COMPARATIVE EXPERIMENTAL TAPPINGS ON HEVEA SEEDLINGS AND BUDDINGS FROM UNPROVED CLONES.

E. DURHEIM and Dr. C. HEUSSER.

INTRODUCTION.

This report concerns an experiment, which was originally started by Mr. Durheim, Manager of the Tamiang Rubber Estates. The experimental area on Tanah Terbang Estate was chosen by him and planted with material which he selected himself. Further the experimental tapping and the determination of the yields were carried out under his supervision. Dr. Heusser rendered some assistance and afterwards worked up the results.

The Planting Material and the Experimental Area.

Nurseries were laid out in 1919 and planted with ordinary seed from the old plantation of Tanah Terbang Estate. About half of the seedlings were budded during the month of July 1920, whilst the other half were reserved to be planted out as ordinary stumps.

The wood which was used for budding, originated from Tanah Terbang trees, which were selected on the basis of measurements of the latex production. However these yield records were kept for a short time only and it afterwards became evident, that the high production of several of the trees was only temporary; some of them developed brown bast disease, or deteriorated in yield from other causes.

During the planting season of 1920, about the month of October, half of the experimental area was planted with buddings and the other half with stumps.

Therefore the planting material which was used is strictly comparable; the root systems are of the same mixed origin and of the same age, whilst the shoots of stumps and buddings are also of the same age.

On account of the slump, which made itself felt about that time and necessitated radical measures of economy, no records were kept during transplanting regarding the origin of the various buddings. The distribution of the clones over the area was therefore quite fortuitous; sometimes they occur in small groups.

The experimental area is level and consists of a sandy, yellow clay; ostensibly there are no differences in uniformity. The planting distance was 20 x 20 ft. square. Buddings and seedlings are planted in alternate strips In connection with the shortage of food during 1920 rice was grown once on the experimental field at the same time that it was planted. Consequently the young Hevea plants were at first somewhat neglected. This had no perceptible unfavourable influence on the seedlings, but it did have on the buddings. Several made shoots again beneath the buds and these shoots, which were not removed early enough,secured an opportunity to gain an advantage over the shoots of the buddings and subsequently, by

withdrawing foodstuffs, causing them to die off. Therefore the plots with buddings are mixed with buddings, which did not succeed, *i.e.* ordinary seedlings. On the contrary some stumps which died were replaced by buddings. So the original plots are more or less mixed.

Before the results were compiled, the trees were examined one by one to see if they were seedlings or buddings. Such an examination of 5 years old Hevea's is not easy. The cylindrical shape of the stem appeared to be a useful characteristic for buddings at this age. The decline of the circumference of the stem with height on Tanah Terbang estate was 1·2 per cent.* for the buddings and 4·4 per cent. for the seedlings. If for instance the circumference of a budding at I M. above the union of scion and stock is 60 cm., the circumference at a height of 20 cm. will be ± 66 cm., whilst the circumferences of a seedling will be 60 cm. and ± 81 cm., respectively.

The best characteristic of buddings from a well defined clone are the seeds, whilst the form of the crown, the branching, the outward appearance of the bark and the leaves are good, often infallible, indications. The elephant foot, by which young buddings can be recognised, is not typical for older plants; there are clones which unite as perfectly as stumps which shoot at the base, and such clones can no longer be recognised by this characteristic.

The experimental area covers 20 acres. The first 20 rows (A—U) with 98 trees each were chosen for the experimental tapping. The first tapping was done during July 1924; counted from the time of transplanting the trees were 3¾ years old. Tapping was done with a left cut over 1/3 of the circumference, at a height of ½ M. The yield was recorded during the first 20 days. The latex was coagulated in the cups, the rubber strung on a wire in the order of the rows and brought to the smoke house. After the rubber had been dried completely the yield of each tree was weighed, and in this way the individual yield per tapping was calculated.

From the month of May 1925 the experimental trees were tapped regularly every alternate month; after the second tapping period, thus from July 1925, the tapping cut was lengthened to half of the circumference. During the first 20 days of the 4th tapping period the individual yields of the trees were recorded for the second time, in the same way as during the first tapping period. The results mentioned hereunder are based therefore on the data obtained during two production measurements of 20 days duration, during the 1st and 4th tapping period. The time which elapsed between both measurements was 14 months, the difference in tapping height 15 cm.

Diseases and damage by wind caused a number of trees to drop out between the first and the second yield measurements, seedlings as well as buddings. Ultimately the total number of experimental trees was 764 seedlings and 545 buddings.

* Calculated from the difference of diameter, divided by the distance between the measurements, viz. 0, 8 M.

The Growth of the Experimental Plot.

