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Intercropping of Rotan Manau *(Calamus manan)*, with Rubber *(Hevea brasiliensis)*

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ABSTRAK

Anak benih rotan manau (Calamus manan) *telah ditanam di antara lorong-lorong getah* (Hevea brasiliensis) *yang berumur 13 tahun seluas 1.4 hektar. Kadar keamatan cahaya (Ralative Light Intensity, RLI) di dalam ladang getah adalah di antara 50 – 60% RLI pada waktu tengah hari. Peratus hidup rotan manau di tahun ketiga didapati sekitar 80.6%. Kadar tumbesaran adalah berbeza-beza. Purata panjang rotan ialah 45.17 ± 32.15 cm. Kadar pertumbuhan amat menggalakkan apabila dibandingkan dengan data-data dari petak-petak percubaan yang dilakukan di dalam hutan.*

ABSTRACT

Rotan manau (Calamus manan) *seedlings were planted between rows of rubber* (Hevea brasiliensis) *trees in a 1.4 ha plantation when the rubber was 13 years old. The relative light intensity (RLI) in the rubber plantation was 50 to 60% measured at midday. Survival of rotan manau at 3 years after planting was 80.6%. The growth rates were variable. The mean stem length was 45.17 ± 32.15 cm. The growth rate is encouraging compared to figures obtained from trials in forest areas.*

INTRODUCTION

Rattans, presently a minor forest produce, have become increasingly important in recent years. They are found mainly in Southeast Asia (Dransfield, 1979). Cultivation of rattan on a commercial scale is rarely done. The only known large scale cultivation of rattans is carried out in the Lower Barito area in Central Kalimantan, Indonesia, where it is cultivated by villagers (Menon, 1980). In Malaysia, the Forest Research Institute, in expanding its rattan research programme has in 1980, started a trial of intercropping of rotan manau *(Calamus manan)* in a 13 year old rubber *(Hevea brasiliensis)* plantation.

The main objective of intercropping rattan under rubber is to observe the growth performance of rattan under such conditions. This paper thus presents survival and growth results of rotan manau seedlings up to 3 years after planting in a rubber plantation.

Location of Study Area

The rubber plantation is located on an area of 1.4 ha situated at Kampong Bukit Tampoi, Dengkil, Selangor; the area slopes gently southwards. The trial plot was made possible through a joint effort with the Penghulu (Chief) Orang Asli of Kampong Bukit Tampoi (owner of the plantation) and the Forest Research Institute, Kepong. The rubber trees at planting of rotan manau were 13 years old and the crown of the trees had already closed.

The soil in the plantation consists of red yellow podzolic soil with reddish soils on residual material. In this particular plantation (having

an average overall slope of $6° - 8°$, the rubber trees were planted following an east-west direction following a 3.0 × 6.0 m planting distance giving a total of about 420 trees. Rotan manau followed the same planting distance but were planted along the inter rows of the rubber trees.

MATERIALS AND METHODS

At the time of planting, the age of the seedlings of rotan manau varied from 10 to 12 months. The average height of the plants, which were all at the rosette stage, was about 16 cm. None of the seedlings had formed a stem at this stage.

Rotan manau seedlings were planted between the rubber rows following an east-west direction at a planting distance of 3 × 6 m. At each planting hole, about 170 gm of fertilizer (Christmas Island Rock Phosphate) were introduced. Planting of seedlings was carried out by the owner of the plantation supervised by the staff of Forest Research Institute.

A total of 491 seedlings of rotan manau was planted in the plantation in the month of December 1980. Survival count was conducted at 3, 6, 12, 24 and 36 months after planting.

There were altogether 24 planting rows of rattan and in each row there were about 20 seedlings. Five (5) rattan planting rows were selected to monitor the stem growth. Two rows (Line 2 and 6) in the lower slope, one row (Line 14) in the middle and another two (Lines 20 and 23) in the upper slope. The stem growth measurements started 1 year after planting as by then, some of the plants had developed a stem (cane). During measurement, the stems, if present, were measured from the ground surface to the base of the petiole of the uppermost leaf.

Light Ratings

Relative Light Intensity (RLI) was measured when the sun was behind clouds at about noon. The plantation on the average measured between 50% to 60% RLI. This could be due to the fact that it is an even-aged plantation with a single canopy layer.

RESULTS AND DISCUSSION

Survival

Survival counts monitored at 3, 6, 12, 24 and 36 months after planting showed encouraging results. As tabulated in Table 1, the percentage survival at 36 months after planting was 80.6%. The increase in mortality after 1 year could possibly be due to the weedicide applied by the owner on the *Imperata cylindrica* (lalang) found in the plantation. Death due to animal (rat and squirrel) attack was not observed.

The distribution of surviving seedlings according to height classes in the whole plantation at 3 years after planting was as follows: of the 396 survivors 41.4% were below 30.5 cm in stem length, 36.8% were between 30.5 to 61 cm, 13.6% between 61.0 to 91.4 cm, 4.7% between 91.4 cm to 121.9 cm, 2% between 121.9 to 152.4 cm with the remaining 1.5% attaining more than 152.4 cm in stem length.

Stem Growth

The stem growth measurement commenced 1 year from planting (Table 2). This was because the seedlings of rotan manau were still in the rosette stage bearing relatively large leaves with long petioles. At 12 months, the mean stem length of the 5 lines being monitored was almost identical i.e. from 12.2 to 16.26 cm in height.

