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Rubber clones in Meghalaya: growth and yield performance

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INTRODUCTION

Hevea brasiliensis (Willd.ex A.Juss.) Muell. Arg., a native of the Amazon rain forests is now under cultivation in different agro-climate zones of the world over owing to its ever increasing importance as the principal source of a strategically important commercial product namely natural rubber and the vast opportunities of job and income it offers to the people involved in the rubber plantation sector. In India, rubber cultivation is undertaken mainly in the state of Kerala and to some extent in the neighboring states of Tamil Nadu and Karnataka. However, increase in demand for natural rubber has forced the rubber plantation industry to be expanded to areas in India like the North-East where the climate is different from that of the traditional zones and is less hospitable. Meghalaya in the NE India is a sub-tropical region where rubber, a tropical perennial crop, is now under cultivation. High altitude, low temperature during winter months, high wind velocity, less soil moisture percent and the absence of North-East monsoon are the major constraints the rubber plantation sector faces in the NE. Despite such limiting factors rubber plantation establishment has so far been successful in the region. One of the challenges has been identifying suitable clones for the region including location specific clone development.

MATERIALS AND METHODS

In the present study, data collected from two clone evaluation trials from the district of West Garo Hills in Meghalaya have been studied. The clone trials were established at the Ganolgre research farm of the Regional Research Station, Tura (latitude 25° – 26°; longitude 90° – 91°; altitude 600 m above msl). The climate there is sub-tropical. Weather conditions (Table 1) are represented mainly by factors such as rain fall, which is 2417 mm, an average of twenty years with a standard deviation of 670, minimum air temperature of 16.5°C, (average of twenty years), maximum air temperature of 28.8°C, (average of twenty years), relative humidity of 89.5 % (6.20AM) and 68.4 % (1.20PM), twenty years average, bright sunshine hours of 5.9 (twenty years average) and wind speed of 2.4 km/hr (twenty years average). Clone trials were established in 1985 and 1986 respectively in single tree single plot randomized design. Spacing adopted was 6.6m x 3.3m and 6m x 3m respectively. Ten clones each were planted in the trials with two clones being common namely RRII 105 and RRII 118. So the eighteen clones included two trials are RRII 105, RRII 118, RRII 203, RRIM 600, RRIM 605, PB 86, PB 235, PB 5/51, GT1 and GL 1 with replications (trial 1) and RRII 5, RRII 105, RRII 118, RRII 208, RRIC 102, RRIC 105, PB 260, PB 310, PB 311 and PR 255 with forty replications (trial 2). Girth was recorded at a height of 150 cm on an annual basis. Although a few clones such as RRII 203, RRIM 600, RRII 118 and PB 235 were opened for tapping from clone trial I in 1995 remaining clones came into tapping by 1997. Similarly from clone trial II all clones came into tapping by 1998. Clones were subjected to S/2 d2 system of tapping. Rubber yield (gram/tree/tap abbreviated as g/t/t) was recorded fortnightly by cup coagulation method.

RESULTS AND CONCLUSIONS

In 1985 clone trial girth ranged from 71.9 cm (GL 1) to 91.4 cm (RRIM 600). RRIM 203, PB 235 and RRIM 118 were the most vigorous clones in the trial after RRIM 600 (Table 2). In 1986 clone trial girth ranged from 73.0 cm (PR

Table 1. Annual data on various weather parameters recorded at RRS TURA (1990 - 2009)

