EVALUATION OF PLANTING MATERIALS UNDER COMMERCIAL PLANTING - THIRD REPORT

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ABSTRACT

This is the third report of a continuous study undertaken by RRII to generate useful information on the yield of different planting materials under commercial planting. Along with the yield rates the consistency figures are also presented. The report covers a region wise analysis of yield of selected planting materials and a comparison with the commercial yield reported by Malaysia.

INTRODUCTION

Selection of the material to be planted is a crucial farm management decision. The decision assumes greater significance in the case of a perennial crop like rubber. Information on the relative performance of various planting materials helps the planters as well as policy makers in arriving at the correct decision. It is with the intention of providing reliable information on the comparative yield of different planting materials,that the Rubber Research Institute of India is undertaking a continuous evaluation. The evaluation was initiated in 1974 and the first and second reports were published in 1982[1] and 1985[2]

SAMPLE SIZE AND METHODOLOGY

Around 40 large estates are participating in this programme. They regularly furnish monthly yield statements. The present report contains data on 21 planting materials including 4 RRII varieties. It is well known that the number of trees tapped per ha differs from field to field in the initial years owing to variations in girthing. Hence only fields, with at least 250 trees tapped/ha in the first year, 275 trees in the second year, and 300 trees in the subsequent years were considered for tabulation. The final yield figures analyzed came from 364 fields covering a total area of 5202 ha. These fields more or less represent the different agro-climatic regions.

LIMITATIONS

Difference in the techniques employed in crop harvesting generally pose limitations in measuring the full yield potential of the clones. Rubber trees respond differently to the different systems of tapping. The type of knife used, the slope and direction of the tapping cut, depth in tapping, consumption of bark, time of tapping, frequency between tappings etc. influence the yield. Application of stimulants and the consequent effect on yield are also factors to be reckoned with. Even small variations in crop harvesting practices influence the yield, though not markedly in all the cases. Most of the fields taken into the study were prone to such variations. The figures reported here may be considered provisional since they may change over time, in tune with the change in the number of fields under evaluation.

DISCUSSION

In Table I yearly weighed average yield figures are given. For 8 planting materials data were available for 15 years of tapping. Excepting for PB 235, RRII 208 and RRII 116 data were available for 10 or more years of tapping. In Table II the summary results are given. Along with the first 5 year, 10 year and 15 year averages, the co-efficients of variation (CV) are also presented. The co-efficients of variation indicate the consistency of yield of the planting material.

a) **First Five Year Period:-** In the first five year period RRII 105 tops the list with 1412 kg/ha. This is followed by PB 28/59 with 1227 kg./ha. Other high yielding clones during this period were RRIM 600, PB 235 and RRIM 605. During this period PB 235

TABLE - 1

Yield performance of various planting materials in commercial practice in India (kg/ha)

Sl. No.	Planting Material	Total area under observation	No.of fields under observation	Year														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	PB 86	569	50	520	749	913	1057	1180	1231	1294	1347	1334	1285	1223	1227	1147	1178	1221
				(26)	(28)	(31)	(35)	(38)	(36)	(37)	(38)	(38)	(43)	(45)	(45)	(42)	(41)	(40)
2.	PB 6/9	68	8	734	995	1153	1164	1170	1249	1294	1187	1244	1124	1001	990	1135	1457	1364
				(7)	(7)	(7)	(7)	(8)	(8)	(8)	(8)	(8)	(8)	(6)	(5)	(5)	(5)	(5)
3.	PB 5/139	227	16	494	886	967	1244	1350	1398	1619	1398	1523	1371	1231	1218	1319	1195	1233
				(12)	(12)	(13)	(13)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(15	(14)	(13)	(13)
4.	RRIM 605	231	19	762	1034	1138	1185	1187	1204	1319	1162	1168	1301	1325	1431	1576	1237	1360
				(16)	(18)	(18)	(18)	(19)	(19)	(18)	(18)	(16)	(15)	(9)	(9)	(8)	(6)	(5)
5.	RRIM 623	363	28	694	846	927	967	1007	1213	1318	1169	1191	1223	1347	1301	1347	1421	1701
				(23)	(27)	(27)	(27)	(28)	(28)	(28)	(27)	(26)	(26)	(21)	(16)	(13)	(10)	(6)
6.	GI 1	487	22	532	786	1049	1138	1353	1276	1427	1378	1219	1281	1179	1222	1222	1116	1279
				(16)	(16)	(16)	(16)	(17)	(18)	(22)	(22)	(22)	(22)	(22)	(22)	(22)	(20)	(19)
7.	LCB 1320	117	15	405	635	821	842	910	910	946	1013	1067	1037	1014	802	855	885	877
				(10)	(10)	(11)	(11)	(12)	(13)	(14)	(14)	(14)	(14)	(14)	(14)	(13)	(13)	(13)
8.	PR 107	68	8	519	760	914	956	996	1088	1305	1317	1433	1350	1179	1014	1093	855	861
				(6)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(6)	(4)	(2)	(2)	(2)	(2)
9.	PB 5/51	232	13	708	905	1075	1136	1209	1369	1729	1526	1853	1627	1528	1489	1456	1301	
				(12)	(13)	(13)	(13)	(13)	(12)	(12)	(11)	(8)	(7)	(5)	(5)	(2)	(1)	
10.	RRIM 600	888	57	681	1164	1137	1277	1387	1430	1588	1663	1532	1508	1382	1389	1855	1527	
				(56)	(57)	(57)	(55)	(52)	(49)	(43)	(36)	(29)	(23)	(15)	(10)	(4)	(2)	

