

# PERFORMANCE OF A FEW RR11 CLONES IN THE ESTATE TRIALS

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## Introduction

Commercial cultivation of *Hevea brasiliensis* was started in India in 1902. However, crop improvement programme by breeding and selection was initiated only in 1954, with the inception of the Rubber Research Institute of India. Breeding programmes with a view to evolving planting materials with high production potential and adaptability to regional agro-climatic condition has been the main aim. During the first phase emphasis was given to evolve planting materials with high production potential (Bhaskaran Nair, *et al.* 1975). From the second phase onwards emphasis was also given to secondary attributes like resistance/tolerance to wind damage, disease and drought. This paper presents the performance of selected RR11 clones from 1954 and 1956 hand pollinated progenies in the block wise planting in Kulathupuzha, Koothattukalam and Kinalur estates.

## Method of Study

Details of the materials planted in the three estates are depicted in Table 1. In Kinalur estate one block, consisting of 300 trees, each of RR11 105, RR11 118, RR11 208 and RRIM 600 has been planted. Nine clones (RR11 105, 107, 109, 113, 114, 116, 118, 203 and 206) along with GT 1 are planted in Kulathupuzha estate of the Rehabilitation Planta-

tions, Punalur. In Koothattukalam estate the clones planted are RR11 105, RR11 203, RR11 208, GT 1 and RRIM 600. Planting was carried out during 1973 in Kulathupuzha. In Koothattukalam two clones namely RR11 105 and RR11 208 were planted during 1973 and one block each of RR11 105, 203, 208, GT 1 and RR11 600 was planted during 1974. In Kinalur estate also planting was carried out during 1974 season.

Annual girth measurements and recording of secondary traits were taken from the fourth year of planting onwards. The trees in two blocks planted in 1973 came into tapping during 1981 and the others in 1982 seasons. The tapping system adopted was S/2 d/3 in Koothattukalam and Kinalur and S/2 d/2 in Kulathupuzha. Rainguards have been provided in all the estates. Yield was recorded on all tapping days. Yield during drought period February to May was considered for ascertaining the relative production during the summer period. The important characters recorded are vigour during immaturity period, girth increment after commencement of tapping, thickness of virgin bark and renewed bark at the sixth year of tapping, annual yield, yield during summer, susceptibility to diseases and proneness to damages caused by wind. Growth vigour during immaturity phase and girth increment

after opening were recorded by measuring the girth of the trunk at a height of 150 cm above the bud union. Thickness of bark was measured with a Schleipers gauge. Incidence of pink disease and wind damage was ascertained by counting the number of affected trees. Diseases like abnormal leaf fall and powdery mildew were assessed by visual observations.

## Results And Discussion

Mean yield in kilogram per hectare per year for the first five years of tapping at Kulathupuzha is given in Table 2. The overall mean yields per hectare per year over five years of tapping range from 810 Kg for RR11 114 to 1428 Kg for RR11 105. Besides RR11 105, four other clones, RR11 118, RR11 206, RR11 107 and RR11 203 are found to yield above 100kg/ha/yr. All these clones are showing better performance than GT 1 at Kulathupuzha estate. At Kuthattukalam estate (Table 3) among the six clones RR11 105 tops the list followed by RR11 208, RR11 203, RRIM 600 and GT.1. Mean yield for first six years of tapping shows that RR11 105 gave 1576 kg, RR11 208, RR11 203, RRIM 600 and GT 1 yielded 1297 kg, 1212 kg, 907 kg and 662 kg respectively per annum during this period. The average annual yield of RR11 clones along with that of RRIM 600 at Kinalur estate are given in Table 4. In this estate also

RRII 105 (1533 kg) is the top yielder followed by RRIM 600 (1394 kg) RRII 208 (1047 kg) and RRII 118 (1007 kg). All the four clones are exhibiting good performance with regard to yield.

The overall mean yield per hectare per year from the three estates are furnished in Table 5. RRII 105 is the highest yielder (1562 kg). The next higher yielder is RRII 208 (1226 kg), followed by RRII 118 (1145 kg) and RRII 203 (1143 kg). All these four clones are showing better performance with regard to yield when compared to RRIM 600 (1104 kg) and GT 1 (843 kg). All the clones also show rising yield trend. From the first year of tapping onwards RRII 105 shows very good yield, with increasing trend and was superior to all the other clones.

The mean data of the few secondary characteristics observed are tabulated and presented in Table 7. The mean girth at opening ranged from 46.5 cm (RRII 113) to 55.9 cm (RRII 118). RRII 203 (55.8 cm) is the second vigorous clone followed by RRII 116 and RRIM 603 both showing 54.4 cm girth. RRII 105 and RRII 208 showed average vigour at opening.

