ASSESSMENT OF YIELD AND YIELD STABILITY OF SOME *HEVEA BRASILIENSIS* CLONES UNDER THE HIGH ALTITUDE CONDITIONS OF MEGHALAYA

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Quantum yield and yield stability of eighteen clones of *Hevea brasiliensis* were studied under the high altitude conditions, in two clone evaluation trials comprising of ten clones each, with two clones in common. In one of the trials, low coefficients of variation and high means were observed for RRIM 600 and RRII 203 whereas high coefficients of variation and high means for RRII 105 and PB 235. The highest expected average annual yield was computed for RRIM 600 followed by RRII 105. In the other trial, low coefficients of variation and high means were observed for RRII 209 and PB 311 and high coefficient of variation and high mean for RRII 105 and PB 310. However, the highest expected average annual yield was for PB 311. Successive recordings of average annual yield of clones from both trials have shown an increasing trend suggesting that it would take a few more years for yield stabilization.

Key words: Clones, *Hevea brasiliensis*, High altitude, Meghalaya, Yield, Yield stability.

INTRODUCTION

Hevea brasiliensis is now under extensive cultivation in many parts of northeast India. Though *Hevea* is a new crop in the region, reports are now available on various aspects of the performance of different cultivated clones (Sethuraj *et al.*, 1989; Meenattoor *et al.*, 1991; Vinod *et al.*, 1996, 2000; Priyadarshan *et al.*, 1998, 2002; Mondal *et al.*, 1999; Reju *et al.*, 2000, 2001). Although environmental constraints such as high altitude and low temperature during winter season are prevalent, rubber cultivation has been successful in the region. Tura is one such area (latitude 25° – 26°; longitude 90° – 91°; altitude 600 m above msl) in Meghalaya, where the experiment was conducted. Assessment on stability of yield of *Hevea* clones has not so far been carried out in this region. In the present study, yield performance in terms of quantum stability of some *Hevea* clones were evaluated in two clone trials.

MATERIALS AND METHODS

The clone trials, I and II, were established in 1985 and 1986 respectively with single tree single plot randomized design, at a spacing of 6.6 x 3.3 m and 6 x 3 m respectively. Clone trial I included ten clones namely, RRII 105, RRII 118, RRII 203, RRIM 600, RRIM 605, PB 86, PB 235,

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PB 5/51, GT 1 and Gl 1 with fifty replications. Clone trial II also included ten clones *viz.*, RRII 5, RRII 105, RRII 118, RRII 208, RRIC 102, RRIC 105, PB 260, PB 310, PB 311 and PR 255 with forty replications. RRII 105 and RRII 118 were included in both the trials. Although a few clones such as RRII 203, RRIM 600, RRII 118 and PB 235 from clone trial I were opened for tapping in 1995, all the remaining clones came into tapping only by 1997. All clones in trial II came into tapping by 1998. The tapping system adopted was ½ S d/2 and the yield (g/tree/tap) was recorded fortnightly by cup coagulation method. Average annual yield of each clone was worked out using the mean monthly dry rubber yield (g/tree/tap) considering 116 tapping days (mean of 6 years, excluding tapping rest period from February to April) and a stand of 350 trees per hectare. For the present analysis of yield, data collected during 1997 to 2003 and 1998 to 2003 were used from clone trials I and II respectively. The yield from January to December was recorded to determine the monthly yield pattern and the projected yield of different clones were calculated accordingly in the initial years of tapping.

RESULTS AND DISCUSSION

Scrutiny of the monthly observations revealed that yield during February to April was very low. Based on correlation between yield and agrometeorological parameters. Environmental stress factors prevalent during winter and summer seasons in the region (Reju *et al.*, 2000, 2001) may have caused such low yield. Therefore, in the present analysis of yield only the data from May to January are discussed with respect to stability and quantum of yield.

