

with poor areas contemplate carrying out manuring with chemical manures it is absolutely imperative that different manures are tried experimentally first. Such experiments must be properly conducted with control unmanured areas. It is only from the results of actual experiments that one would be justified in manuring large areas.

In connection with these efforts to improve these old areas, the crux of the matter, in my opinion, must be "Results versus Costs." Unfortunately we have very little accurate data to work on. On first principles it would seem that such steps as, say, "silt pitting" should improve the soil, but I have yet to see the carefully compiled results from any estate showing to what extent any improvement in growth, yield, etc., has been produced by this work. Many of us "think" what an improvement is caused by silt pitting. We think we note an improved appearance of the trees. Still gentlemen, it is time, I would suggest, that we get into closer touch with these problems and attempted to secure more accurate data. Knowledge is power and without that knowledge we can flounder about for years spending large sums of money upon work from which we get no return or at least returns not commensurate with the outlay.

This, gentlemen, brings me to the end of my paper. I do not offer these remarks as being of a highly scientific nature, indeed they are extremely commonplace. Still if I have only stimulated your interest in the urgent soil problems which confront the rubber growing industry, indeed all tropical agricultural industries, I shall feel that the time we have spent here this morning has not been wasted. I may not have brought to you any startling fresh information and possibly you disagree with the views I have expressed. If so, all the better, for you will now set yourself to prove matters and see who is correct.—The Bulletin of the Rubber Growers' Association, Vol. VII, Nos. 7 and 8.

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## **TAPPING SYSTEMS AND OTHER FACTORS INFLUENCING YIELD OF HEVEA BRASILIENSIS.**

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This article is based on the results of tapping experiments carried out on numerous rubber estates throughout the Peninsula, results of which were kindly supplied to the Department of Agriculture.

The writer is not familiar with the conditions under which the experiments were conducted and cannot therefore make any comment as to the accuracy of the results. Unfortunately little information was given in respect of many of the tests and in several instances the results had to be omitted owing to the absence of sufficient data.

Tapping experiments require special knowledge in their preparation and a high standard of supervision. It is not proposed here, however, to deal with the principles which should govern field tests with the rubber tree but merely to draw attention to the fact that there are many problems to be considered since so many factors have a direct influence on the yield

of latex. If any estate manager contemplates conducting tapping experiments it is advisable that he should first consult the Department of Agriculture.

#### **YIELDS DURING WINTERING AND AT OTHER TIMES.**

The following comments were made on the results obtained on six estates.

*Estate 1.*—“The best yielding period is from October to the middle of February. The crop, during the wintering season, decreases to a greater extent on flat land than on undulating land.”

*Estate 2.*—“The crops steadily fall off from March and do not recover until the trees have put on fresh foliage, which is usually during the month of June. Should a period of drought be experienced the yields will be affected, provided the duration of the drought is sufficiently long, say two weeks.”

*Estate 3.*—“The best yielding month is December”  
“The poorest yielding month is April.”

*Estate 4.*—“There is less falling off in yield due to wintering with alternate day tapping as compared with daily.”

*Estate 5.*—“The harvests generally begin to fall away, owing to leaf change (wintering) about the middle of February until the crop reaches its lowest point towards the end of March. Two or three weeks later, a slight increase in crop is noticed and this increase is generally steadily maintained until the crop becomes normal about the middle or end of May. The influence of wintering is felt over a period of around 3½ months. A spell of dry weather before wintering commences is responsible for fairly regular leaf fall throughout the estate. Heavy rains immediately preceding the wintering season induce trees to retain old foliage longer than they would otherwise. Under such circumstances, wintering is not only retarded but often very irregular and the period over which poorer yields are obtained, is extended. The output almost invariably touches its lowest point when the new foliage is bursting. The best yielding months are November, December and January.”

*Estate 6.*—“The crop drops considerably during the wintering season and if the wintering is heavy, the reduction may be as high as 50%. The crop is larger during wet weather, provided the rains do not interfere with tapping to any great extent.”

#### **HOUR OF TAPPING.**

The following comments were made on the results obtained on 5 estates.

*Estate 1.*—Late tapping produces about 60% of a normal crop obtained from early tapping.