TABLE 1
Percentage of survival of rotan manau up to 3 years after planting in a rubber plantation

Months	0 – 3	3 – 6	6 – 12	12 – 24	24 – 36
Survival (%)	100	96.5	94.4	89.4	80.6

TABLE 2
Mean stem length of rotan manau seedlings in a rubber plantation

Rotan manau		12 months	24 months	36 months
Line 2 }	lower	14.26 ± 4.97	22.27 ± 12.17	68.75 ± 36.17
Line 6 }	slope	16.05 ± 4.49	32.26 ± 14.25	97.70 ± 40.06
Line 14 }	middle	16.28 ± 3.84	21.73 ± 7.98	48.35 ± 20.46
Line 20 }	upper	12.20 ± 2.84	14.29 ± 3.63	20.47 ± 7.69
Line 23 }	slope	13.47 ± 2.61	14.80 ± 3.07	17.94 ± 5.63

At 24 months, the stem height for Lines 2, 6 and 14 ranged from 21.73 cm to 32.26 cm. All these lines were from the lower slope of the plots. Slow growth was observed at Lines 20 and 23 which were 14.29 cm and 14.80 cm respectively.

At 36 months, the mean rate of growth for Lines 2, 6, 14, 20 and 23 were 69.75 cm, 97.70 cm, 48.35 cm, 20.47 cm and 17.94 cm respectively. The differences in growth between seedlings in the respective lines were found to be significant. This is possibly due to the availability of the soil nutrient being washed down the slope, considering that the supply of other important growth parameters such as light and water was adequate in the plantations.

At 36 months after planting, the overall mean stem length measured was 45.17 ± 32.15 cm and the longest stem length recorded was 250 cm. At 24 months this particular stem measured 70 cm. Its rate of growth from the second to the third year was 180 cm. The second longest stem was gauged at 200 cm; this measured 56 cm at 24 months. Its growth rate therefore was 144 cm. Both these canes were found in the lower slope.

Table 3 compares the stem growth of rotan manau under different planting conditions. The data shows that at 3 years after planting, rattan planted under rubber performs comparatively well. In Block D 3, with the various treatments imposed, the growth is better attaining more

TABLE 3
Comparative mean stem length of rotan manau seedlings grown under different planting conditions in various plots at 3 years after planting

Place		Mean stem length (cm)	Range (cm)	Survival (%)	Source
Rubber plantation Dengkil, Selangor.		45.17	10 to 250	80.6	
Block D3, Sg. Buloh, Forest Reserve.	Treatment 1 (Control)	37.2	10 to 80	84.5	Aminuddin and Nur Supardi (1986)
	Treatment 2 (3' opening)	54.6	13 to 150	87.8	
	Treatment 3 (6' opening)	62.3	10 to 135	74.0	
	Treatment 4 (9' opening)	65.6	15 to 175	79.7	
	Treatment 5 (12' opening)	66.7	10 to 150	83.7	
Field 41, Bkt. Lagung Forest Reserve.		36.3	5 to 254	67.1	Anon. (1981)
Field 28, Bkt. Lagung Forest Reserve		31.7	8 to 107	55.0	Anon. (1981)

than 54.0 cm in length; rattan under rubber (averaging; about 45.17 cm in length) can be said to be growing relatively well considering the cost incurred in carrying out the respective treatments.

Rattan species vary in their light requirements (Kuswata *et al.*, 1986). Some only grow up into the forest canopy when light becomes available from a tree fall gap or other opening while some other species grow in dense shade and in large openings or secondary forests where light levels are high (Dransfield, 1979). Rotan manau, probably typical of most species, seems to exploit small openings in primary forests as observed by Manokaran (1977) in a trial plantation in Ulu Langat Forest Reserve in Selangor. According to him, rotan manau grew relatively faster in positions where the canopy was relatively open than dense. This was later observed by Mori (1980) where he found that the rotan manau seedlings require about 50% RLI which is considered to be a relatively open condition. As the RLI is between 50 to 60% in a rubber plantation, conditions appear suitable for the growing of rattan.

CONCLUSION AND RECOMMENDATIONS

The stem growth of rotan manau seedlings in the rubber plantation at 3 years after planting showed better growth rates than those grown in the forest without any treatment. This growing potential should increase the income of the rubber growers when the time comes to harvest and market the rattan at maturity period.

Other considerations that have surfaced as a result of these observations are: –

1. Planting of rattan in an old rubber plantation is more economical as compared to planting under forest conditions since it reduces cost of maintenance such as weeding. Research along this lines should be further conducted.
2. Research ought to be carried out to study the effect of growing rattan on the latex production of the rubber plantation.
3. A possible extension of research will be to consider the correlation between rattan growth and the size of the rubber tree. It may be possible to use the size of the rubber tree as an indicator for selection of rattan planting sites or prediction of rattan growth.
4. To facilitate tapping and collection of latex, rattan should be planted in alternate rows and at a closer interval to give the maximum number of seedlings (about 420) per hectare.
5. Further research should also be carried out on the fertilizer regimes. This is important because in this plantation, slightly more than 50% of the seedlings are short with an average height of around 45 cm after 3 years. More research efforts should be geared towards boosting the growth. Besides fertilizer regimes, research on the relationship between rattan growth and soil conditions should be intensified so that species and sites can be carefully selected for the successful cultivation of rattan.

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