

RESEARCH WORK ON RUBBER CULTIVATION IN 1929*

Economy.—Luytjes and Tergast gave a third report on the situation of the native rubber in the Netherlands-Indies, covering the year 1928 and the first five months of 1929.

The exports of native rubber amounted in 1928 to 129,178 tons wet rubber (equivalent: 90,962 tons dry rubber) against an equivalent of 98,683 dry rubber in 1927. This diminution has to be attributed to the low prices in 1928. Many of the imported labourers left the rubber districts in this year—only in Djambi many of the imported Javanese coolies remained—while the tapping by the owners and the members of their families and the employment of local labourers increased. This change in the labour conditions brought a lowering of the expenses and the adaptation to the low prices of rubber. It may be expected, that in most districts tapping will go on regularly as long as prices do not fall lower than one shilling per lb.

Only in those districts, where the population has other important means of existence (especially in Tapanuli, west coast of Sumatra and Bangka) the decrease in production sets in at a higher market price.

The production that would be obtained if the native fields were all regularly tapped may be estimated at 135,000 tons for 1929. The area which is not yet in production may be estimated at two to three times the present area in production. The young fields have been planted from 1924 up to 1929 and are gradually getting into production. Lately planting of new fields has been done less on account of the low prices.

Another important report on native rubber in the Dutch East Indies is that of Taylor and Stephens, who visited the more important native producing districts by commission of the Rubber Growers' Association.

They point out that the planting of rubber by the natives rose to fever height in the boom years 1925-26 and has steadily declined since.

The stand of the trees is dense and large yields are obtained for some years. From the evidence collected average figures that appear to be applicable are:

Table I

Age				Pounds per acre
5 years	...	...	...	300
6 "	...	...	...	400
7 "	...	...	...	600
8 "	...	...	...	700
9 years and above	...	...	...	800

The number of trees per acre is very large (about 375) and accordingly the yield per tree is low.

In order to enable the tapper on the 50-50 share basis, still very common in all districts, to earn at present prices what is considered a sufficient remuneration, a good yield is essential, a general average of 4 to 5 lb. per diem (more usually the latter), being the usual return. And if such yields are not capable of maintenance even by the growing practice of larger tasks, tapping the trees becomes spasmodic and finally ceases, though this is still comparatively a rare occurrence.

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Bark consumption is rapid and generally after about two years the renewed bark is tapped, and this second tapping is nearly always a mass of wounds. The third tapping after another couple of years is still worse. To compensate for the declining yield from the single cut, one or more additional cuts at all angles and in any promising looking spot are added. This enables large yields per acre to be maintained up to about the twelfth year of age. Taylor and Stephens estimate that the decline in yield after six to seven years of tapping is probably not less than 10 per cent per annum. "Brown Bast disease" is very common.

It is estimated that taking the amount of native rubber planting done during the period 1923-28 the proportion planted in the various years was: 1923 almost nil; 1924 10 per cent.; 1925 30 per cent.; 1926 30 per cent.; 1927 20 per cent.; and 1928 10 per cent. On this basis a forecast has been made of what appears to the investigators to be the *potential* yields for the next five years. "But so long as prices between 9d. and 1s. per lb. prevail it is not thought that the potential yield will anywhere be realised."

The estimated areas under native rubber cultivation are as follows:

Table II

		Estimated areas (in acres)		
		Old	Young	Total
Pontianak	...	53,000	159,000	212,000
Bandjermasin	...	50,000	100,000	150,000
Palembang	...	53,000	265,000	318,000
Djambi	...	70,000	140,000	210,000

The estimated *potential* outputs for the years 1929-1933 are given. That of 1933 may be mentioned here:

Table III

Estimated Potential output (1933)

Pontianak	Bandjermasin	Palembang	Djambi	Total (estimated at 70% of the whole of the native rubber in the Neth. E.I.)
Tons	Tons	Tons	Tons	Tons
51,000	34,500	77,500	47,500	220,000

Botanical Research.—Morris gave a general review of previous investigations on the *Pollination and fertilisation* of the Hevea tree. He added the results of some of his own investigations on Pilmoor Estate, Batoe Tiga, Selangor (F. M. S.)

The supposition of Heusser, that pollination with pollen of another tree of the same clone would result in a higher percentage of fertilisation than self-pollination was not confirmed; pollination between different trees of clone A 44 remained without result; the same was the case between trees of clone B 58.