The vegetative development of the experimental trees is very good. In order to express this in figures the circumferences at a height of 1 m. above ground of all trees were measured in the beginning of January, 1926; the following averages were found:

Seedlings	63'12 cm.
Buddings	60'15 cm.

The circumferences of the seedlings varied betwen 41 and 93 cm., those of the buddings between 44 and 80 cm. Classifying the trees into groups of 10 cm., the following percentages were found:

Group	41—50	51—60	61—70	71—80	81—90	91—100	cm.
Seedlings	5'—	35'—	40'4	17'5	2'—	0'1	%
Buddings	7'3	47'5	36'2	9'—	—	—	%

The average circumference at a height of 1 m. of the seedlings was 5 per cent. larger than that of the buddings. The variation in girth of the buddings is smaller.

The Results of Yield Measurements.

1. The average yield per tree per tapping is given in the following table.

Average yield per tree per tapping in grams of dry rubber.

	1st yield measurement		2nd yield measurement		Average	
	Gr.	%	Gr.	%	Gr.	%
Seedlings	2'58	100	6'64	100	4'61	100
Buddings	3'06	118	6'26	94	4'66	101

Taking the yield of the seedlings as 100, the relative figures for the buddings are 118 for the first yield measurement, 94 for the second and 101 for the average.

So the average yield of the buddings was 18 per cent. higher during the first experimental tapping and 6 per cent. lower during the 7th tapping period (2nd yield measurement) than that of the seedlings. Further the latter show an increase in yield from the first to the second measurement of 4'06 grams, whilst this increase of the former is 3'2 grams only. This concurs with the well known experience, that the yield of buddings increases less with a lower tapping cut as compared with that of seedlings.

2. The complete tables with the individual yields from the experimental trees are not published, because we are of opinion, that a classification into five groups according to yield suffices. This classification is based on the average yield of both experimental tappings, viz., 4 6 grams.

Division of seedlings and buddings into yield classes.

Yield classes	0-2,3 G	2,3-4,6 G.	4,6-6,9 G.	6,9-9,2 G.	9,2 G.
Seedlings	8'6 %	49'2 %	30'8 %	8'8 %	2'6 %
Buddings	12'3 %	45'5 %	26'6 %	10'8 %	4'8 %

3. It was impossible to determine the yield of the different clones, because, as already mentioned above, no records were kept about their origin after transplanting. However several buddings could be classified as belonging to well defined clones by means of the seeds. In the following table the average yields per tree per tapping are given for 4 of these clones.

Average yield per tapping per tree of 4 Tanah Terbang clones.

Origin	Number of trees	1st yield measurement	2nd yield measurement	Average
Buddings (mixture)	545	3·06	6·26	4·66
Clone I	21	2·02	4·79	3·41
Clone II	47	5·38	7·96	6·67
Clone III	7	1·49	3·71	2·60
Clone IV	9	10·69	13·64	12·16
Seedlings	764	2·58	6·64	4·61

Once all buddings have borne fruit, it will not be difficult to identify the whole mixture according to clones and to increase the number of trees belonging to the clones already identified.

The superior clone IV, registered under number T.T.I., is a vigorously growing type with large leaves. The buddings in question are located in a group; these are trees 1,3,4,7, in row T. and 3,4,5,6,8, in row U. Judged by the form, there are still more trees belonging to this clone; the following harvest of seeds will bring certainty in this respect.

The representatives of the bad clone I are to be found in the first strip of buddings, scattered over rows A.—H. and numbers 4-15; the buddings of clone III are to be found in the neighbourhood of numbers 30 and 50 of rows A.—H.

A group of high yielding buddings, not yet identified, is to be found in the vicinity of L. 10.

Survey of the results secured.

The yields of the seedlings and the mixture of buddings from unproved clones are about the same. It may be accepted for the present that the buddings will yield more with a high tapping cut, the seedlings with a low one.

When the experimental plot is thinned out selectively, the buddings will gain an advantage over the seedlings, because more bad, but also more good yielders are present amongst the buddings as compared with the seedlings.

It goes without saying that the method, used in planning the experiment on Tanah Terbang Estate 6 years ago, should no longer be applied when laying out a plantation of buddings. The experiment shows, that unknown clones should not be used on a large scale, but demonstrates on the other hand what may be expected from buddings of clones with the qualities of T.T.I. clone.

No doubt the most important result of this experiment is, that some superior clones were found. Outside the plot used for the experimental tappings, some good clones were also found; one amongst them seems to be even better than T.T.I. These clones, proved on the estate's own terrain, are of great value for the estate; planted out as buddings in the new clearing, they will amply repay all the trouble bestowed on this experiment.—Archief Voor de Rubbercultuur, 10e, Jaargang, No. 5.