*Estate 2.*—With late tapping, the output from any daily system is more adversely affected than in the case of alternate day tapping.

*Estate 3.*—A loss of from 25 to 40% of the crop is experienced when tapping is started late. Afternoon tapping (vacant tasks) gives approximately 60% of normal yields.

*Estate 4.*—The yield obtained, when tapping was commenced at 2 p.m., never exceeded 50% of a normal day's crop.

*Estate 5.*—Late tapping is responsible for a loss in crop of 25% of the yield obtained from early tapping.

It has been proved in Java and Sumatra\* that early tapping produces a higher yield than later in the day and that the yield decreases especially after 9 a.m.

#### DAILY VERSUS ALTERNATE DAY TAPPING.

A few years ago, daily tapping was popular throughout the Peninsula but the majority of estates here are now working on the alternate day system which is a more economical one and a few on periodical tapping. Some experiments have shown that alternate day tapping produces about 70% of the yield as compared with daily, over a period, with equal lengths of tapping cut but if the length of the cut in the alternate day system be increased, a more favourable comparison does it make.

The Mycologist, S.S. and F.M.S. is of opinion that alternate day tapping from the disease point of view is to be recommended in reference to any system of daily tapping. R. M. Richards has also expressed a similar opinion.†

*Estate 1.*—A test was conducted over a period of two years to compare the yields obtained from a quarter cut daily and from a V cut alternate day. The fields are similar in size and the cuts were practically at the same height from the ground.

System.	Yield 1st Year.	Yield 2nd Year.
¼ cut daily	595 lb. per acre	563 lb. per acre
V cut alternate day	605 " " "	703 " " "

It will be seen that as tapping continues the more favourable does the yield of the alternate day system become. With the V, there was a saving of just over 1½ cents per lb. in cost.

*Estate 2.*—On this property the system was changed from a fairly low, daily third cut, to an alternate day ½ cut. After six months tapping approximately 95% of the former crop was obtained.

*Estate 3.*—The system was changed from a third cut daily to ½ cut alternate day and the new system yielded approximately 90% of the former crop.

*Estate 4.*—During the year 1920 the trees were tapped daily on the quarter cut and during 1921 and 1922 they were tapped alternate daily on the ¼ cut.

Year.	Yield per Acre.	Yield per Tree.	Cost of Tapping,
1920	220 lb.	2'66 lb.	9'04 cents
1921	203 "	2'59 "	5'62 "
1922	257 "	3'28 "	4'81 "

The yields for 1922 are calculated on seven months results.

*Estate 5.*—When the trees were 10 years old a change was made from daily to alternate day tapping, quarter cut. It is reported that 15 to 16 year old trees are producing rather more on a ¼ cut, alternate day tapping, than they did at the age of 10 to 11 years when they were tapped daily.

#### TAPPING AT INTERVALS OF MORE THAN TWO DAYS.

Numerous experiments have been carried out to enquire into the

\* Dr. J. G. J. A. Mass, *Archief*, January 1925, page 215.

† Lectures delivered at the Planters' Conference, Kuala Lumpur, July 1924, page 52.

prospects of tapping at intervals of more than two days but there is no sufficient evidence to enable definite recommendations to be made.

#### SYSTEM OF TAPPING V ON HALF THE CIRCUMFERENCE.

Area.	System.	Total Yield.	Yield per Acre.	No. of tapping months.
(1) 10 acres	Alternate day	2,765 lb.	276 lb.	10
(2) 20 acres	every 3rd day	5,341 „	267 „	11
	(1) Bark consumption at the rate of 9 in. per annum			
	(2) „ „ „ „ „ „ 6 in. „ „			

In (1) tapping was conducted over a period of 10 months whereas in (2) the period was 11 months.

The land is flat and of a clay texture.

*Estate 6.*—Two superimposed  $\frac{1}{4}$  cuts tapped every 3rd day yielded 47.70 per cent. of the crop obtained from 2 superimposed cuts  $\frac{1}{4}$  circumference daily tapping over a period of two years (5,592 lb. against 11,724 lb.) The higher cut being 36 inches and the lower cut 20 inches from the ground. The areas are similar in size and appearance. One experiment carried out in Ceylon showed that the relation in yield between alternate day tapping and tapping every third day to be approximately 5 to 4. The system was one cut half the circumference of the tree in both cases.