TABLE - 1 (Cont'd)

Sl. No.	Planting Material	Total area under observation	No.of fields under observation	Year														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
11.	GT 1	992	48	672	924	1079	1173	1246	1259	1780	1665	1739	1756	1704	1551	1650	1330	
				(45)	(46)	(47)	(45)	(43)	(38)	(30)	(27)	(22)	(17)	(6)	(3)	(2)	(1)	
12.	PB 28/59	556	34	715	1138	1359	1493	1432	1438	1501	2060	1756	1624	1589	1396	999		
				(31)	(34)	(31)	(29)	(23)	(19)	(17)	(15)	(10)	(8)	(6)	(2)	(1)		
13.	RRIM 628	100	6	643	851	1005	987	783	1083	1185	1427	1488	1512	1162	1298			
				(5)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(5)	(4)	(4)	(1)			
14.	RRIM 701	32	3	509	841	686	1208	1159	1145	1490	1313	1627	1416					
				(3)	(3)	(3)	(3)	(30)	(3)	(3)	(3)	(2)	(2)					
15.	PB 217	125	7	691	918	1097	1090	1207	1290	1647	1530	1191	1917					
				(7)	7)	(7)	(7)	(7)	(7)	(6)	(5)	(3)	(2)					
16.	PB 252	18	2	604	973	1092	1289	1205	1172	1794	2048	1741	1735					
				(2)	(2)	(2)	(2)	(2)	(2)	(1)	(1)	(1)	(1)					
17.	PB 235	41	3	996	1001	1271	1219	986	1059	2089								
				(3)	(3)	(3)	(2)	(2)	(2)	(1)								
18.	RRII 105	44	11	888	1376	1473	1651	1675	1798	1608	2038	1365	1687					
				(10)	(7)	(8)	(7)	(4)	(4)	(3)	(2)	(1)	(1)					
19.	RRII 116	7	2	485	685	1009	1129	1016	1254	1133								
				(2)	(2)	(2)	(2)	(2)	(2)	(2)								
20.	RRII 208	12	4	498	941	1001	1108	1154	1132	943								
				(2)	(2)	(4)	(4)	(4)	(4)	(4)								
21.	RRII 118	25	8	433	699	1092	1240	1232	1171	1195	1576	1286	1719					
				(5)	(5)	(7)	(6)	(7)	(7)	(7)	(4)	(2)	(1)					
	Grand Mean Yield	5202	364	658	971	1095	1193	1237	1309	1488	1468	1446	1384	1299	1247	1257	1180	1178

TABLE - II

The first five, ten and fifteen year averages-(field in kg/ha)

