EARLY GROWTH PERFORMANCE OF CERTAIN *HEVEA* CLONES FROM ON-FARM TRIALS IN GARO HILLS OF MEGHALAYA

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Two on-farm trials (OFTs) were established in 2009 at Mendipather, North Garo Hills, Meghalaya. The trials were initiated to study the performance of certain selected clones of *Hevea brasiliensis* in farmers' fields and the clones were planted in the fields of two progressive farmers at Mendipather. Six clones *viz*., RRIM 600, PB 235, RRII 203, RRII 417, RRII 422 and RRII 429 were planted in blocks. Data on girth and other secondary characters recorded during the initial years have been analysed in the present study. The highest girth was recorded in RRII 429 followed by RRII 417 whereas the lowest girth was recorded in RRII 422 in Field 1. In Field 2, maximum girth was recorded in PB 235 followed by RRII 203 and minimum was in RRII 422. Maximum bark thickness was recorded in PB 235 closely followed by RRII 429 whereas the lowest bark thickness was recorded in RRII 422. Performance of the clones based on absolute girth suggests the superiority of PB 235 and RRII 429 over RRIM 600 in the local agro-climatic conditions of North Garo Hills.

Keywords: Growth, *Hevea brasiliensis,* Meghalaya, North Garo Hills

Meghalaya is one of the potential states for rubber cultivation in the North East India. Rubber cultivation provides rural employment for the tribal population of Meghalaya. In Meghalaya, the Garo Hills regions, situated at 25°65.438'N latitude, 90°39.129'E longitude and 77-78 m above MSL are suitable for rubber cultivation compared to that of the Khasi and Jaintia hills of the state. The topography of the Garo Hills region is mostly undulated and close to the border of Assam state. Though the performance of several *Hevea* clones have been tested in the clone evaluation trials of the Regional Research Station, Tura their performance in the farmer's field have so far not been tested in on-farm trials. Certain clones tested in large-scale trials in the Garo Hills and other regions of the North East India *viz*., RRII 203, PB 235 and RRIM 600

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(Reju *et al.*, 2004; 2007; Das *et al.*, 2013) along with modern clones RRII 429, RRII 417 and RRII 422 were included in the study. The study is the first report on the performance of selected *Hevea* clones in the farmer's field in Meghalaya.

The study was conducted at Mendipathar, North Garo Hills of Meghalaya. This region is experiencing moderate rainfall (2400 mm) with minimum temperature remaining as low as 5 ^{0}C during winter and maximum temperature of 35 ^{0}C with long sunshine hours and altitude ranging from 150 m to 600 m above MSL. Six clones *viz*., RRIM 600, PB 235, RRII 203, RRII 417, RRII 422 and RRII 429 were planted in blocks of 100 plants each at a spacing of 4.5m x 4.5m in July, 2009. Clones, their parentage and country of origin are given in Table 1. The experiment was conducted in two farmers' fields. The planted area was plain and the soil was acidic in nature (pH 5.5), available P was very low and organic carbon and available K were medium to high (Mandal *et al.*, 2000; Singh *et al*., 2013). Recommended cultural practices were followed for general maintenance of the plantation and fertilizer application was done as per the recommendations for North Eastern states of India. As the area receives sufficient rainfall with a few pre-monsoon showers, the plants did not suffer moisture stress during the period of study. Pre-monsoon rainfall is a common phenomenon of this region. Girth of the clones at 150 cm height from the bud-union, number of leaves, number of whorls, number of branches, forking height and bark thickness were recorded. Number of plants affected from cold injuries was also recorded. Data recorded during the fourth year after planting were used for analysis. All the data were subjected to standard methods of statistical analysis (Gomez and Gomez, 1984).

The climate of Mendipathar, North Garo Hills region is sub humid in nature. During the study period, the average minimum and maximum temperatures were 17.1 and 29.1 ^{0}C respectively with an average annual rainfall of 2507 mm well distributed in all the areas with an average of 91 rainy days (Fig. 1).

