

CAN RUBBER (*HEVEA BRASILIENSIS* MUELL. ARG.) BE GROWN AS A TIMBER CROP?

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Demand for timber has been in increasing trend both locally and internationally as it is closely associated with the increase in population and the improvement on living standard of people. In Sri Lanka, commercial timber crop plantations are few and also, timber trees in the home gardens are not sufficient to cater the national demand resulting in a threat to the protected forests which occupy less than 20% of the total land area of the country. Therefore, planting tree species for timber production needs to be promoted where possible. In this context, multipurpose tree species undoubtedly play an important role providing wide range of benefits to the growers hence a practical option in participatory forestry. At present, Rubber (*Hevea brasiliensis*) is grown in an area of ca. 114 thousand hectares (Sri Lanka Census of Agriculture – 2002, Department of Census and Statistics) in the country mainly for latex, and then for timber and firewood. With high economic value for both latex and timber, rubber would be an ideal crop for the programmes on participatory forestry. Nevertheless, growers should be aware of its productivity in timber production against other timber species. Therefore, we have attempted to compare the timber production of rubber with that of other commonly grown species in the country.

For this purpose information on timber production of Rubber at different age categories was obtained from three estates, namely Ambetenna, Uskvalley and Dartonfield, situated in Kalutara district of Sri Lanka. In the first two estates, there was a small scale Rubber/timber intercropping experiment which provided the data for first ten years of Rubber growth. Data for the rest of the lifespan of Rubber were gathered from the Dartonfield estate. Six different alternative timber species, i.e. Albizzia (*Albizzia moluccana*), Alstonia (*Alstonia macrophylla*), Eucalyptus (*Eucalyptus* spp.), Pine (*Pinus* spp.), Teak (*Tectona grandis*) and Mahogany (*Swietenia macrophylla*) were chosen for the comparison. Information on growth and timber production of Alstonia was obtained from the Rubber/timber experiment mentioned earlier whilst the data for other species were gathered from the yield tables compiled by the Forestry Department of Sri Lanka. Crops were compared for parameters such as girth, basal area and timber volume under six age categories *viz.* 4-5, 6-10, 11-15, 18-20, 21-30 and 31-40 years.

Based on the capacity for latex production, the economic lifespan of Rubber is considered as 30 years whilst economic productive period/lifespan of Teak, Mahogany, Pine, Eucalyptus, Alstonia and Albizzia was 50, 45, 35, 25, 20 and 15 years, respectively.

The planting distance recommended for Rubber was 4.0 × 4.5 m for square planting and 2.5 × 8.0 m for avenue planting with an initial planting density of 500 trees per hectare. The lowest spacing was found for Pine *i.e.* 2.4 × 2.4 m, occupy 1700 trees per hectare initially. All the other timber species had a spacing of 3.0 × 3.0 m, resulting in an initial planting density of ca. 1100 trees per hectare. Though not in Rubber, periodical thinning was a common practice in cultivation of other timber species. Depending on the lifespan and growth rate, the thinning programme varied with the timber crop (Table 1). Nevertheless with tree growth, drastic decline in crop density was observed in all timber species due to thinning. Except in Rubber, the crop density of all other timber species have decreased to 50% of its initial planting density in their first thinning and remained only 10-20% at the end. However, Rubber secured 60% of trees from its initial planting density at the end of its 30 year economical life span with 300 trees per hectare (Fig.1).

Table 1. Information on basic management practices of different timber species

Timber type	Planting space (m)	Initial planting density (trees/ha)	Life span (yrs)	Thinning programme (at years)			
				1 st	2 nd	3 rd	4 th
Rubber	4.0×4.5	500	30				
Teak	3.0×3.0	1100	50	6	14	22	32
Mahogany	3.0×3.0	1100	45	20	30	40	
Alstonia	3.0×3.0	1100	20				
Eucalyptus	3.0×3.0	1100	25	7	13	18	
Pinus	2.4×2.4	1700	35	6	13	20	
Albizzia	3.0×3.0	1100	15	4	10		

(Source: Yield tables, Forestry Department of Sri Lanka.)

Up to 10 years, the rate of girth expansion was highest in Albizzia followed by Rubber and Alstonia (Fig.2). With the removal of Albizzia, the growth rate of Eucalyptus was the highest. Also Pine showed an improved growth. Rubber has secured the second place out of all species considered. At the end of the lifespan the average girth at the breast height was 72, 87, 96, 110, 112 and 129 cm for Pine, Albizzia, Teak, Eucalyptus, Rubber and Mahogany, respectively (Fig.2).