Sl. No.	Planting materials	First 5 year average yield	Coefficient of variation	First 10 Year average yield	Coefficient of variation	First 15 year average yield	Coefficient of variation
1.	PB 86	884	29	1091	26	1127	21
2.	PB 6/9	1043	18	1131	14	1151	15
3.	PB 5/139	988	34	1225	28	1230	22
4.	RRIM 605	1061	17	1146	14	1226	15
5.	RRIM 623	888	14	1056	19	1178	22
6.	GI 1	929	28	1130	25	1145	20
7.	LCB 1320	723	28	859	24	868	19
8.	PR 107	829	24	1064	27	1043	24
9.	PB 5/51	1007	20	1314	28	—	—
10.	RRIM 600	1129	24	1327	21	—	—
11.	GT 1	1019	22	1329	29	—	—
12.	PB 28/59	1227	26	1452	25	—	—
13.	RRIM 628	854	18	1098	28	—	—
14.	RRIM 701	881	34	1139	32	—	—
15.	PB 217	1001	20	1258	29	—	—
16.	PB 252	1033	26	1363	33	—	—
17.	RRII 105	1412	20	1556	19	—	—
18.	RRII 118	939	34	1164	31	—	—
19.	RRII 208	940	25	—	—	—	—
20.	RRII 116	865	28	—	—	—	—
21.	PB 235	1095	13	—	—	—	—

recorded better consistency compared to other planting materials. The lowest yield figures are recorded by LCB 1320, RRIM 628 and PR 107. Among the top five materials PB 235 and RRIM 605 showed relatively less variation in yield. Among the top three, RRII 105 is relatively more consistent. Clones such as PB 5/139, RRIM 701 and RRII 118 were found to be comparatively unstable. The RRII Varieties other than RRII 105 were also highly unstable.

b) **First Ten Year Period :-** During the 10 year period also the first and second positions were claimed by RRII 105 with 1556 kg/ha and PB 28/59 with 1452 kg/ha. Other promising materials were PB 252, GT 1, RRIM 600, PB 5/51 and PB 217. During the 10 year period, LCB 1320, PR 107 and RRIM 623 had the lowest yield. The highest consistency in yield was recorded by PB 6/9 and RRIM 605. Among the 18 planting materials for which data are available for 10 years, RRII 105 shares the second position with regard to consistency along with RRIM 623. Among the highest ranking materials RRII 105 and RRIM 600 showed better consistency. The most unstable ones are RRII 118, RRim 701, PB 252, PB 217 and GT 1.

The average yield of PB 217, PB 252, PB 5/51 and GT 1, had increased during the ten year period compared to the first five years, while consistency was on the decline. Clones RRIM 605 and PB 6/9 did not show high yield figures but their consistency had improved. The RRII 105, PB 28/59 and RRIM 600 have retained their premier position on yield during the ten year period. Compared to the first five years consistency in yield improved during the ten year period.

Taking yield and consistency as criteria, (10 year data) a classification of 18 planting materials was attempted. The result is presented in Table III. The table illustrates the unique position of RRII 105 over other high yielding varieties. Among the planting materials with medium yield PB 6/9 and RRIM 605 mark high consistency while the rest, have shown low consistency with the exception of RRIM 623.

c) **First Fifteen Year Period:-** Data are available only for ten planting materials for the fifteen year period. Among them PB 5/139 claims the first position with regard to yield followed by

TABLE - III

Classification of Planting Materials according to yield and consistency.

	Group	Planting Material
1.	HY with HC	Nil
2.	HY with MC	RRII 105
3.	HY with LC	PB 28/59, PB 252
4.	MY with HC	PB 6/9, RRIM 605
5.	MY with MC	RRIM 600
6.	MY with LC	PB 5/139, GI 1, PB 5/51, GT 1, RRIM
7.	LY with HC	Nil
8.	LY with MC	RRIM 623
9.	LY with LC	PB 86, LCB 1320, PR 107, RRIM 628

Hy = High Yield
MY = Medium Yield
LY = Low Yield

HC = High Consistency
MC = Medium Consistency
LC = Low Consistency

HY = Yield 10% higher than grand Mean Yield.
MY = Yield falling within the range of 10% higher and 10% lower values of Grand Mean Yield.
LY = Yield 10% lower than Grand Mean Yield.
MC = CV falling within the range 10% higher and 10% lower values of Grand CV.
LC = CV 10% higher than Grand CV.
HC = CV 10% lower than Grand CV.

