

EARLY SURVIVAL AND GROWTH IN FIELD TRIALS OF *AQUILARIA MALACCENSIS* (KARAS) AND *AZADIRACHTA EXCELSA* (SENTANG)

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Aquilaria malaccensis Lamk., a member of the Thymelaceae family, is commonly found in the lowland forests of Malaysia, Indonesia, the Philippines, Myanmar and India (Corner 1988). It is locally known as karas and produces aloes wood or 'gaharu' which is fragrant in nature. The production of 'gaharu' is believed to be due to the pathological infection and reaction of the wood caused by injuries. Gaharu is highly sought after and priced both for local use and in the international market particularly in the Arab countries where it is used as incense and in religious ceremonies (Desch 1954, Gianno & Kochummen 1981). The timber, a light hardwood, is suitable for veneer making, packing boxes, indoor light construction and possesses native medicinal values for treating asthma and body healing properties (Burkill 1966, Whitmore 1972, Wong 1978, Lok & Ahmad Zuhaidi 1996, Anonymous 1998). *Azadirachta excelsa* or sentang, belonging to the Meliaceae family, is fast growing and can reach 50 m in height and 4 m girth. It is a medium hardwood, locally important and used in house-building. An effective botanical insecticide has been identified in the species (Ng 1999). The tree is described by Wyatt-Smith (1952), Ng and Tang (1974), Corner (1988). Further information including the use of its timber has been compiled by Noraini (1997).

Currently, these two species, which occur naturally, have attracted many local planters, entrepreneurs, individuals and researchers into domesticating them on a large scale. Karas trees are normally exploited for gaharu and are often felled while gaharu is being examined and extracted. Thus, planting of the species is strongly recommended to ensure sustainable supply of the wood and its valuable non-wood product. Since information on the early growth performance and other silvicultural requirements of the species is scanty, trial plots were established to assess their survival and height growth at Bukit Lagong Forest Reserve, Selangor, Peninsular Malaysia.

The two plots, Field 26(A) (established in April 1996) and Field 52(B) (established in May 1997), are located at 3° 14'N and 101° 38'E. The mean daily temperature ranges from 27 to 30 °C with annual rainfall of between 2000 and 2900 mm. In Field 26(A), only karas were randomly line-planted with 80 selected tissue culture plantlets and 159 seedlings under pine at a close spacing of 1×1 m. The pines are sparsely scattered and the karas seedlings are about 40% shaded. They are located at the lower slope of the lower ridge of Bukit Hari at an altitude of 100–110 m above sea-level. Aspect is southerly. In Field 52(B), 375 karas were randomly interplanted in the open with 406 sentang seedlings at a spacing of 3×3 m. The plot is located on the ridge of Bukit Hari at an altitude of 200–220 m above sea-level. At both sites the soil is a heavy clay loam of granitic origin, reddish-brown with an average pH of 4.5.

Six-month-old seedlings, germinated from freshly collected seeds, were potted and later transferred to and planted in the fields. Initial average height and survival rates of the seedlings and plantlets were measured at one month after planting and then over periods of 24 months for Field 26 (A) and six months for Field 52 (B).

In Field 26 (A), karas tissue culture plantlets performed better than the raised seedlings. The percentage survival of both species decreased gradually over the period; at 24 months

plantlets gave 66.3% survival and seedlings 40.3% (Figure 1a). The initial and final heights of the plantlets were 43.1 and 136.6 cm respectively while those for the seedlings were 27.9 and 114.8 cm respectively (Figure 1b).

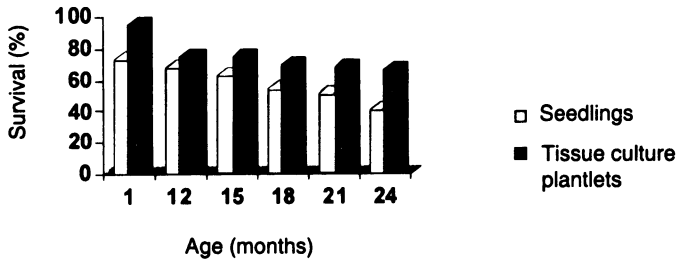


Figure 1a. Survival rates of karas seedlings and tissue culture plantlets

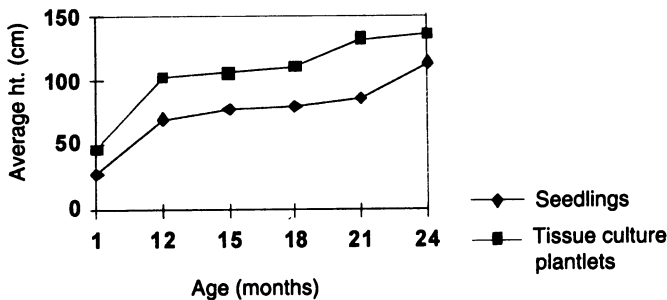


Figure 1b. Average heights of karas seedlings and tissue culture plantlets

In Field 52(B), six-month-old seedlings of both karas and sentang attained a similar higher survival rate of 93% although the value for sentang was initially higher (Figure 2a). They were planted in the open and at wider spacing of 3 x 3m. This further suggests that karas can be planted in the open although it has been regarded as shade loving compared to sentang which is shade intolerant and a faster growing species. The average heights achieved after six months for karas and sentang seedlings were 86.2 and 114.4 cm respectively (Figure 2b).

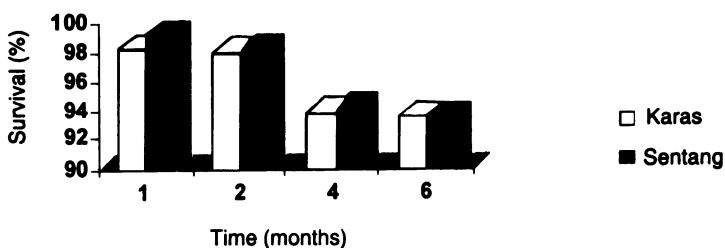


Figure 2a. Survival rates of karas and sentang seedlings

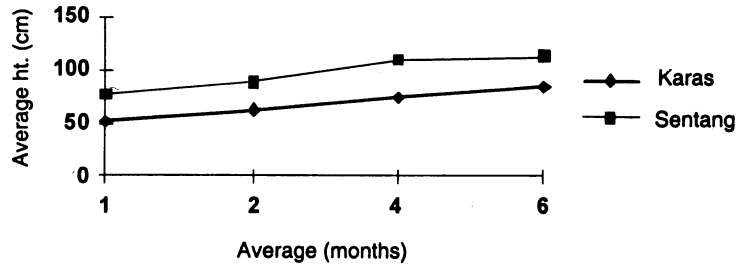


Figure 2b. Average heights of karas and sentang seedlings

These early results suggest that karas can be interplanted with sentang. Shade, especially for the former, can be provided at the early stage of planting to ensure a good survival rate. Planting stocks from karas can also be raised through seeds, wildings or tissue culture plantlets whereas sentang are usually planted using seedlings. In karas, the results shows that higher survival rate and average height growth can be obtained from tissue culture plantlets compared to seedlings. However, to ensure the suitability of the planting stocks on an operational scale, future studies should be conducted for longer durations and in larger trials for which a tree selection programme/provenance trials can be initiated to obtain a more precise conclusion.

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