

CONTRIBUTIONS FROM THE RUBBER RESEARCH
SCHEME (CEYLON)

PROVED HEVEA CLONES—II

CLONES IN MALAYA AND THE DUTCH
EAST INDIES

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FOREWORD

THIS report is the second of a series of notes, the object of which is to keep the planter in Ceylon in touch with the performance of the imported clones established in his clearing or nursery. The first of the series was published in this Journal in July 1932 and in Rubber Research Scheme *Quarterly Circular* Vol. 9, Parts 1 and 2, and the present report extends the information to the latest tapping year. Notes on Ceylon clones are being issued in a separate series.

No attempt has been made to give an inclusive account of all proved clones from Malaya and the Dutch East Indies. Only those believed to be of interest to Ceylon planters are mentioned; and clones which are no longer specially recommended by those in the best position to judge have been omitted. Their omission does not necessarily imply that they have developed any new undesirable characteristics; in many cases they have been superceded as the choice of high-yielding material has become wider. Information regarding clones not yet introduced to Ceylon will be given in subsequent reports should their performance become of outstanding interest.

The results are presented in a somewhat different form to that adopted in last year's report. The yields of the best Malayan clones are given together in Table I, and of those from Java and Sumatra in Table II. The separation of the clones into these two classes has not been done on geographical grounds alone. A comparison of the yields from Malaya with those from the Dutch East Indies is not justified without taking two factors into consideration.

(1) Growth in Malaya is, in general, more rapid than in Java or Sumatra, so that at any age the young budgrafts are more advanced.

(2) Tapping of the Malayan clones is in all cases on half the circumference, whereas in Java and Sumatra most of the yields are derived from one-third of the circumference.

The yields are expressed in lb. of dry rubber per tree per annum, and in order to make the figures comparable they are calculated on a basis of 160 tapplings. (To convert the figures to grams dry rubber per tapping they should be multiplied by 2.84. This will facilitate comparison with the performance of the young Ceylon clones given in R.R.S. *Quarterly Circular*, Vol. 10, Part 2.) It must be recognised that these are calculated rather than absolute figures, but since the number of tapplings in the year has usually approximated to 160 the error introduced is small. The yields are given according to age, calculated to the nearest half year from the date of establishment (budding or planting of budded stumps) to the middle of the tapping year. The tables also give the situation; the year and month of planting or budding, the number of trees under test and the tapping system employed. In the last column the following abbreviations are used:—

a.d. = tapped alternate daily,

d.a.m. = tapped daily in alternate months.

Buddings of the second "vegetative generation" of some of these clones are now in tapping, and the records published to date are given in Table III. Most of the well-known Java and Sumatra clones have been established on an experimental clearing at Tjiomas, Java, and the yields from these young buddings will provide a good comparison of the various clones.

In the publication mentioned above full particulars were given regarding the conditions under which the trees are tapped and the yields recorded, and for this information the reader is referred back. The notes on the characteristics of the individual clones, also, are not repeated, but are supplemented by any new features which may have developed or new information come to hand.

Up to the present all the yield records and most of the other observations are derived from the countries in which the clones originated. It is hoped that from 1934 onwards it will be possible to publish data regarding the performance of these foreign clones in Ceylon.

In the current issue is reproduced a translation of a lecture given in Java by Ir. J. S. Vollema, in which the most recent information regarding the Java and Sumatra clones is given, and certain aspects of the use of buddings as planting material fully discussed. Attention is particularly directed to the yields obtained from relatively large areas of budgrafts tapped on a commercial scale, and to their close general agreement with the figures recorded from small scale test-tappings. For convenient reference these practical figures have been reproduced in tabular form in Table IV.

PRANG BESAR CLONES

These clones are established and tested under careful supervision on Prang Besar Estate, Malaya, a point which is particularly stressed by the Estate being that the trees are tapped under strictly commercial conditions. Yields and other information regarding the best clones are issued annually in pamphlets, from which most of the following information is abstracted.