In his hybridisation experiments Maas (Sumatra) obtained up to 56% of successful cross-pollinations. Heusser (Sumatra) obtained in his cross-pollination experiments very different results with different combinations of trees. With some combinations, for instance, tree No. 29 pollinated with pollen of tree No. 141 no success at all was obtained, while with other combinations cross-pollination always resulted in a rather high percentage of fertilisations. The highest percentage was obtained in pollinating tree 138 with pollen of tree 146. Schweizer (Java) obtained 18% successful pollinations and Van der Hoop (Java) in 1924 35%, in 1926 35% and 1927 6.9%.

Morris obtained the following percentages of successful cross-pollinations in the different combinations :

Table IV

<u>Combinations</u>				<u>Percentage of successful cross-pollinations</u>	
A 44 ♀	X	B 58 ♂	...	...	0.4
B 58 ♀	X	A 44 ♂	...	...	1
A 8 ♀	X	A 44 ♂	...	...	6
A 44 ♀	X	A 8 ♂	...	...	3
A 44 ♀	X	D 6 ♂	...	...	18

All the percentages must be regarded as low in comparison with those obtained in Java and Sumatra.

In the second series of his experiments Morris pollinated 7 mother-trees with pollen of different other trees. Of all these pollinations including 1248 flowers of 186 inflorescences, 91 fruits were obtained with 274 seeds, of which 205 germinated.

Thus 7% were successful.

The results of Morris' experiments of 1928 can be summarised as follows: 2290 flowers of 8 clones were pollinated; 1685 crosses gave 94 fruits, *i.e.*, 5.5 per cent. of success, and 213 seeds germinated. All the 605 self-pollinations failed.

Investigations on *correlation between vegetative characters and yield* of rubber have been carried out by quite a large number of workers, the final object being selection of high yielders.

Sanderson and Sutcliffe investigated this matter again.

In order to find out whether or not there was a close correlation between the number of latex vessel rows and the yield, the number of latex vessels in 485 trees was recorded at three different heights 5 in., 10 in. and 20 in. The average total of latex vessel rows at 5 in. was 15.27, at 10 in. it was 13.17 and at 20 in. 11.00.

For each girth increase of 4 in. at 20 in. there appears to be an average increase of one in the number of latex vessel rows. The correlation coefficient between the characters, girth and number of vessels is $+0.44 \pm 0.036$. This is sufficiently high to indicate a definite correlation, but not high enough to justify the assumption that trees of the greatest girth at 20 in. will also have the largest number of latex rows at that point.

A similar correlation exists between the girth at 20 in. and the yield. The correlation coefficient ($+0.3983$) is too low to justify selection of a small percentage of high-yielding trees by girth measurement alone, but is yet sufficiently high to indicate that large girth is a desirable character, since it has some influence on the yield.

Such a correlation exists also between the yield and the latex vessel rows at 20 in. The coefficient is $+0.46 \pm 0.2265$.

As regards the rubber content of the latex, this varied from 16% to 38%. The coefficient of variability 14.6 is so high that volumetric determination of yield cannot be relied upon; final determination of yield should be by actual dry rubber.

PLANTING AND REPLANTING

In planting seed of selected trees, we meet often the difficulty, that we get only a small number of seeds in consequence of the low fertility of the tree. In such a case the method which Ramaer described and which

gives *two seedlings from one seed*, will be useful. When the seed has germinated and the young stem has just emerged from between the cotyledons, the top of the stem is cut away and the base of the stem at a length of about $\frac{1}{2}$ cm. above the insertion of the cotyledons is left. Thereupon the main root, the hypocotyl and the rest of the stem are split lengthwise. After some time the buds, situated in the axils of the cotyledons begin to swell and develop into two new stems, while two halves of the main root develop each into a new main root.

After the operation the plants must be treated with care and planted out into a loose soil. After some time, when a few green leaves have been developed, the cotyledons are exhausted and dry up, and the two plants stand independent from each other. A short period of rest sets in, in which, however, the root develops further; then the final buds develop again. At this time the seedlings must be transplanted. In the beginning these "twin-seedlings" are a little backward in comparison with ordinary ones, but after some time no difference is to be seen.

The question of rejuvenation of the old fields planted with planting material which is at present regarded as being of inferior quality, is still much discussed.

