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GROWTH PERFORMANCE OF *EURYCOMA LONGIFOLIA ON* TWO DIFFERENT BRIS SOIL SERIES AT SETIU, TERENGGANU

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Abstract: ***A study was conducted to compare the growth performance of Eurycoma longifolia which were interplanted with Acacia manguim, Acacia auriculiformis and Acacia hybrid stands at two different BRIS soil namely Rhu Tapai and Rhu Dua in Setiu, Terengganu. This is a first agroforestry project where commercial timber species were intercropped with a valuable herbal plant, Tongkat Ali (E. longifolia) on poor sandy soil. A promising growth rates were obtained for E. Longifolia grown on both soil types. An average height and diameter obtained at Rhu Dua were 0.86 m and 14.80 cm respectively while for Rhu Tapai soil types were 0.77 m and 14.76 cm respectively. Similarly, the average root length and root dry weight for Rhu Dua were 3.25 m and 11.87 g while at Rhu Tapai soil type were 2.99 m and 11.42 g respectively. The results indicates that there is a potential of exploit and developinging BRIS soils for commercial cultivation of E. longifolia with other commercial timber species.***
Keywords: ***Eurycoma longifolia, Acacia species, interplanting, BRIS soil, agroforestry***

1. INTRODUCTION

Eurycoma longifolia Jack. (Tongkat Ali) belongs to the family of *Simaroubaceae*. It is native to Malaysia, Sumatra, Burma, Thailand, Borneo and the Philippines. *E. longifolia* is a tall slender shrub commonly found as an understorey species in the lowland forests with altitude up to 500 m above sea level. It can grow up to 10 meters in height and with reddish brown petioles. It is one of the commercial herbal plants in Malaysia and has been used for medicinal purpose for centuries. The roots are commonly used as an after birth tonic, reducing fevers, curing mouth ulcers, syphilis, bleeding gum and to treat intestinal worms. On top of the therapeutic properties, it also has aphrodisiac properties (Ang *et al*. 2003).

Commercial planting of this species is considered timely due to the local market demand. Since Tongkat Ali is considered a shade tolerant shrub species, the commercial planting trials have been conducted on various fertile soils inter - plant with other forest dwelling species under the agroforestry system. However, one of constraints in large scale cultivation is to obtain good agriculture land areas, as most of the suitable land areas have been converted to the lucrative oil palm plantations and other development purposes. Therefore, one way to solve the land issue is to try to utilize alienated land, such as poor sandy BRIS soil along the east coast of Peninsular Malaysia which is sometimes still left uncultivated.

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BRIS soil (Beach Ridges Interspersed with Swales) is considered as one of the problem soils in Malaysia besides peat, tin tailing and acid sulphate soils. According to Amir (1999) and Ghazali et al. (2008) almost 99% of the topsoil in BRIS area is sand and normally exceeds one meter depth and have poor water and nutrient retention properties. Symptoms such as leaf scorching and wilting are widespread during dry season when air and surface soil temperatures are high especially in the afternoon. According to The Department of Agricultural of Malaysia BRIS soil has been divided into seven types, mainly based on depth, drainage and soil profile. These soil types are Rusila, Rhu Tapai, Rompin, Rhu Dua, Baging, Jambu and Merchang soil types.

Therefore, in this study growth performance of 3-year-old *E. longifolia* trees which have been mixed planting with A. *mangium, A. auriculiformis* and *Acacia hybrid* (*A. mangium* x *A. auriculiformis*) on two different types of BRIS soils are compared and discussed. This is also a first agroforestry project where commercial timber species were intercropped with a valuable herbal plant, Tongkat Ali (*Eurycoma longifolia*) on poor sandy soil.

2. MATERIALS AND METHODS

2.1 Study Area

The experiment was conducted at Setiu, Terengganu on two BRIS soil types; Rhu Tapai and Rhu Dua series. This is a flat land area, formerly occupied by the main coastal shrubs such as *Melaleuca* and *Casuarina* species. They were cleared off prior to planting. The texture of the soil was more than 98% sand, poor in nutrient content and during the dry period, the surface soil temperatures can be very high reaching degrees. The pedological features of Rhu Dua soil which is moderately deep, sandy soils, structureless and single grained, yellowish brown in colour and spodic horizon at 80cm depth while, Rhu Tapai is a young soil type without a podogenetic horizon. Most of this soil types are found near the sea and has high sand with a quartz composition (Amir, 1999 and Mohd. Ghazali *et al*. 2007).

41 hectares of BRIS area which contain Rhu Tapai and Rhu Dua soil series were selected for the study area. A five sample plots each comprising of 30 x 30 meters were established in the Rhu Tapai series and another five plots of similar in size were established in Rhu Dua soil series.