TABLE - IV

**Yield rates - A region - wise analysis (Kg/ha)

Planting Material		Year 1	2	3	4	5	Five year average	All India	Year 6	7	8	9	10	Ten year average	All India
RRIM 600	A	675	949	1416	1209	1426	1135	1129	1576	1717	1661	1860	1705	1403	1327
	B	732	1022	1193	1381	1481	1162		1537	1682	1520	1466	1586	1360	
	C	636	940	1107	1203	1326	1042		1313	1427	1576	1463	1441	1223	
	D	582	943	1041	1183	1405	1031		1323	1475	1567	1535	1541	1252	
	E	731	985	1042	1262	1244	1053		1277	1681	1442	1472	1350	1249	
PB 28/59	A	811	1385	1643	1677	1726	1448	1227	2005	1824	1307	1693		1563	1452
	B	826	1233	1559	1515	1548	1336		1568	1733	2353	1796	1677	1581	
	C	663	1036	1177	1337	1219	1086		1143	1143	1704	1431	1544	1240	
	E	589	1039	1187	1679	1594	1217		1795	2007	2565	2384	1646	1648	
PB 86	A	473	760	977	1096	1214	904	884	1422	1441	1380	1509	1364	1164	1091
	B	522	649	828	1038	1156	839		1160	1250	1337	1219	1230	1039	
	C	582	948	999	1123	1190	968		1276	1302	1357	1405	1442	1162	
	D	535	759	990	1121	1169	915		1397	1265	1369	1304	1032	1094	
	E	545	696	882	1062	1136	868		1231	1754	1342	1492	1407	1155	
RRIM 623	B	806	1027	1001	1111	1099	1009	888	1294	1389	1232	1263	1224	1145	1056
	C	672	797	1067	1094	1185	963		1407	1585	1333	1239	1532	1191	
	D	554	714	705	693	713	676		960	1043	947	832	886	805	
	E	654	817	770	991	1033	863		1091	1056	1388	1243		1005*	
GT 1	A	645	1149	1213	1142	985	1027	1019	1853	1480	1302	1852		1291*	1329
	B	793	1079	1203	1340	1455	1174		1327	1865	1724	1802	1387	1398	
	C	657	877	1068	1183	1153	988		1218	1739	1511	1433	1615	1245	
	D	556	844	930	940	1083	871		1176	1525	1683	1692	1669	1210	
	E	643	843	1055	1115	1209	973		1271	1814	1672	1927	1953	1250	

*Averages for the respective periods only.

** Weighted average

TABLE - V

Comparison between Yield Rates of Malaysia and India.

	Five Year		Ten Year	
	India	Malaysia	India	Malaysia
RRIM 600*	1129	1386	1307	2029
GT 1	1019	1206	1329	1860
PB 5/51	1007	1227	1314	1787
PB 28/59	1227	1532	1432	1708
RRIM 605	1061	1287	1146	1459
RRIM 623	886	1220	1056	1497
PB 86	884	886	1091	1225
GI 1	929	958	1130	1126
PR 107	829	970	1064	1329
LCB 1320	723	1017	859	1261

*9 averages.

Source for Malaysian Yield Figures: Planters' Bulletin No. 144, May 1976.

RRIM 605. RRIM 605 along with PB 6/9 has shown the highest consistency.

REGION-WISE ANALYSIS

There are agro-climatic rubber growing regions in India. Due to paucity of data we have limited the analysis to five regions.

A = Kanyakumari District of Tamil Nadu.

B = Quilon, Trivandrum and Pathanamthitta districts.

C = tayam, Alleppey, Idukki and Ernakulam districts.

D = Palghat, and Trichur districts.

E = Malappuram, Calicut and Cannanore districts.

A meaningful analysis demands sufficient number of fields and we have limited our analysis to five planting materials. The results are presented in Table IV. In all cases except one (GT 1, 10 year) the yield figures of Region A were above the respective all India averages. The yield figures in Region B were lower than all India figures only two cases (PB 86, 5 year and 10 year). It is found that in Region C and D three planting materials showed lower yield average compared to national average for both periods (C = RRIM 600, PB 28/59 and GT 1; D =RRIM 600, RRIM 623 and GT 1). Finally in Region E, the five materials recorded lower yield during the five year period compared to all India figures. During the ten year period only two materials (RRIM 600 and RRIM 623) showed yield lower than the all India averages.

COMPARISON WITH MALAYSIAN YIELD

An attempt has been made to compare the commercial average yields of India and Malaysia in Table V. We have comparable data only in the case of 10 planting materials.

In the first five year period the Indian averages were lower than those of Malaysia in all the ten cases. In the 10 year period all the materials in India except GI 1 showed lower yield compared to Malaysia. In the ten year period differences in yield also widened considerably.