The data on number of plants survived (present stand) in both the fields and the number of plants lost due to casualties were recorded (Table 2). Minimum casualty was observed in PB 235 (5%) followed by RRII 417 (8%) while RRII 422 showed the maximum number of casualties (22.5%) in both the fields due to severe cold or other edaphic factors. The plant stand in Field 1 was 600 (100%) after vacancy filling where no further damage was recorded whereas

Table 1. **Parentage and origin of the selected *Hevea* clones under study**

Clone	Parentage	Country
RRII 417	RRII 105 x RRIC 100	India
RRII 429	RRII 105 x RRIC 100	India
RRII 422	RRII 105 x RRIC 100	India
RRII 203	PB 86 x Mil 3/2	India
PB 235	PB 5/51 x PB S/78	Malaysia
RRIM 600	Tjir x PB 86	Malaysia

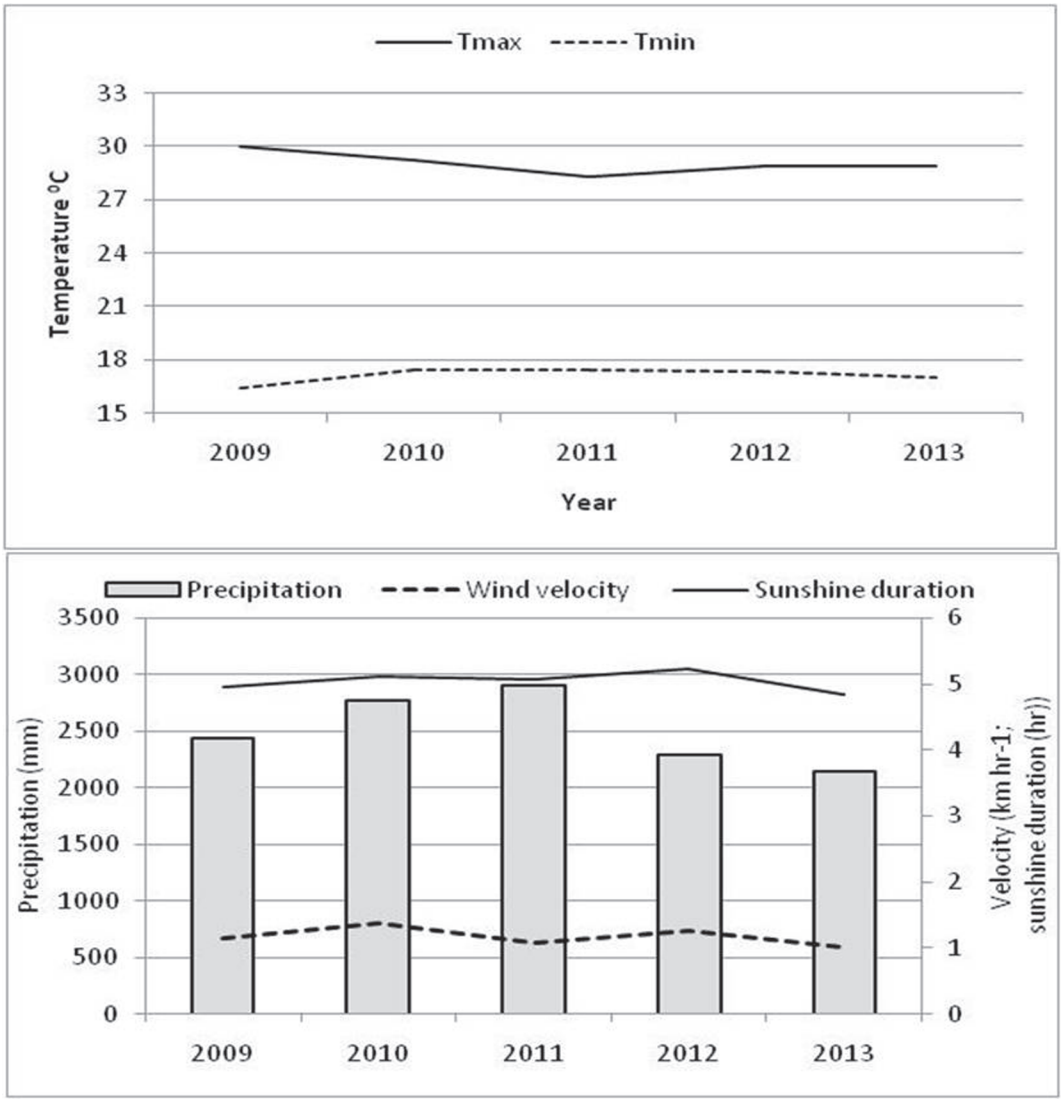

Fig. 1. Pattern of weather parameters during 2009 to 2013 at North Garo Hills of Meghalaya

in Field 2 present stand was 504 (84%). Cold injury was more in Field 2 in the form of branch drying compared to that of Field 1 where it was in the form of splitting of bark followed by oozing of latex. Number of branches of each clone showed limited variation. The highest number of branches was recorded in RRIM 600 followed by PB 235 and RRII 203 whereas the lowest number of branches was recorded in the clone RRII 429 (Table 3). Forking height of each clone was recorded after four years of growth. The data on forking height indicated more uniformity among the clones. However, PB