Mean yearly girth increment over first four years of tapping varied from 3.0 cm for RRII, 113 to 6.7 cm for RRII 109. Among the high yielding clones RRII 105 showed 4.2 cm annual mean girth increment on tapping. RRII 118 and RRII 203 showed 4.7 and 4.0 cm respectively. The girth increment of RRII 208 was average (3.7 cm). RRIM 600 (5.0 cm) showed above average girth increment on tapping.

The response of high yielding clones towards drought

shows wide variations. Out of the twelve clones RRII 116 showed comparatively low yield depression during summer months, followed by RRII 203, RRII 208, RRII 118 and RRII 105 in order. The yield drop of RRIM 600 was more pronounced.

There is much difference between clones with regard to bark thickness on virgin and renewed. The virgin bark thickness in the sixth year of tapping ranged from 7.9 mm (GT 1) to 10.5 mm (RRII 116). RRII 118 showed 10.2 mm bark thickness whereas RRII 105, RRII 203, RRII 208 showed 9.8 mm, 9.9 mm and 9.2 mm respectively. RRIM 600 showed only 8.9 mm bark thickness. The thickness of reewed bark ranged from 10.7 mm (RRII 116) to 8.5 mm (RRII 208). RRII 203 and RRII 118 showed 11.0 mm bark thickness and RRII 105 has 9.2 mm bark renewal.

All the clones are found to be susceptible to abnormal leaf fall disease caused by *Phytophthora* spp. However RRII 105, 118, 203 and 114 showed comparatively good leaf retention. RRII 208 RRII 206 and GT 1 showed average leaf retention. RRII 208 is susceptible to shoot rot and the tender shoot is affected by the *Phytophthora*. RRIM 600 was found to be highly susceptible to leaf fall disease.

RRII 105 and RRIM 600 are susceptible to Pink disease. The incidence was comparatively low in RRII 118, 203 and 208. The incidence of Oidium was comparatively low in RRIM 600 and RRII 105. RRII 203, 208, 118 and GT 1 showed varying degrees of infection.

Among the clones RRII 105, RRIM 600 and GT 1 are susceptible to brown bast. In the S/2 d/2 system of tapping the

incidence of brown bast was found to be more (15%). But when the system of tapping is changed to S/2 d/3 the incidence of brown bast was lesser (7%). RRII 203 showed 4.2% of the trees affected by brown bast whereas RRII 208 showed 3.6%. In RRII 118 the incidence of brown bast was negligible. The incidence of wind damage was highest for RRIM 600 (12%) RRII 105, RRII 208, and GT 1 showed 3.3, 2.4, 2.3% of wind damage respectively.

The performance of RRII clones, RRIM 600 and GT 1 in the three estates shows wide variations. RRII 105 is the highest yielder in all the three estates. The next highest yielder is RRII 208, RRII 203 and RRII 118 are comparable with regard to yield. RRIM 600, is showing very good performance in Kinalur estate. The performance of RRII 208 and 203 at Koothattukalam is good compared to GT 1 and RRIM 600. RRII 118 showed good yield both at Kinalur and at Kulathupuzha. RRII 107 and RRII 206 are showing above thousand kg/ha/year at Kulathupuzha during the first five years of exploitation.

The mean yearly yield of four RRII clones along with that of RRIM 600 and GT 1 is depicted in Table 6. The overall average annual yield for six years of tapping for RRII 105, RRII 208, RRIM 600 and GT 1 and for 5 years tapping for RRII 203 and RRII 118 are shown in Table 5. RRII 105 is the highest yielder followed by RRII 208.

With regard to secondary characters RRII 105 is sturdy, the tree is tall with straight trunk and good branching habit. The canopy is dense. This clone shows branch snap during immaturity period due to thick foliage (George *et al.*, 1980). It has a fair degree of



resistance to abnormal leaf fall disease, when the usual prophylactic measures are adopted (Bhaskaran Nair and George, 1968; Bhaskaran Nair *et al.*, 1975). It is comparatively susceptible to brown bast. S/2 d/3 system is preferable. The clone is also susceptible to Pink. Even though the summer yield of this clone is satisfactory the response of this clone to physical drought is more. The very high yield of this clone is an outstanding trait.

The clone RR11 208 ranks second in the case of yield. This clone shows susceptibility to *Phytophthora* during young stages. It shows above average resistance to all other diseases. The girth increment on tapping is average for this clone. The thickness of virgin bark is average and renewed bark thickness is below average. Similar characteristic has been reported for RRIM 729, 728 and PB 280 (Ong S.H. 1983). RR11 208 shows good branching with light canopy (Saraswathyamma *et al.*, 1980). RR11 203 and RR11 118 are vigorous clones, showing above average yield. Both these clones are show-

ing above average resistance to almost all the diseases. The clone RR11 203 showed wind damage and brown bast in the small scale trial but these were not severe in the estate trials. In Kulathupuzha RR11 107 and RR11 206 are showing above thousand kg/ha/year (mean over five years of tapping). The clone GT 1 shows wind damage in Koothattukalam even though this clone is reported to be resistant to wind damage (Ong S.H., 1983). Incidence of Powdery mildew caused by *Oidium* is noted in

GT 1. RRIM 600 is however reported to show resistance to *Oidium* (Anonymous, 1983). Incidence of Pink disease is reported for RRIM 600 Anonymous, 1980) and this clone is susceptible to Pink disease also. The yield of GT 1 is generally not very good. But this clone ranks second in Kulathupuzha.

