SELECTED ARTICLES

THE PERFORMANCE OF IMPORTED CLONES IN CEYLON—I*

INTRODUCTION

FOR our knowledge of the performance of the various high-yielding clones which have been imported into Ceylon we have hitherto been almost exclusively dependent on data published in the countries of origin, and with the object of keeping the Ceylon planter in touch with the latest information regarding the clones established in his field or nursery such data have, from time to time, been collated and published in the *Quarterly Circular*. Doubts are often expressed, however, as to the extent to which results obtained in other countries will be applicable to the diverse conditions of climate, elevation and, in a smaller degree, soil under which rubber is grown in Ceylon, and the time when these clones became tapped on our own estates has been eagerly awaited. There are as yet in Ceylon no large areas planted exclusively with imported clones which have reached the stage of commercial tapping, and for such figures we are still dependent on Malaya and the Netherlands East Indies. Test-tapping data of small groups of trees are, however, beginning to accumulate, and although such records are of a somewhat fragmentary nature they are considered to be of sufficient interest to merit publication at the present juncture. The following notes are intended as the first of a series of annual reviews, which will run parallel with notes on clones of local origin.

It is convenient to consider the available information under two headings : (1) Growth and (2) Yield.

GROWTH

It has been observed that not only do clones show considerable variation amongst themselves in respect of vigour of growth, but that there is a differential response to environmental conditions, *i.e.*, a clone which is vigorous in one locality may be less satisfactory in another. In planning replanting or budding programmes it is clearly important to know which clones are likely to show satisfactory development under the specific conditions in which they are to be grown, for it is obviously undesirable to select a clone which has a very high potential yield but is unsuited to the locality on account of growth or other secondary characteristic.

* By R. K. S. Murray, Botanist and Mycologist in the combined Second and Third Quarterly Circulars for 1936, Rubber Research Scheme (Ceylon).

Our knowledge of the regional suitability of the various imported clones is very imperfect and, being based mainly on general observations, is of a somewhat empirical nature. We are in possession, however, of two series of comparative measurements which illustrate the rate of development of some of the more important clones under conditions of relatively low and high rainfall respectively. The figures are given in tables I and II and are commented on in the notes on individual clones. It should be mentioned that the girths given in table I are strictly comparable, being derived from replicated plots whereas those in table II are taken from contiguous fields, some of which are more favourably situated than others. Clones A.V.R.O.S. 49 and B.D. 5, in particular, suffer from being planted in rather exposed areas.

TABLE I

Girth Measurements at Iriyagama Division, Experiment Station, Peradeniya

Average Annual Rainfall : 93·3 ins. Elevation : 1,550 feet
Planted budded stumps : October, 1929
Seedlings as basket plants : October, 1929
Means of 60 trees in each clone

Clone	Girth at 3 feet in Nov., 1933	Aug., 1934	Sept., 1935
Tjirandji 1	11·62 ins.	14·30 ins.	17·90 ins.
Tjirandji 16	10·36 ,,	13·26 ,,	16·31 ,,
A.V.R.O.S. 49	10·45 ,,	12·60 ,,	15·54 ,,
A.V.R.O.S. 50	9·91 ,,	11·66 ,,	14·59 ,,
Bodjong Datar 5	9·91 ,,	11·39 ,,	14·42 ,,
Tjirandji 8	9·47 ,,	11·66 ,,	14·24 ,,
Heneratgoda 2	9·51 ,,	11·33 ,,	14·12 ,,
Sungei Reko 9	9·83 ,,	11·55 ,,	13·98 ,,
Seedlings	11·02 ,,	13·55 ,,	17·02 ,,

TABLE II

Girth Measurements on Estate A, Ratnapura District (made at 3 feet from ground)

Average Annual Rainfall : 200 ins. Elevation : 400 feet
1927 stocks budded : 1931–32