The six best clones for which yield records for 1932 have been issued are Nos. 23, 25, 86, 180, 183 and 186. Nos. 24 and 123 have been omitted from the list given last year, and No. 180 added.

As shown in Table I the number of trees in test-tapping is in all cases 10. The number of trees in each clone actually under observation is, however, considerably larger, and tests have shown that the average yield from the 10 trees in test-tapping is substantially the same as that from the total number of trees in the clone.

With regard to the yields, it is stated that the crop for 1932 was interfered with by weather to an exceptional degree, and this presumably accounts for the slight decrease in the yield of some of the clones.

The following notes supplement those given last year:

P.B. 23.—Early growth is weak and variable, but from the second year onwards there is a marked increase in vigour and general evening-up in size. The trees are showing satisfactory growth in a poor lateritic soil at Nivitigalakele. The bark is soft and easy to tap. Five cases of Brown Bast have been reported out of 63 trees under observation.

P.B. 25.—Growth is very variable, but has so far been quite good at Nivitigalakele. Yields from buddings of the second "vegetative generation" promise to confirm the high yield of the original trees.

P.B. 86.—Nothing new to report. This is the youngest of the proved Prang Besar clones, and for its age is second in yield only to *P.B. 186*.

P.B. 180.—Growth is stated to be good, the crown being particularly large. Bark renewal is moderately good and wound recovery satisfactory. The clone is somewhat late maturing, but has been the second highest yielder during the last two years.

P.B. 183.—Nothing new to report.

P.B. 186.—This clone has been by far the highest yielder among the Prang Besar clones for the last three years. As explained above the decline in 1932 is attributed to bad weather conditions. Growth is vigorous even under poor conditions. The bark is thick but rather hard, and requires careful tapping in early years. Nine trees have developed Brown Bast out of 261 trees under observation.

OTHER MALAYAN CLONES

For information regarding these clones we are indebted to notes published by the Rubber Research Institute of Malaya. The clones have been established at the Rubber Research Scheme Experiment Station, Nivitigalakele.

Sungei Reko 9.—This clone was established on Kajang Estate in October-November 1921, and has been tapped continuously under commercial conditions since 1927. Its yield is not as high as the best Prang Besar clones but is the average of as many as 84 trees. The growth in the first year or two is very vigorous and uniform under all conditions, though the clone is not actually one of the quickest to come into tapping. Clone *S.R. 9* seems to possess no serious defects.

Glenshiel 1.—This clone was established in Glenshiel Estate in November to December 1921. The yield records given in Table I are derived from 20 trees, but there are six further groups of 20 trees each tapped on different systems, and, in addition, 180 trees are under observation in normal commercial tapping. The slight decrease in yield during the last two years is accounted for partly by the fact that the 1930 yields were rather high, the trees having benefited from a rest during the last six months of 1929, and partly by the fact that in 1932 the cuts were only a few inches above the union. The opening of a new panel at 40 inches in October 1932 resulted in an immediate increase in yield. The tree is moderately vigorous.

virgin and renewed bark being entirely satisfactory. "Dry" patches have occurred on several cuts on a half-spiral, and this clone appears to respond better to tapping on one-third of the circumference.

Rubana 393.—This clone was established on Rubana Estate in December 1921, and the 9-8 buddings have been tapped continuously since April 1928. The growth is of average vigour with prolific branching and a heavy crown. Virgin bark is of moderate thickness and renewal satisfactory. One case of Brown Bast has occurred, but no other disease has been reported.

Sabrang 24.—This clone was established on Sabrang Estate in October 1921. Twenty trees were originally test-tapped, of which 17 have been tapped continuously since April 1928. In 1932 the yield reached the high figure of 31.3 lb. per tree. Growth is fairly vigorous and branching sparse. Virgin bark and renewal are excellent. No case of Brown Bast or other disease has been reported, but two trees have gone dry and one was damaged in a storm.