2.2 Experimental Plots

In each plot, *Acacia mangium, A. auriculiformis* and hybrid, totaling 100 trees were mixed planted at the spacing of 3 x 3 meters. Weeding was carried out quarterly, and no other silivicultural treatment was applied.

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Figure 1: *E. longifolia* tree in the study plot.

Figure 2: *E. longifolia* sampel were taken

The total heights and their root collar diameters were measured based on obtained from ten randomly selected trees. The Ritcher Tape was used for the total height measurement, starting from the ground surface to shoot tips. The root collar diameters were measured using Mitutoyo Digital Caliper.

2.4 Root Measurement and Samples

All *E.longifolia* sample trees were uprooted and their root lengths from root collars to root tips were measured. The root collars and root tips were immediately cleaned from soils using running tap water and then cut into pieces. The samples were wrapped nicely with news papers and placed in plastic bags before sending back to the laboratory. They were dried in oven at 80º C for about one month and then their dried weights were recorded.

3. RESULTS

3.1 Total Height and Root Collar Diameter

The average height and collar diameter of 3-year-old *E. longifolia* at two different BRIS soil series are as shown in Table 1. The average mean height and collar diameter for *E. longifolia* trees at Rhu Tapai soil type obtaines were 0.78 meter and 14.76 mm while, the Rhu Dua were slightly taller and bigger at 0.85 m and 14.8 cm respectively. Even though the average heights and collar diameter sizes of *E. longifolia* trees were varied between Rhu Tapai and Rhu Dua planting sites, T-test result showed no significant difference (p=value < 0.05). This showed that all *E. longifolia* trees planted at different BRIS soil series were uniformed in their height and diameter size.

Table 1: The Averages Total Heights and Collar Diameters of 3-year-old *E. longifolia* planted at different BRIS soil series.

Plot No.	**BRIS SOIL (RHU TAPAI)**		**BRIS SOIL (RHU DUA)**	
	Average Total Height (m)	Average Collar Diameter (mm)	Average Total Height (m)	Average Collar Diameter (mm)
1	0.77	13.50	0.96	16.38
2	0.72	12.80	0.72	14.42

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3	0.89	16.65	0.82	13.67
4	0.79	16.04	0.89	14.56
5	0.74	14.92	0.88	15.00
Total	**3.91**	**73.91**	**4.27**	**74.00**
Mean	**0.78 ± 0.28**	**14.76 ± 0.49**	**0.85 ± 0.03**	**14.80 ±0.39**

± Standard error of mean

3.2 Root length and Root Dry Weight

Table 2 shows the average means for root length and dried weight of *E. longifolia* trees planted at both soil series. The average means for root length and root dry weight of trees planted at Rhu Tapai were 0.3 m and 11.42 g, while at Rhu Dua were 0.33 m and 11.88 g respectively dry weight. No significant different results was obtained for both soil types

Table 2: The Average Root Length and Dry Weight of 3- year- old *E. longifolia* Planted at Different in BRIS Soil Series.

Plot No.	**BRIS SOIL (RHU TAPAI)**		**BRIS SOIL (RHU DUA)**	
	Average Root Length (m)	Average Root Dry Weight (g)	Average Root Length (m)	Average Root Dry Weight (g)
1	0.31	10.09	0.32	16.35
2	0.27	8.66	0.31	10.67
3	0.30	18.32	0.29	10.27
4	0.40	10.95	0.46	10.88
5	0.21	9.09	0.27	11.22
Total	**1.49**	**57.11**	**1.65**	**59.39**
Mean	**0.30± 0.02**	**11.42± 1.21**	**0.33± 0.45**	**11.88± 0.89**

± Standard error of mean

4. DISCUSSION AND CONCLUSIONS

It is astonishing that *E. longifolia* trees can survive and grow well when inter – planted with *Acacia* species on sandy BRIS soil. This is the first study carried out as it was not highlighted before that *E. longifolia* trees could be successfully planted on BRIS soil under the agroforestry concept. The results also revealed that similar the growth performance in term of height, collar diameter, root length and dry weight can be obtained. This growth performance was almost similar to trees planted on normal mineral soil (Mohd. Noh 2000). However it is possible to inter –plant *E. longifolia* seedlings with teak tree will give more vigorous and faster growth rates after at 1½ years after planting). Ab. Rasip *et al.* (2000).

The success of planting of *E.longifolia* on BRIS soil will provide a lot of new technical information and knowledge on exploitation and commercial development of BRIS soil by local farmers. The agroforestry concept will encourage local farmers to plant forest species and medicinal plants for their short and long terms income. It is recommended that E. longifolia be planted after the Acacia plants have been established on the sandy soils.

In conclusion, the results of this study show that *E. longifolia* trees can be successfully intercropped with *Acacia* species on two different types of BRIS soil.

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