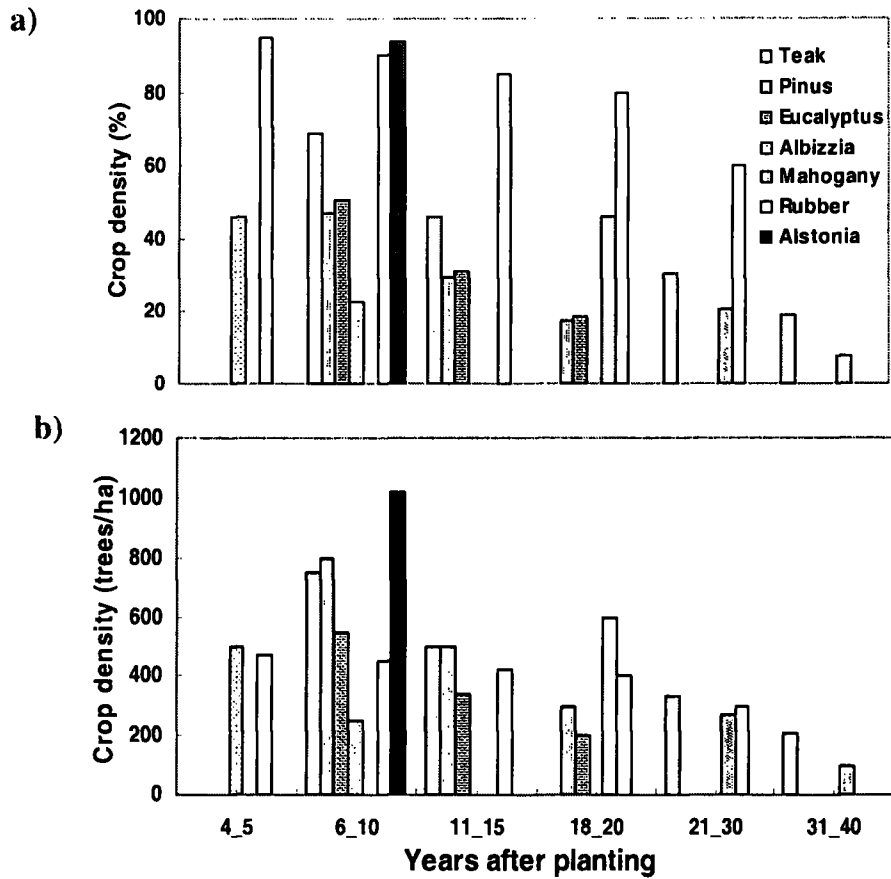


Fig.1. Variation of crop density of different timber species from the initial planting density. In a) as a percentage & in b) as trees per hectare

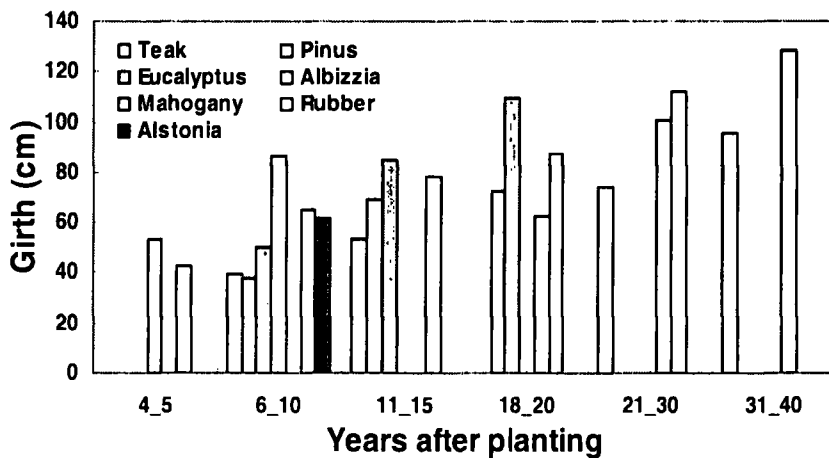


Fig. 2. Ontogenic girth expansion of timber species

In terms of basal area covered by the tree trunks, Rubber had the highest basal area through out the lifespan except for the first ten years when Albizzia was dominating. The basal area is a function of girth and crop density, hence with no thinning done Alstonia showed the highest basal area 8 years after planting. However, no further information on subsequent years of this crop was available (Fig.3).