A.V.R.O.S. CLONES

The buddings of the A.V.R.O.S. clones are planted on various estates and experimental gardens in Sumatra, the test-tapping being under the general supervision of the A.V.R.O.S. Proefstation. Some of the clones have been test-tapped on more than one estate, and the records from the various situations are given in Table II. A comparison of the relative merits of two clones is clearly of greater value if based on the average results from various localities, than if it is merely a comparison of one clone on one estate with the other clone on a different estate.

The clones specially recommended by the A.V.R.O.S. Proefstation are Nos. 49, 50, 152 and 256, and only these clones are included in Table II. These are the same clones to which preference was given in last year's report, and the manner in which the older clones have maintained their position is worthy of note. The other older clones have been discarded on account of undesirable characteristics or because their yield has not increased according to expectations. There is also a number of newer clones, the yields of some of which promise to exceed those of the older clones. So far as is known these have not yet been introduced to Ceylon, but data will be given in future reports if their performance becomes outstanding.

Second generation buddings of Clones 50 and 152 are being test-tapped on an experimental clearing at Tjiomas, Java, and the yield records are given in Table III. In general, the A.V.R.O.S. clones are giving lower yields in Java than those obtained from the original buddings on the East Coast of Sumatra at the same age. This is probably due to the milder system of tapping and the slower growth in Java. In Malaya, on the other hand, where growth is more rapid, the A.V.R.O.S. clones are reported to be giving substantially higher yields than at the same age in Sumatra.

The following notes supplement those given last year:

A.V.R.O.S. 49.—There are no new features to report. The resistance to conditions of drought should make this clone very suitable for relatively dry districts, such as Matala and Uva. The buddings show very uniform and rapid growth on a wide range of soil types, and are resistant to wind damage.

A.V.R.O.S. 50.—This clone is a vigorous grower, but is more susceptible to soil conditions than A.V.R.O.S. 49. It is stated to grow badly where natural grasses have been allowed to remain. The buddings are extremely resistant to wind damage.

A.V.R.O.S. 152.—This clone is very sensitive to soil conditions and the growth is therefore extremely variable, being particularly bad under grass. Like A.V.R.O.S. 49 it is resistant to drought and shows only a slight yield decline during the wintering period. The trees are somewhat susceptible to damage by wind.

A.V.R.O.S. 256.—There is no information to add to the notes given in last year's report. Young buddings in a nursery at the Experiment Station, Nivitigalakele, have shown quicker growth in the first year than any of the other imported clones, but the growth is believed to be somewhat variable. Little damage due to wind has been experienced.

BODJONG DATAR CLONES

An area of mixed buddings was established on Bodjong Datar Estate, Java, in February 1918, and was first tapped in 1922. The various clones were not, however, identified until 1926, and the test-tapping records date from June of that year. With the exception of a rest for five months in 1927 the trees have been tapped continuously on alternate days on a $1/3$ spiral cut.

TABLE II
JAVA AND SUMATRA CLONES

Clone	Where planted	When planted	No. of trees	Yield in lbs. dry rubber per tree per year of 160 tappings at an age of (to nearest half year)														Tapping system						
				4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11		11½	12	12½	13	13½	14
A.V.R.O.S. 49	Polonia	VII. 1919	4	3.7*	7.2*	11.5*	12.6*	12.2	15.2	19.4	22.7													½* & ¼ sp. d.a.m.
"	Tjinta Radja	V. 1920	112-89	5.1*	7.5*	8.9*	10.8	12.3	15.8															"
"	Boekit Maradja	X. 1922	25	8.8*	10.0	13.8																		"
"	Peoloe Tagort	I. 1922	15		7.5*	8.6																		"
A.V.R.O.S. 50	Belawan	I. 1919	10.9	5.3*	11.3*	12.4*	10.7	10.9	14.1	16.0	13.7													"
A.V.R.O.S. 152	Boekit Maradja	X. 1922	100	6.0*	8.3	11.7	14.4																	"
"	Peoloe Tagort	I. 1922	20		6.2*	8.2																		"
"	Aloer Djamboe	end 1922	25		9.0																			½ sp. d.a.m.
A.V.R.O.S. 256	Tamiang	X. 1920	8-20		14.7	16.3	14.7	16.6																½ sp. d.a.m.
B.D. 5	Bodjong Datar	II. 1918	8-5		17.4	15.7	17.4	18.7	25.0	24.2	27.0	33.4												½ sp. a. d.
B.D. 10	"	II. 1918	50-44		15.7	18.7	18.0	20.1	18.7	18.7	18.0	20.1	20.1											"
"	Pasir Waringin	1918	23-20								(17.8)	(21.3)	(27.5)											"
(War. 6)																								"
Tjir. I.	Tjirandji	1920	5-2		27.0*	24.0	31.6	29.7*																½* & ¼ sp. a. d.
Tjir. VIII.	"	1920	34		13.9	14.7	15.8	16.1	17.4															½ sp. a. d.
Tjir. XVI.	"	1920	11		21.2	21.3	19.0	19.1	24.3															"
Djas. I.	Djasinga	1920	150-144		(9.8)	13.3	12.6																	"