Year	Temperature (°C)		RH (%)		Rainfall (mm)	BSSH	Wind velocity (km/hr)
	T (Max)	T (Min)	6.20 AM	1.20 PM			
1990	27.4	16.4	86.3	70.6	2486	6.1	5.0
1991	27.8	16.8	87.8	68.3	2451	5.8	4.8
1992	29.2	16.1	86.1	66.4	2080	6.4	4.8
1993	27.8	17.3	87.3	71.8	2835	6.5	4.0
1994	28.5	17.3	86.5	68.7	1640	6.9	3.4
1995	28.5	17.5	88.5	71.3	2188	6.2	3.0
1996	28.8	17.5	86.4	66.5	1983	6.7	2.9
1997	27.9	16.9	85.1	61.6	1425	6.5	2.4
1998	28.6	16.7	85.0	71.2	1912	5.9	2.8
1999	29.0	16.9	84.0	66.1	1764	5.9	1.5
2000	28.6	15.9	85.4	65.8	2570	6.0	1.9
2001	29.2	15.6	84.8	63.6	1817	5.4	1.3
2002	28.8	15.1	85.4	66.7	3105	5.6	1.1
2003	28.9	16.3	86.2	69.8	2128	5.9	0.9
2004	29.5	15.7	85.4	73.2	3256	5.6	1.2
2005	30.1	16.5	85.9	69.2	4002	5.4	1.7
2006	30.1	16.7	85.0	69.0	2224	5.7	1.4
2007	29.1	16.0	84.6	71.6	3303	5.3	1.2
2008	28.8	15.7	87.3	72.3	2668	5.2	1.5
2009	30.0	16.4	87.1	70.9	2433	5.0	1.2
Mean/Total	28.8	16.5	85.9	68.4	2398	5.9	2.4
SD	0.7	0.7	1.2	2.9	670	0.5	1.4

Table 2. Girth attained by clones 20 years after planting.

1985 clone trial			1986 clone trial		
Clone	Girth (cm)	Rank	Clone	Girth (cm)	Rank
RRIM 105	75.7	8	RRIM 5	79.8	8
RRIM 118	84.8	4	RRIM 105	81.8	7
RRIM 203	88.4	2	RRIM 118	86.5	5
RRIM 600	91.4	1	RRIM 208	85.1	6
RRIM 605	78.6	7	PB 260	76.0	9
PB 86	83.1	5	PB 310	93.6	1
PB 235	86.5	3	PB 311	89.3	2
PB 5/51	68.2	10	RRIC 102	89.0	3
GL 1	71.9	9	RRIC 105	88.8	4
GT 1	80.4	6	PR 255	73.0	10
Mean	80.9			84.3	
SD	7.4			6.5	

Table 3. Yield data from 1985 clone trial (Average of 12 years)

Clone	Dry rubber yield in gram/tree/tap	Dry rubber yield in kg/tree/yr	Productivity in kg/ha/yr
RRIM 600	44.3	4.4	1551
RRII 105	40.6	4.1	1421
RRII 203	39.2	3.9	1372
PB 235	37.2	3.7	1302
RRII 118	33.5	3.4	1173
GT 1	30.0	3.0	1050
PB 86	29.7	3.0	1040
GL 1	27.8	2.8	973
PB 5/51	27.4	2.7	959
RRIM 605	26.9	2.7	942
Mean	33.7	3.4	1180
CD(P 0.05)	7.6		

Table 4. Yield data from 1986 clone trial (Average of 11 years)

Clone	Dry rubber yield in gram/tree/tap	Dry rubber yield in kg/tree/yr	Productivity in kg/ha/yr
PB 311	43.8	4.4	1532
RRII 105	36.6	3.7	1281
RRII 208	35.6	3.6	1247
PB 310	35.2	3.5	1231
RRII 118	31.7	3.2	1110
PB 260	30.6	3.1	1071
RRII 5	29.2	2.9	1023
PR 255	28.4	2.8	994
RRIC 102	26.9	2.7	940
RRIC 105	24.9	2.5	872
Mean	32.3	3.2	1130
CD(P 0.05)	7.1		

255) to 93.6 cm (PB 310). Clones PB 311, RRIC 102, RRIC 105, RRII 118 and RRII 208 attained above average girth (Table 2).

There was significant clonal variation in rubber yield which ranged from 26.9 g/t/t (RRIM 605) to 44.3 g/t/t (RRIM 600) in the 1985 clone trial (Table 3). Yield of clones like RRII 105, RRII 203 and PB 235 were comparable in yield with the top yielder RRIM 600 which was also the check clone. In the 1986 clone trial PB 311 was the top yielder (table 4). Yield ranged between 24.9 g/t/t (RRIC 105) and 43.8 g/t/t (PB 311). Other promising clones in the trial were RRII 105 (36.6 g/t/t), RRII 208 (35.6 g/t/t) and PB 310 (35.2 g/t/t). Of all the clones recorded for girth and yield, clone RRIM 600 was found superior in terms of both growth and yield. Clones like RRII 105, RRII 203, RRII 208, PB 235 and PB 310 also performed fairly well and are promising for cultivation in Meghalaya.