Mean monthly yield of clones from clone trial I exhibited low coefficient of variation for RRIM 600 followed by RRII 203, PB 86 and RRII 118. High mean was also recorded for RRIM 600 but was followed by RRII 105, RRII 203 and PB 235 (Table 1). In clone trial II, low coefficient of variation was observed for RRII 5 followed by RRII 208, RRII 118 and PB 311. However, high mean values were recorded for PB 311 followed by RRII 208, RRII 105 and PB 310 (Table 2). It was noticed that RRII 105, a high yielding clone in the traditional regions of India, has been one of the high yielders in this non-traditional region (Meghalaya) being next to the best yielder RRIM 600. In terms of yield potential,

Table 1. **Average monthly yield (g/t/t) of clones (Clone trial I)**

Clone	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mean	CV
RRIM 600	30.5	38.8	33.8	31.8	46.1	50.8	51.8	44.0	38.5	40.7	19.5
RRII 203	22.6	29.2	31.5	33.9	37.6	41.3	45.1	35.6	26.5	33.7	21.2
PB 86	18.7	20.8	17.4	21.1	24.1	31.8	33.3	28.8	23.3	24.4	23.4
RRII 118	23.7	22.8	22.8	27.5	33.0	38.7	43.6	29.3	26.4	29.8	24.7
Gl 1	18.9	16.4	16.7	16.3	21.1	27.5	33.5	28.6	19.7	22.1	28.3
PB 235	23.4	27.1	25.4	24.1	40.3	42.1	47.5	37.9	25.7	32.1	28.4
GT 1	18.5	16.0	17.9	19.5	21.3	30.9	34.8	28.7	20.2	23.1	28.7
RRII 105	23.1	23.4	21.8	30.7	34.7	45.0	48.2	45.1	38.5	34.5	30.0
RRIM 605	14.1	14.7	16.9	17.3	21.0	29.3	33.3	26.7	18.1	21.3	32.3
PB 5/51	14.7	14.3	13.7	14.4	23.9	30.6	33.2	27.9	18.3	21.2	36.7
Mean	20.8	22.4	21.8	23.7	30.3	36.8	40.4	33.3	25.5	28.3	
CD (P≤0.05)										7.1	
CD (P≤0.01)										9.3	

Table 2. **Average monthly yield (g/t/t) of clones (Clone trial II)**

Clone	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mean	CV
RRII 5	21.0	16.9	19.1	22.9	26.2	28.8	30.4	28.4	22.7	24.0	19.6
RRII 208	22.8	24.9	30.3	27.0	32.8	41.2	40.5	36.3	26.5	31.4	21.7
RRII 118	22.6	20.0	21.6	23.7	30.8	34.9	36.3	32.1	24.1	27.3	22.7
PB 311	38.5	26.9	33.5	37.7	46.6	54.0	51.0	41.6	30.3	40.0	23.0
PB 260	21.5	18.1	16.6	19.8	25.4	31.3	31.7	27.6	20.8	23.7	23.6
PB 310	24.1	20.5	25.2	26.3	33.9	40.4	39.3	33.8	24.5	29.5	24.4
RRIC 105	19.3	12.4	14.4	14.1	20.9	22.0	27.1	24.5	17.6	19.1	26.2
RRIC 102	17.6	14.9	16.9	16.1	21.4	30.1	30.6	36.5	18.3	21.4	28.5
PR 255	19.1	11.9	17.2	15.4	22.8	29.1	34.5	28.5	19.1	21.8	33.9
RRII 105	18.4	18.3	24.3	23.3	30.7	43.6	43.8	43.5	29.1	30.6	34.6
Mean	22.6	17.9	21.2	22.1	29.1	35.7	36.8	32.3	23.0	26.7	
CD (P≤0.05)										6.7	
CD (P≤0.01)										8.8	

RRIM 600 followed by RRII 105 and PB 235 were high yielding in Assam (Mondal *et al.*, 1999). RRIM 600 the most suitable clone in Tripura (Priyadarshan *et al.*, 2002) among the non-traditional regions in the northeast India in terms of both high mean yield and low coefficient of variation.