† On replanted land. * See under "Tapping system" Figures in brackets are approximate, the number of tappings not being known.

Clones B.D. 2, 5 & 10 attracted early attention, but B.D. 2 developed various undesirable characteristics and has been discarded from planting recommendations. Other Bodjong Datar clones are moderately high yielders but are not of interest to Ceylon planters.

B.D. 5.—The yield of this clone in its fifteenth year attained the high figure of 36 lb. per tree for 173 tappings. This represents a considerable advance on the previous year, and it would appear that the yield is still on the increase. The yield of the second generation buddings on Tjiomas is also satisfactory.

There is often a delay in the shooting of the buds, but early growth is vigorous. The buddings have a very late branching habit, however, and on this account the girth increase is slow. The small crown is probably responsible for the great resistance of this clone to any form of damage by wind. Growth is very uniform and there is evidence to show that B.D. 5 may prove one of the most vigorous clones on replanted land. In the wet districts of Ceylon the clone suffers as the result of being particularly susceptible to attack by *Phytophthora palmivora* on the young green shoots. Provided this disease can be controlled in the early years the budgrafts subsequently show satisfactory development, but the trouble thus incurred, and the probability that the mature foliage will be susceptible to "secondary leaf-fall", have checked the extensive use of this clone in Ceylon.

B.D. 10.—The yield of this clone is considerably lower than that of B.D. 5, but being derived from 44 trees is a more reliable average figure. The clone is also established on Pasir Waringin Estate under the name Waringiana 6, and here the yield showed a big rise in 1932. The young plants on Tjiomas are also yielding well. Early growth is very vigorous and uniform. An unsatisfactory feature of this clone is the tendency to form a twisted or corrugated stem, but this is stated not to interfere with tapping. Out of 68 trees, 8 have been affected with Brown Bast.

TJIRANDJI CLONES

The Tjirandji clones were planted on Tjirandji Estate, Java, in 1920, and are test-tapped under the supervision of the Proefstation, West Java. Clone Tjir. I has probably been more extensively planted in Ceylon than any other clone.

Tjir. I.—The yield of the two original buddings, although very high, has shown a marked decrease in 1932, despite the cut having been changed from 1/4 to 1/3 circumference. Such fluctuations, however, are to be expected when the average is derived from only two trees. On account of this small number of trees (three out of the original five buddings were destroyed by a storm in 1929) the exceptionally high figures have been accepted with a certain reserve. It is now fortunately possible to give yield records from a relatively large number of second generation buddings (see Table III), and their good performance in several clearings has materially increased one's confidence in this clone.