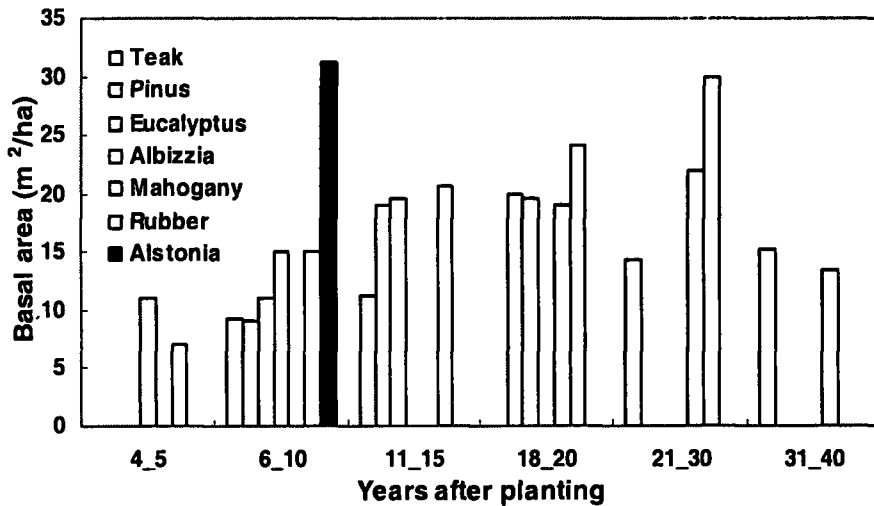


Fig.3. Basal area distribution of timber species

Although basal area covered by Mahogany and Teak was less than that of other crops at given time period, at the end of the long lifespan Mahogany and Teak have covered 47.5 m³ and 41.6 m³ cumulative basal area per hectare of land, respectively. Out of the crops, which complete their lifespan within 30 years, the maximum cumulative basal area was recorded for Pine, i.e. 45.0 m³/ha and then Eucalyptus and Rubber with the values of 41.5 and 30 m³/ha, respectively. Being a fast growing species Albizzia has given 38 m³ of cumulative basal area per hectare of land within 10 years of its short lifespan.

Due to the early thinning of Albizzia, Rubber has showed the highest timber volume at 5 and 10 years of planting in terms of both timber volume per tree and per hectare. Timber production of Albizzia at the final harvest of its 10 year growth was 0.62 m³ per tree and 156 m³ per hectare. In the 30 year growth period, rubber maintained the highest timber production among the crops assessed with the values of 2.3 m³ per tree and 689 m³ per hectare. Teak was the lowest producer among all species assessed with the values of 0.46 m³/tree and 95.5 m³/ha. Mahogany was able produce timber volume of 1.3 m³ per tree and 130 m³ per hectare at the end of its long lifespan (Fig. 4 & 5).