#### PERIODICAL TAPPING.

On one estate in Malaya the yields obtained, per acre, over a period of 12 months, on alternate month tapping, were higher than that obtained from alternate day tapping but on another estate the manager reports that he discontinued the daily tapping with periods of rest as the results were so inferior to that obtained from alternate day tapping.

In the *Archief*, January, 1925, page 218 it is reported "For the time being the conclusions arrived at are that resting periods may vary from  $\frac{1}{2}$  to 2 months, but that these may not last longer than two months, whilst the tapping periods should not be shorter than one month and not longer than two months. The record of the daily yields and the changes as far as the rubber content of the latex is concerned furnish indications as to the proper duration of the tapping periods as compared with the duration of the preceding resting."

"As regards the influence of resting periods on the intrinsic characteristics of the rubber, De Vries stated that resting periods of more than two months only caused marked deviations in the uniformity. Uniformity should however not be taken for quality and it should further be kept in mind that not all the sections of an estate are rested at the same time and therefore latex obtained from trees which have just been rested, is mixed in the factory with latex from other sections."

#### A. B. C. SYSTEM.

In the A. B. C. system the area is divided into three equal divisions and each tapped in turn for equal lengths of time, the trees are therefore rested for double the time they are in tapping. The period over which tapping should be continued has not been definitely decided. The following are the results obtained with the A. B. C. system on one cut half the

circumference of the tree daily tapping, as compared with the control plots which were tapped on alternate days on half the circumference of the tree :—

Estate A. A.B.C. system yielded 69% of the crop of the control.

"	B.	"	"	"	62%	"	"	"
"	C.	"	"	"	72%	"	"	"
"	D.	"	"	"	80%	"	"	"
"	E.	"	"	"	81%	"	"	"
"	F.	"	"	"	67%	"	"	"
"	G.	"	"	"	80%	"	"	"

One manager who tried this system for two years came to the conclusion that he obtained 81% of normal output with 66% of the labour and bark. Mr. C. R. Harrison of Midlands Estate, Klang, delivered an interesting lecture at the 2nd Planters' Conference, Kuala Lumpur on Periodic Tapping in which he dealt with a system of tapping evolved by himself namely alternate day A. B. C. on half the tree. The method is to divide the area into three equal parts called for convenience A. B. C. Tap sections A and B on alternate days, while C is rested. Stop tapping A section after a fixed period, then tap B—C and so on. This lecture will no doubt be published.

#### NUMBER OF CUTS TO A TREE.

It is reported that an experiment was started on June 1st, 1914, and continued until the end of 1917, the object being to record the difference in yields obtained from a single cut on the quarter, and from two cuts on a quarter; daily tapping in both cases. The trees were 7 years old at the time the experiment was started, the appearance of the trees in both areas was very similar, and as far as could be judged, all other conditions were equal.

The average amount of No. 1 rubber collected, per cooly, during each year was :

Year	Average yield per cooly per annum obtained from 2 cuts on the quarter	Average yield per cooly per annum obtained from a single cut on the quarter.
1914	671'07 lbs. (for 7 months)	643'55 lbs. (for 7 months)
1915	1,307'97 "	1,282'68 "
1916	1,979'00 "	1,987'65 "
1917	1,929'06 "	1,896'00 "
	<u>5,887'10 lb.</u>	<u>5,809'88 lb.</u>

Notes on the experiments :—

(1) Each cooly tapped 400 trees per day, irrespective of whether trees had one cut or two cuts.

(2) Over the areas where the trees had single cuts, all cuts were opened at 20 inches from the ground. Trees on which two cuts were tapped had the upper cut at 36 inches from the ground and the lower cut at 20 inches from the ground.

(3) By the end of 1917, the bark renewal on trees which had been tapped with two cuts was so poor, that it was quite evident that this system of tapping was far too drastic.

(4) The yield obtained from a single cut was 98'69% of that obtained from a double cut.—The Malayan Agricultural Journal, Vol. XIII, No. 9.