Table 2. **Casualty of plants and present plant stand in two growers' fields**

Clone	Casualty at 4th year (%)			Present plant stand (No.)		
	Field 1	Field 2	Mean	Field 1	Field 2	Mean
RRII 417	6	10	8.0	100	95	97.5
RRII 429	3	26	14.5	100	79	89.5
RRII 422	11	34	22.5	100	66	83.0
PB 235	5	5	5.0	100	95	97.5
RRII 203	7	24	15.5	100	76	88.0
RRIM 600	8	12	10.0	100	93	96.5
Population mean	6.7	18.5	12.6	100	84	92.0
SD	2.7	11.2	6.3	0	12.1	6.1
CV			49.8			6.6

235 showed highest branching height and RRII 203 and RRIM 600 showed the minimum height of branching.

The bark thickness of each clone was recorded after four years of growth. Ten plants from each clone were selected randomly for the recording of the bark thickness. Maximum bark thickness was recorded in PB 235 closely followed by RRII 429 and RRII 417 whereas lowest bark thickness was recorded in RRII 422.

The growth of the plant is the most important parameter for evaluating the maturity of the plantations in relation to harvesting the latex (Sethuraj and George, 1980; Paardekooper, 1989). Girth and annual girth increment among the clones recorded after four years of growth are presented in Table 4. Highest girth was observed in PB 235 closely followed by RRII 429 whereas the lowest girth was observed in RRII 422. The superiority of the clone RRII 429 based

Table 3. **Growth pattern of different clones in two different grower's fields at 4th year**

Clone	Number of branches			Height of first branching (m)			Bark thickness (mm)			Cold injury (%)		
	F1	F2	Mean	F1	F2	Mean	F1	F2	Mean	F1	F2	Mean
RRII 417	9.4	6.2	7.8	2.5	2.7	2.6	6.1	6.0	6.0	12.0	8.0	10.0
RRII 429	7.8	6.7	7.3	2.5	2.6	2.5	6.3	6.1	6.2	13.0	19.0	16.0
RRII 422	8.5	6.2	7.4	2.4	2.5	2.5	5.3	3.8	4.6	14.0	30.0	22.0
PB 235	9.2	7.0	8.1	2.6	3.0	2.8	6.6	6.3	6.5	10.0	10.1	10.1
RRII 203	9.5	6.3	7.9	2.2	2.5	2.4	6.1	5.7	5.9	16.0	20.0	18.0
RRIM 600	10.3	8.0	9.2	2.2	2.6	2.4	5.5	5.6	5.5	11.0	13.0	12.0
Population mean	9.1	6.7	7.9	2.4	2.7	2.6	6.0	5.6	5.8	12.7	16.7	14.7
SD	0.9	0.7	0.8	0.2	0.2	0.2	0.6	1.0	0.8	2.2	8.0	5.1
CV		8.6			6.3			10.4			32.9	

F1 - Field 1; F2 - Field 2

Table 4. **Growth pattern of different clones under the climatic condition of Garo Hills**

Clone	Girth at 4th year (cm)			Girth increment (cm yr^{-1})		
	Field 1	Field 2	Mean	Field 1	Field 2	Mean
RRII 417	45.6	33.3	39.5	7.6	6.9	7.2
RRII 429	47.3	35.2	41.3	7.2	7.0	7.1
RRII 422	39.5	28.1	33.8	7.5	6.9	7.2
PB 235	44.0	38.9	41.4	7.5	7.3	7.4
RRII 203	43.9	36.5	40.2	7.2	7.6	7.4
RRIM 600	42.3	35.6	39.0	7.2	6.7	7.0
Population mean	43.8	34.6	39.2	7.4	7.1	7.2
SD	3.7	2.7	2.8	0.17	0.33	0.17
CV			7.2			2.4

on absolute girth suggests the adaptability of the new clone in the North Garo Hills regions of the Meghalaya.

The present study concluded that there are clonal variations for almost all characters and their influence on early vigour in terms of girth and girth increment. PB 235 recorded least casualties in both fields. Among the modern clones, RRII 417 showed lowest casualty. RRII 422 showed high casualty and cold injury symptoms compared to RRIM 600. These observations support the cold susceptibility of RRII 422 in the NE region reported by Meti *et al*. (2003). RRII 429 recorded better growth, girth increment rate and bark thickness. RRII 417 showed comparable growth and bark thickness and lesser cold injury symptoms than RRIM 600. The overall superiority of the clones based on absolute girth suggests the adaptability of PB 235 and RRII 429 over RRIM 600 in the North Garo Hills region of Meghalaya. This on-farm trial is the first of its kind in the Garo Hills of Meghalaya. Data generated from this trial can be used for location specific clone recommendations.

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