Annual expected average yield (Tables 3 and 4) shows year to year variation for all the clones. However, on conversion of these

Table 3. **Expected average annual yield (kg/ha) of clones (Clone trial I)**

Clone	97-98	98-99	99-00	00-01	01-02	02-03	Mean
RRIM 600	836	1230	2002	1360	2282	2196	1651
RRII 105	747	1080	1385	1311	1937	1945	1401
RRII 203	918	1023	1559	1271	1717	1721	1368
PB 235	528	881	1551	1332	1859	1790	1324
RRII 118	861	1015	1409	889	1535	1543	1209
PB 86	650	735	1169	926	1173	1279	989
GT 1	524	609	1015	889	1218	1372	938
Gl 1	495	568	1023	1019	1043	1230	897
RRIM 605	495	633	1092	857	1035	1108	863
PB 5/51	581	637	905	796	1056	1198	862
Mean	659	841	1311	1065	1486	1538	1150

Table 4. **Expected average annual yield (kg/ha) of clones (Clone trial II)**

Clone	98-99	99-00	00-01	01-02	02-03	Mean
PB 311	840	1746	1547	1766	2225	1625
RRII 208	694	1421	1332	1250	1669	1273
RRIC 105	662	1165	1141	1510	1726	1241
PB 310	540	1275	1165	1324	1742	1209
RRII 118	662	1409	1088	1052	1340	1110
RRII 5	621	934	958	974	1393	976
PB 260	577	1039	1035	889	1263	961
PR 255	503	974	905	885	1263	906
RRIC 102	573	889	893	918	1072	869
RRII 105	495	840	893	654	1003	777
Mean	617	1169	1096	1122	1470	1095

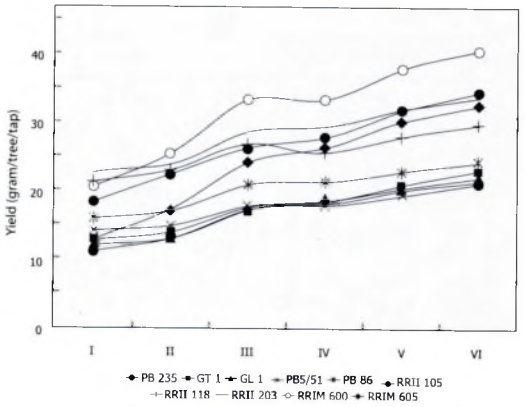

Fig. 1. Successive average yield of clones (Clone Trial I): I. Yield during 1997-98; II. Mean yield of 1997-98 and 1998-99; III. 1997-98 to 1999-2000; IV. 1997-98 to 2000-01; V. 1997-98 to 2001-02; VI. 1997-98 to 2002-03.

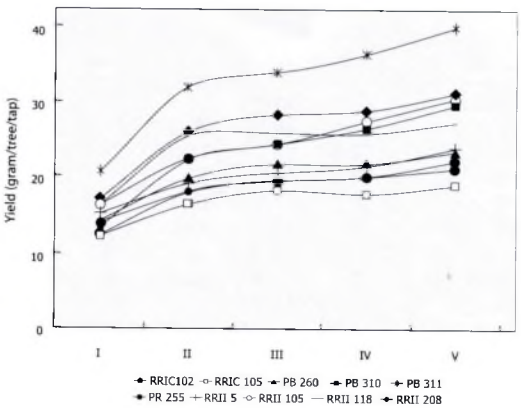

Fig. 2. Successive average yield of clones (Clone Trial II): I. Yield during 1998-99; II. Mean yield of 1998-99 and 1999-2000; III. 1998-99 to 2000-01; IV. 1998-99 to 2001-02; V. 1998-99 to 2002-03.

values into successive averages an increasing pattern of average annual yield has become evident. Such steady increase in yield suggests that yield has not yet stabilized. Successive average yield displayed graphically shows the trend in yield with respect to the stability (Figs. 1 and 2).

Under the high altitude agroclimatic conditions of Meghalaya, clones such as RRIM 600, PB311, RRII 105, RRII 203, PB 235 and PB 310 were found high yielding. RRIM 600 is particularly superior in terms of both stability and quantum of yield after the first 5 to 6 years of tapping. However, it may take a few more years to attain yield stabilization for these clones.

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