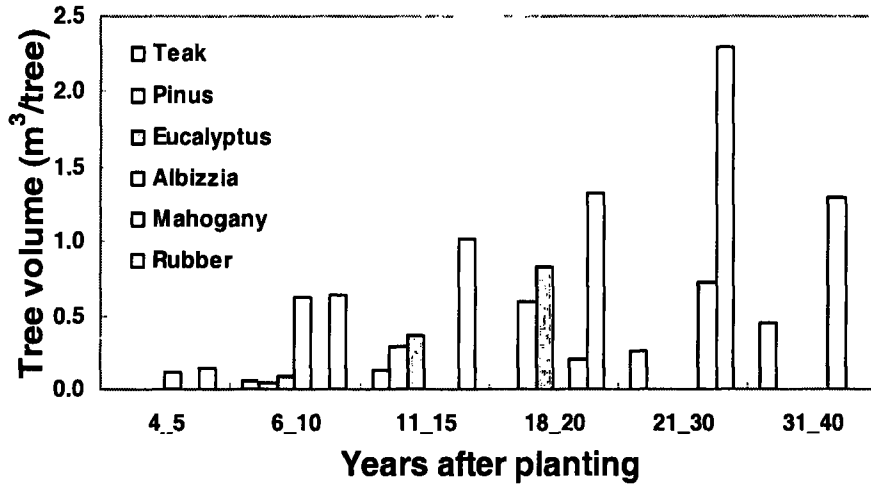


Fig.4. Production of timber volume in tree basis

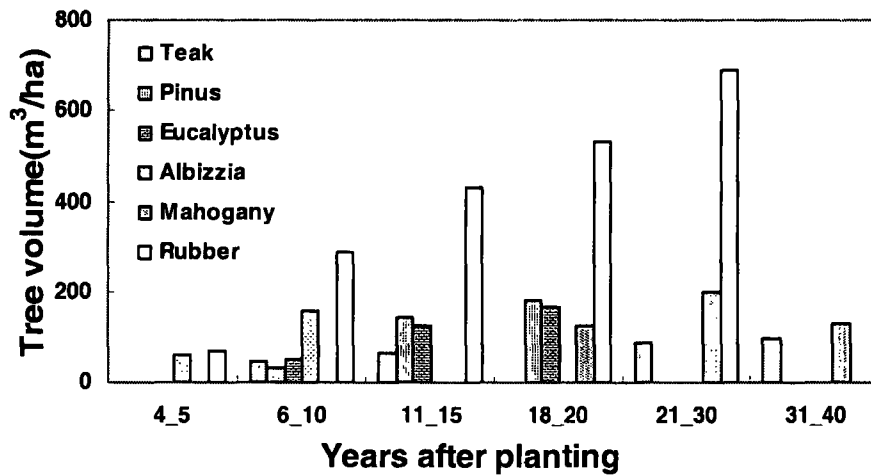


Fig.5. Availability of timber volume

With no thinning programme conducted instantaneous and cumulative timber production of rubber was alike. However, Rubber was capable of producing the highest timber volume even when compared to the cumulative timber production of other crops. Total timber production of Albizzia during its lifespan was 398.5 m³ of timber per hectare. At the end of 30 years, Rubber has produced 689 m³ of timber per hectare whilst the cumulative values for Pine, Eucalyptus, Mahogany and Teak were of 375.5, 345, 300 and 145 m³/ha, respectively. However, Mahogany and Teak were able to produce 245 and 420 m³ of cumulative timber volume by their final harvests at 50 years (Fig.6).

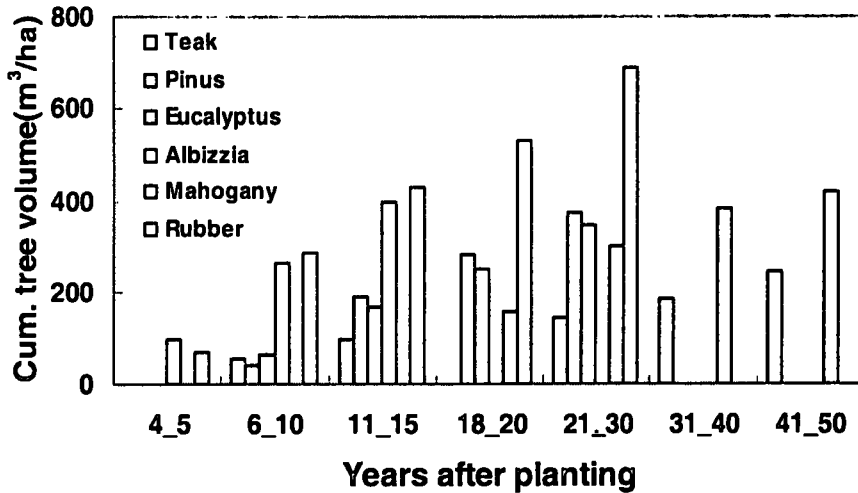


Fig.6. Production of cumulative timber volume

Rubber is considered to be a quality timber with medium strength and wood density is between 700-800 kg/m³. Once treated it is specially suitable for furniture and wooden products. This timber is mainly preferred by Europeans because of its yellow colour, hence called as golden timber. However, Eucalyptus is superior in strength than rubber with the wood density of 700-1000 kg/m³ and greyish brown in colour. Teak, Albizzia, and Mahogany are medium strength timber having similar wood density of Rubber, i.e. between 700-800 kg/m³ with golden brown, mid brown and reddish brown in colour, respectively. *Alstonia* is a white timber with the density of ca. 400 kg/m³, therefore included in low strength category (R.H. Farmer, Hand book of hard woods, 2nd Edition, Department of the Environment Building Research Establishment, UK)

Considering the capability of producing high quality and quantity of timber, farmers will undoubtedly prefer to cultivate rubber for the purpose of both latex and timber. The subsidy programmes in operation for Rubber would attract the farmers for this venture. If the priority would given to timber production, high density systems can be practised with periodical thinning programmes. Marginal areas for cultivation of Rubber for latex production (eg. Hilltops) could be diverted to this sort of programme adding a special value to the land. Therefore, planting Rubber for timber would provide additional mode of foreign exchange earning to the country.