Koch proposed not to interplant between the old trees, but to apply a drastic tapping system during two years and to replant entirely in the third year. He calculates, that, if the old trees are left standing, they would produce in 18 years 3600 kg., rubber per bahu (0.7 ha.), while one would get from one bahu, if it is replanted with superior strains, in 18 years consecutively: 400 kg., 400 kg., 100 kg. (from the old heavily tapped trees), then four years no yield, and the following years: 120 kg., 200 kg., 270 kg., 270 kg., 340 kg., 420 kg., 460 kg., and finally 500 kg. per bahu, or altogether in 18 years 4710 kg.

Drastic tapping of the old trees before removing is also recommended by Vollema. The system he applies consists in tapping daily with two cuts each over half circumference. The yield thus obtained during three years is three times the ordinary yield. After these three years the old trees are removed and the whole field is replanted.

The question of replanting, rejuvenation and supplying of old fields is also a subject of discussion in a paper of Sutton. It is the opinion of the author, that this question must seriously be considered for old rubber fields, even if the production is still some 400 lb. per acre (450 kg. per ha.). Replanting, *i.e.*, removing all the trees and replanting the whole field is, in the opinion of the author, to be preferred if the field taken as a whole is no longer first rate and he considers it advisable to replant every year $\frac{1}{20}$ part of the whole plantation, thus the whole plantation being renewed in 20 years. Rejuvenation, *i.e.*, the removal of some 60 or 70 per cent. of the original stand should be applied where there is a good proportion of sound rubber. Supplying, consisting in removing some 30% of the trees, should be applied in the best fields. The whole scheme may be then, that replanting is begun with the worst fields and supplying with the best fields, which will presumably be the last to be replanted in the 20 years of replanting.

In replanting great attention must be paid to the tapping out of the area. A general method of tapping out is difficult to give, the method must have regard to former tapping systems, but as a general rule every day tapping should be instituted as soon as is possible and a five-year basis should be taken. The felling and removal of stumps is a formidable work and, if done by hand a most expensive one. The author recommends using monkey winches and tools of the "Handy Andy" and "Forest Devil" description. Jacks are useless for this type of work. A gang of about five coolies is sufficient for one machine, which can deal with from 15 to 25 trees

per day. Promiscuous burning should on no account be allowed as it impoverishes the soil. In hilly terrain contour terracing is recommended. On lands where the subsoil is heavy or lacking in porosity, the interplanting of *Albizzia* has been found most advantageous in the breaking up of the subsoil.

After the soil has been dug in the ordinary way, the trees can be planted. The great question is: what planting material should be used? if only seedling from selected trees are planted a very close initial stand should be taken, say about 250 to the acre (about 625 per ha.). But the author prefers to plant alternately seedlings and budded trees, with an initial stand of 200 trees to the acre (500 per ha.) and a final stand of 90 to 100 in ten years. As regards rejuvenation, the author gives an example of a field of 24 acres having 78 trees to the acre and yielding 312 lb. per acre. Of these 78 trees those, which give less than 4.8 lb. rubber (per year) are removed. This is the case with 56 trees; 22 with a production of 4.8 lb. or more per year are left. These trees give 138 lb. rubber per year.

The different systems to be followed in terracing or a clearing were discussed by Holland. Holland discussed: (1) whether holing is to be done before or after terracing; (2) the distance apart of the terraces, and the spacing of the plants in the terraces; (3) the width and slope of the terraces. In 11 figures the main types of terraces are represented.

SOIL AND MANURING

De Vries gave a short review of the manuring experiments in Java.

In total 94 experiments were running in 1928, 17 of which with young trees, but only 51 of these came up to the requirements of method. Of these 51 experiments, 9 were running for a too short time to allow an opinion about the results, while with 12 the result was more or less dubious; 21 experiments gave a positive result.

Apart from the experiment at Djasinga Estate, Serpong Estate and Soekamadjoë Estate, in which the manuring (sulphate of ammonia gave an increase in yield of 20%, 35%, and 25% the following successful manuring trials must be mentioned.

Nitrogen-manures gave an increase in yield on the following estates: Soekamadjoë (young volcanic soil) (diammonphos more successful than sulphate of ammonia), Parakan Salak and Tjilentab (both on young volcanic soil), Soemoerbarang and Tjibaroekgak (tertiary soils), Boeniseuri (tertiary volcanic soil) Pondok Gedeh (young volcanic soil). Potassium manure seems to have some effect on the estates Bodjong Godeh (boundary between young volcanic and tertiary soil).