Results discussed above indicate that the clones show region wise response with regard to yield and secondary attributes. So the evaluation

Table-1

Clone	Parentage
RR11 105	Tjir 1xGI 1
RR11 107	Tjir 1 x Mil 3/2
RR11 109	Tjir 1 x Mil 3/2
RR11 113	Mil 3/2 x Hil 28
RR11 114	Mil 3/2 x Hil 28
RR11 116	Mil 3/2 x Hil 28
RR11 118	Mil 3/2 x Hil 28
RR11 203	PB 86 x Mil 3/2
RR11 206	Mil 3/2 x AVROS 255
RR11 208	Mil 3/2 x AVROS 255
RRIM 600	Tjir 1 x PB 86
GT 1	Primary clone

Table-2

Mean yield (in kg / ha / year) of clones at Kulathupuzha

Clone	First year	Second year	Third year	Fourth year	Fifth year	Mean over 5 years
RR11 105	1163	1577	1487	1178	1737	1428
RR11 107	820	1419	1297	927	933	1079
RR11 109	633	720	796	1057	1204	882
RR11 113	549	912	1067	880	1373	958
RR11 114	605	776	889	894	896	810
RR11 116	588	796	964	1048	1208	921
RR11 118	773	1123	1515	1319	1683	1283
RR11 203	594	1022	1249	902	1408	1035
RR11 206	645	914	1140	1420	1399	1104
GT 1	718	816	1183	1144	1081	988

of planting materials at different environs is necessary.

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Table-3  
Mean yield (in kg/ha/year) of clones at Koothattukalam

Clone	Year of tapping						Mean
	1	2	3	4	5	6	
RR11 105	982	1317	1645	1905	1687	1917	1576
RR11 203	809	1160	1407	1474	...	....	1212
RR11 208	832	1148	1147	1429	1526	1698	1297
RRIM600	749	823	703	849	1054	1266	907
GT 1	466	390	496	686	731	1202	662

Table-4  
Mean yield (in kg/ha/year) of clones at Kinalur

Clone	Year of tapping					Mean
	1	2	3	4	5	
RR11 105	1277	1352	1682	1859	1494	1533
RR11 118	804	865	1057	1192	1118	1007
RR11 208	790	954	1140	1208	1144	1047
RRIM 600	1378	1341	1464	1392	—	1394

Table-5  
Yield performance of clones

Clone	Mean yield (5 years) kg/ha/year
RR11 105	1562 * (3)
RR11 208	1226 * (2)
RR11 203	1143 (2)
RR11 118	1145 (2)
RR11 206	1104 (1)
RR11 107	1079 (1)
RR11 113	958 (1)
RR11 116	921 (1)
RR11 109	882 (1)
GT 1	843 * (2)
RRIM 600	1104 * (2)

\* Mean over 6 years.

Figures within bracket indicate number of estates.

Table-6  
Overall yield performance of a few clones (kg/ha/yr)

Clone		Year of tapping					
		1	2	3	4	5	6
RRII	105	1140	1415	1605	1647	1639	1917
RRII	118	789	994	1286	1256	1401	....
RRII	203	702	1091	1328	1188	1408	....
RRII	208	811	1051	1144	1319	1335	1698
RRIM	600	1063	1082	1084	1029	1099	1266
GT	1	592	603	840	915	906	1202

Table-7  
Some important secondary traits

Clone	Vigour at opening (cm)	Girth increment on tapping (cm)	Percentage yield depression during summer	Virgin bark thickness (mm)	Mean thickness of 5 years renewed bark (mm)
RRII 105	52.8	4.2	43.6	9.8	9.2
RRII 118	55.9	4.7	39.8	10.2	11.2
RRII 203	55.8	4.0	27.4	9.9	11.2
RRII 208	53.0	3.7	36.7	9.2	8.5
RRII 206	53.5	5.0	21.6	8.8	9.5
RRII 107	49.5	6.1	42.8	10.1	9.7
RRII 109	48.8	6.7	33.7	8.6	10.8
RRII 113	46.5	3.0	29.3	10.1	10.0
RRII 114	53.0	3.5	36.4	9.0	9.2
RRII 116	54.4	4.1	13.0	10.5	10.7
RRII 600	54.4	5.0	51.1	8.9	9.5
GT 1	49.7	4.0	43.0	7.9	10.2