CONCLUSIONS

In the first five year period RRII 105, PB 28/59 and RRIM 600 respectively claim the first, second and third position with regard to yield. The highest consistency is accounted for by PB 235 followed by RRIM 623. In the ten year period RRII 105, PB 28/59, PB 252, GT 1 and RRIM 600 were the first five better yielding clones. The highest consistency is claimed by PB 6/9 and RRIM 605. In the fifteen year period PB 5/139 tops the list with regard to yield. It is followed by RRIM 605.

A comparison of the regional averages with all India yield figures has shown that regions A and B perform better than other regions. The foreign clones do not yield in India as much as in Malaysia. In some cases the yield are strikingly different.

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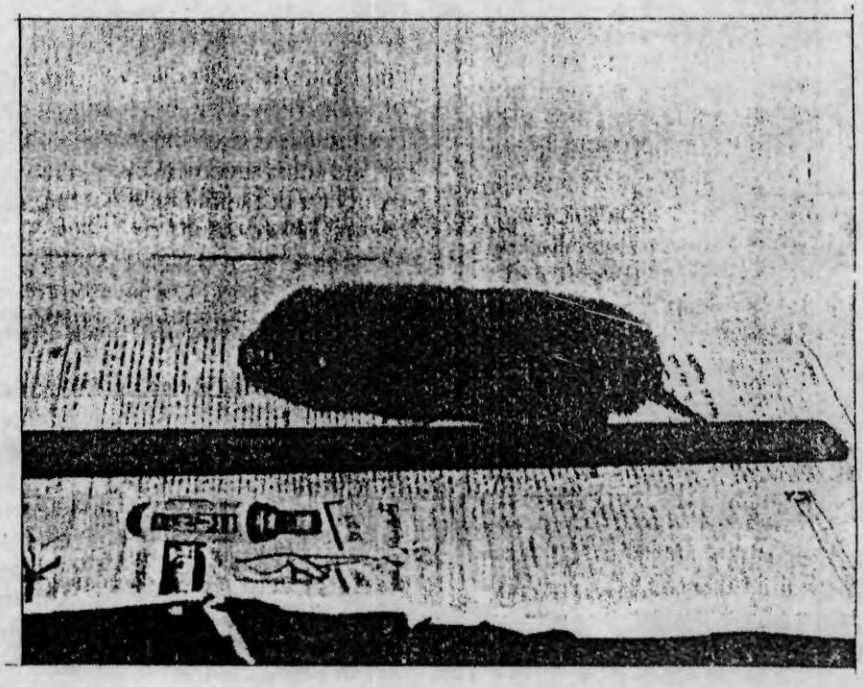
Bamboo Rat menace in Rubber Plantations in Tripura

The Tripura Rehabilitation Plantation Corporation Ltd. (T.R.P.C.) is engaged in raising rubber plantations over undulating hillocks, which abound in Tripura, for the resettlement of landless shifting cultivators (Jhumias). Usually the hillocks are covered with degraded bamboo forests. Some bamboo clumps present in the area have to be cut and burnt before planting rubber. These clumps take 2/3 years to die. From the third year onwards it has been noticed that occasionally rubber plants are being cut by the rats below the ground. The damaged plants vary between 15 cm. to 30 cm. in circumference at collar and from 3 to 4 meter in height. The damage is caused below the ground level at about 15 cm. resulting in the falling down or uprooting of the plants. A group of 10-15 plants in an area may be damaged before it is realised as to what is happening. The rats do not leave any external evidence of scooped earth or entrance or exist holes, hence remain undetected. The rat as seen in the picture, could be provisionally identified as Hoary Bamboo rat (Prater's Book of Indian Animals). The rat measures 24 cm. - 26 cm. in length with a tail of 3 - 4 cm. The insisors of the rat are large and they produce a hissing sound; the eyes are red and



there is practically no neck. Legs are small with powerful claws.

The body is hairy and the colour is greyish brown. The rats move in under ground tunnels of different lengths. The control measures adopted using zinc phosphide bait and rat traps have not been successful. Moosh - Moosh cake, a rodenticide marketed by M/S, Ralli's India is being tried for control, but so far it has not been effective. The only method which has achieved some success so far is manual capture. For every rat captured Rs. 15/- is paid to the trapper. The tribal beneficiaries are encouraged to capture the rats. The rats killed are delicious meat for the tribals.

These rats are found in the area which originally supported bamboo clumps and which take about 2 - 3 years to die completely after being cut and burnt in the first year. When their (rats) natural food the bamboo rhizomes are not available these rats look out for other available food.

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