Clone	No. of trees measured	Percentage in Classes in June, 1936 Under 10″	10″-15″	15″-18″	Over 18″
Tjirandji 1 ..	3,337	14·3	10·1	26·7	48·9
Bodjong Datar 10 ..	555	12·4	23·1	30·1	34·4
A.V.R.O.S. 50 ..	3,161	14·3	24·9	38·3	22·5
A.V.R.O.S. 49 ..	2,362	15·2	28·0	33·6	23·2
Bodjong Datar 5 ..	1,988	26·2	37·5	27·1	9·2
1928 stocks budded : 1932					
A.V.R.O.S. 256 ..	806	22·2	69·4	8·4	—
Tjirandji 16 ..	648	30·9	59·4	9·4	0·3

YIELD

The yield records available up to the end of 1935 are summarised in Table III. The procedure of test-tapping on the different estates is somewhat variable, the trees having been tapped in some cases for the whole year and in others for only a few months, and in order to bring the figures to a common basis they have all been calculated as a yield in lb. dry rubber per tree for a year of 130 tappings on a half-spiral system. In some cases the recording is done on the estate while in others the rubber is sent regularly to these laboratories to be weighed.

At first sight it would appear that the variation in yield within a clone is unduly large, the figure for one estate being sometimes as much as twice the yield of trees of the same age on another estate. A partial explanation is to be found in the average girths given in column 4, but there are other reasons which cannot be mentioned in detail in an article of this nature. For example, all the yields on the Experiment Station, Peradeniya, are relatively low, and this is only to be expected in view of the dry climate and high elevation. The figure of 130 tappings per annum, also, while considered fair for the wetter districts, is rather low for Peradeniya where the smaller yield per tapping is partly compensated by the larger number of tapping days.

Comparison of these figures with the yields of the original buddings of the same clones in the countries of origin is not possible in all cases as test-tapping was not always started at these immature ages. For most clones, however, records of " second generation " buddings are available, and on the whole it may be said that the Ceylon yields compare quite favourably with those in other countries when girth as well as age is taken into consideration.

On some estates there is an interesting comparison between the buddings and ordinary unselected seedlings planted in the same area, and the comparison is always greatly in favour of the former. The following example may be quoted :—

On Estate E a clearing was planted with seed in 1927. Alternate plants were budded in 1929, and the yields of 11 Tjirandji 1 buddings and the inter-planted seedlings for the period November, 1934 to December, 1935 were as follows :

	Average Girth in December, 1935	No. of Tappings	Yield per tree
Tjirandji 1	25 inches	133	6·6 lb.
Seedlings	31 inches	133	2·3 lb.

The yield of the buddings was therefore nearly three times that of the seedlings, despite the fact that the latter were two years older and 6 inches larger in girth.

NOTES ON INDIVIDUAL CLONES

The following notes are based not only on the yields given in Table III, but also on records which are coming to hand during 1936.

Tjirandji.—The growth of this clone is exceptionally vigorous under all recorded conditions, and in all collections of imported clones which have come under the writer's observation Tjirandji 1 heads the list. Table I shows that in the relatively dry climate of Peradeniya the buddings of this clone are larger than seedlings planted as basket plants at the same time.

The yield records, also, are very satisfactory and show that this clone attains a high yield at an early age. Results from other countries indicate that the clone is susceptible to periods of drought, the yield falling off in a marked degree. Experience in the drier districts of Ceylon is insufficient to judge to what extent this will be balanced by the exceptionally high yields in the wetter months, but in the meantime it would be unwise to use this clone extensively in such districts as Uva and Matale.

The most important defect of this clone is susceptibility to wind damage on account of the heavy crown, but it would appear that the steady winds which are experienced on our exposed hill slopes are less damaging than the violent cyclonic storms which periodically occur in the flatter lands in other countries.

Tjirandji 16.—This clone is usually found to be a weak grower in the wetter districts, but it occupies second place in the Peradeniya collection given in Table I. Judged by vigour of growth it would appear to be more suited to the drier than to the wetter zones. The trees are rather susceptible to attacks of Oidium owing to a late wintering habit.

