *Tilia cordata* (Spethmann 1986). The ability of branch cuttings to develop an orthotropic growth form would facilitate the application of cutting propagation as the cutting materials could be taken from any part of the plant.

A total of 400 branch cuttings of *Hopea odorata* (Merawan siput jantan) were taken from 25 17-*mth*-old seedlings planted in an open area of the Forest Research Institute Malaysia's nursery compound. The average height of these seedlings was about 74 *cm*. The semilignified and the lignified parts of the branches were used as the cutting materials. The undeveloped apex and shoot were discarded. The length of each cutting

was about 6 to 10 *cm* and at least two nodes were present on each cutting. The leaves were transversely cut into half to reduce transpiration. The cutting base was cut at right angle and no growth hormone was used in this experiment. The prepared cuttings were then planted in shaded rooting beds containing 100% coarse sand (3 to 8 *mm* diameter size). The planted cuttings as well as the rooting medium were kept moist by automatic sprinklers which operated from 7 a.m. to 7 p.m. at an interval of 5 *m*. The cuttings were harvested 14 weeks after being planted and the number of rooted cuttings was recorded.

The rooting percentage obtained in this experiment was 70%. These rooted cuttings were potted in the polythene bags using forest top soil and sand media in the ratio of 3:1. The potted cuttings were kept in the shade house with 50 to 60% shade for one month before they were sent to the normal transplanting beds with 30 to 40% shade. The survival count at six months after potting was 80% and these branch cuttings showed plagiotropic growth pattern. For further observation of their growth behaviour, a total of 200 rooted cuttings were planted in the open area of the FRIM's nursery compound. The planting distance was 1×1 *m*. Survival count one year after planting was 87% and the average height was 1.4 *m*. Almost all the planted branch cuttings still retained their plagiotropic growth pattern (Figure 1). Only 7% produced orthotropic leaders at the base of the branch cuttings which probably developed from the accessory buds (Figure 2). Following this, pruning of the other branch cuttings was made to induce the production of the orthotropic leaders. The cut was made at the ground level and 30 *cm* above the ground. Observations made six months after pruning indicated that 22 and 14% of those cut at the ground level and 30 *cm* above the ground respectively produced orthotropic leaders.

Figure 1. Branch cuttings of *Hopea odorata* retained their plagiotropic growth pattern

Figure 2. Orthotropic leader developed from the base of branch cutting of *Hopea odorata*

This experiment shows that the use of the branch cuttings is not recommended when normal upright plantlets of *H. odorata* are required. Treatment by pruning the branch cuttings does not appear to solve the problem of eliminating their plagiotropic growth pattern.

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