TABLE III
SECOND GENERATION BUDDINGS

Clone	Where planted	When planted or budded	No. of trees	Yield in lb. dry rubber per tree per annum at age of (years)		Tapping system	
				4½	5½		
P.B.	24	Prang Besar	XI. 1927	142		6.1*	½ sp.a.d.
F.B.	25	„	XI. 1927	139		6.0*	„
A.V.R.O.S.	50	Tjiomas (Java)	IV. 1926	1-13	3.3	3.3	½ sp.a.d.
A.V.R.O.S.	152	„	IV. 1926	2-3	3.5	4.4	„
B.D.	5	„	I. 1927	5-10		5.3	„
B.D.	10	„	I. 1927	12-14		4.4	„
Tjir. I		Tjirandji	1927	24-33		4.6	„
„		Tjimatis	1927	110-219		5.3	„
„		„	1928	153-265	3.5		„
„		Tjiomas	I. 1927	10-15		5.5	„
Djas. I		„	IV. 1926	3		3.3	„

* Calculated from three months' tapping.

The trees show very vigorous growth, being uniform under most conditions. The clone possesses three defects, one or all of which may be of importance in certain districts and situations:

- (1) It is distinctly susceptible to wind damage.
- (2) Its yield is markedly depressed in conditions of drought and during the wintering period.
- (3) The latex tends to flow until the early afternoon.

Tjir. VIII.—The yield of this clone, though, showing a steady annual increase, is only moderate, and in Java the clone is only recommended for mixed planting. So far as is known it possesses no serious defects.

Tjir. XVI.—The yield in the thirteenth year has shown a big increase. Growth is slow, but primary and secondary bark are very good. There is no record of susceptibility to disease or wind damage.

CLONE DJASINGA I

This clone was established on Djasinga Estate in 1920, being one of the few original clones planted unmixed with other buddings. The yield is only moderate but the average is derived from as many as 144 trees. The slight decrease in yield in the twelfth year is attributed to root disturbance consequent on the removal of interplanted seedlings. The clone is now only recommended for mixed planting, but the records are given in this report as it has been fairly extensively established in Ceylon. A feature of Djas. I is the small crown which permits close planting.

COMMERCIAL TAPPING OF BUDDED AREAS

The question most frequently asked by the practical planter regarding the yield of budgrafts is: "Are the yields obtained by the test-tapping of a small number of trees going to be reproduced when large budded areas are tapped on a commercial scale?" This matter will not be discussed in detail here as it is fully dealt with in the translation of a Dutch paper reproduced in the current issue. Suffice it to say that the yields so far recorded give every indication of following the same trend as those obtained in the test-tappings.

The practical figures published to date are summarised in Table IV: other records of a similar nature are known but are not available for publication. When considering these figures, which at first sight may seem disappointing, it must be borne in mind that many of the clones which comprise these plantings have since been discarded, and that the tapping systems are mostly milder than are employed in Ceylon. Results of greater significance will be obtained when unmixed clearings of what are now regarded as the best clones come into commercial tapping.

TABLE IV
PRACTICAL YIELD FIGURES FROM BUDDED AREAS

Clones	Situation	Acreage in tapping	Year	Age (years)	lb. rubber per acre	Tapping system
Untested H.A.P.M.	H.A.P.M.	200	1929	9-10	1,000	$\frac{1}{2}$ sp. d.a.m.
	E.C. Sumatra.					
"	"	5 $\frac{1}{2}$	1928	8-9	1,104	"
			1929	9-10	1,452	"
B.D. 2, 5, 10 (proportions 3:1:5)	Bodjong Datar Java.	55 $\frac{1}{2}$	-	5-6	404	$\frac{1}{2}$ sp.d. 15 days rest 30 days.
{ 215 ac. A.V.R.O.S. 36 } 52 ac. A.V.R.O.S. 36, 49, 50, 52, 80, 152, 163.	Aloer Djamboe, E.C. Sumatra.	267	1929	5-6	337	$\frac{1}{3}$ sp. d.a.m.
A.V.R.O.S. 36	"	121	1930	6-7	543	"
A.V.R.O.S. 33, 49, 50, 52, 80, 152.	Batang Trap, E.C. Sumatra.	42	1930	6-7	427	"
Mixed.	Java	-	-	8-9	1,361	"