Bodjong Datar 5.—Early growth is rapid, but it is usually not until about the fourth year that the plant begins to form a crown. While the tree consists of a single main stem with a number of small, useless lateral branches the girth increase is very slow, and the clone is accordingly one of the last to attain tappable size. The formation of a crown can be artificially induced by pollarding at a height of about 8 feet as soon as the bark is quite brown at that height. The cut should be made in an internode and three shoots allowed to develop at well-spaced intervals. The growth of the clone seems to be remarkably uniform under different environmental conditions.

The yields so far obtained in Ceylon show promise but are not outstandingly high, and in view of the exceptionally high yields obtained from older buddings

in Java it would appear that the clone is late maturing. B.D. 5 is probably well suited to the drier districts.

Bodjong Datar 10.—Growth is rapid and the early yields encouraging, but the clone is no longer recommended on account of susceptibility to Brown Bast, unevenness of the renewed panel and liability to wind damage.

Djasinga 1.—This is one of the older Java clones which is now generally considered to be only a moderate performer. The growth is relatively slow, but the yields obtained on Estate B (Table III) are very high.

A.V.R.O.S. 49.*—Compared with the figures published in other countries the growth and early yields of this clone are rather disappointing. There is some evidence that A.V.R.O.S. 49 may be better suited to the drier districts.

A.V.R.O.S. 50.—This clone is now recognised in other countries as being of only moderate merit, and experience in Ceylon confirms this view.

A.V.R.O.S. 80.—This clone has not been extensively used in Ceylon, but the only record of yield available is very encouraging. Experience in Sumatra, however, shows that the buddings never attain an exceptionally high yield.

Prang Besar 23.—Growth is rather weak and early yields are not specially promising.

Prang Besar 25.—The buddings show vigorous development on a rather poor lateritic soil at the Experiment Station, Nivitigalakele, and early yields from two estates are very high. The performance of this clone in Ceylon and Malaya indicates that it will probably be of value for replanting poor land.

*Since these notes were written information has been received that the latex from buddings of this clone has an objectionable tendency to pre-coagulation.

TABLE III

Clone	Where tapped	No. of trees	Average girth at 3 ft. in July, 1935 in ins.	Calculated yield in lb. per tree for a year of 130 tappings at ages of (years) 4	4½	5	5½	6	6½	7	7½
Tjirandji 1 ..	Estate (A)	8	19·7				6·3				
	,, (B)	39	25·4						9·8		
	,, (C)	3	23·2	3·0		4·6					
	,, (D)	6	18·1				4·3				
	,, (E)	11	23·5					6·4			
	,, (F)	10	21·5	2·3		3·3					
	Experiment Station, Peradeniya	7	19·1				3·0				
Tjirandji 16 ..	Estate (A)	2	17·0				4·7				
	,, (B)	20	22·5						6·2		
	Experiment Station, Peradeniya	6	17·5				2·8				
Bodjong Datar 5 ..	Estate (A)	2	17·5				3·6				
	,, (B)	47	25·0							8·7	
	Experiment Station, Peradeniya	2	18·8				2·8				
Bodjong Datar 10 ..	Estate (A)	6	17·6				5·3				
	Experiment Station, Peradeniya	7	17·8				2·5				
Djasinga 1 ..	Estate (B)	10	24·0					8·7			
	,, (D)	6	16·0				2·9				
	,, (G)	11	22·5				4·2				
A.V.R.O.S. 49 ..	Estate (A)	2	18·7				3·4				
	,, (B)	32	25·0							5·6	
	,, (G)	2	22·2				4·1				
	Experiment Station, Peradeniya	3	17·1				2·2				
A.V.R.O.S. 50 ..	Estate (A)	3	18·5				3·4				
	,, (B)	37	25·0							6·3	
A.V.R.O.S. 80 ..	Estate (B)	14	24·5							9·3	
Prang Besar 23	Estate (G)	2	21·5			3·7					
	,, (H)	3	18·5			3·3					
Prang Besar 25	Estate (G)	3	21·2			5·1					
	,, (H)	3	20·7			4·8					