Lime seems to have some effect on the soil of the estate Tjikasintoe.

Nitrogen-phosphor manure gave an increase in growth of nursery plants on the estates Djasinga, Soekamadjoë and Tjikasintoe (boundary between tertiary tuff and marly soils).

Nitrogen-phosphor-potassium manure had effect on nursery plants on estates Serpong and Bolang.

As regards the method of determining the need of manure of the old fields by means of manuring experiments in nurseries, in six cases this method was tried and the results compared with those of direct manuring experiments in the field. In five of these cases the results did not correspond and in one case the correspondence was dubious. The "nursery-manuring-method" thus does not seem recommendable with rubber.

In Ceylon Roy Bertrand carried out a manuring experiment with pots and lawn plots. The object of the experiment was to test the amount of root growth induced in mature rubber by the application of different manures. 11 different manures were tried, both organic and inorganic ones. As the author correctly points out this experiment must only be considered tentative and it is only able to give indications in some directions. The author considers that it appears from this experiment: 1. that inorganic manures produce as much root growth or more than an equal value (monetary) of organic manures; 2. that alkaline or neutral fertilisers appear best suited to the soils in question; 3. that the effect of organic manures does not appear to last longer than that of inorganic ones.

An account, given in 1928 by Lord, of a statistical examination of the results of the manurial experiments 1914-1924 is revised by this author in which revision the yields of the different plots are figured out with use of the "regression coefficient." This method has recently been used by Eden in examining the effect of lime on tea (see *Tea Quarterly*, 1929, Vol. II, Part I, page 8.)

In order to give an idea of the yields obtained, those of the two first years may be mentioned here:

Yield of dry rubber per tree

Year	Control plot	Manured plot
1914	2.69	2.37
1915	3.62	3.50
1926	5.50	6.06
1927	5.44	7.31

The manurial plot received per acre yearly: groundnut cake 182 lb., steamed bone meal 43 lb., blood meal 100 lb., and sulphate of ammonia 150 lb.

The value of the regression coefficient for the two series of yields for the whole period of the experiment is +0.1085 and the conclusion is that the manured plot has gained on the control plot at the rate of 0.1 lb. per year and that this gain is due to the manurial treatment. This figure of 0.1 lb. shows the cumulative effect of the manure over a period of fourteen years. The mean average increase of the nitrogen over the control plot is 0.5 lb. and it is this figure which should be used in judging the profitableness of the treatment.

THINNING OUT

Whether Ashplant's method of using the diameter of the latex tube as an indication of the yield will indeed prove useful in plantation practice is, according to De Vries, still quite uncertain. Ashplant has not yet given a complete exposition of his method and we are left in ignorance about the way of preparing, colouring and measuring the latex tubes in the leafstalks of the young plants. But, apart from this fact, Ashplant gave figures which show a rather close correlation between the diameter of the latex tube and the production in old trees; we have however no proof, that there is also correlation between the diameter of the latex tube of the *young* seedling in the nursery and the yield of the tapped tree. Another weak point in the method of Ashplant is the fact, that he figured out the average diameter of the latex tube of each plant by measuring 120 latex tubes. For plantation practice such a large number of measurements would be impossible, but then the question arises, how great the error is when a smaller number of measurements are made.

De Vries figures out how great the difficulties would be in applying Ashplant's method, even if we satisfy ourselves with eliminating in the nursery 25% of the plants viz. those with the smallest latex tube diameter, or (other method) in selecting for planting out only the 25% with the largest diameter, making only one measurement (and not 120) for each plant. In the last mentioned case—*i.e.*, planting out the 25% best plants—a gang of 3 to 4 trained laboratory workers would need 10 days for selecting the plants for one hectare, and if 100 are to be planted in 4 months a gang of at least 12 laboratory workers would be busy during that time. These considerations show clearly, that Ashplant's method—even if it would be a reliable one, which is quite uncertain—is unsuitable for plantation practice. De Vries thinks it possible that the method may have some value for the work of testing the different clones.

TAPPING

The fact that the yield of budded trees decreases less rapidly than that of seedlings with the distance from the soil opens a large field of investigation.

De Vries published the result of an experiment, in which 5 budded trees were tapped with two cuts above each other two budded trees with three cuts and one with four. The trees were budded in December 1920 and in June 1919 and planted over in January and February 1921. They were tapped from May to October 1926 over 1/3 three times every week.

The results are given in the following table :

Table VI

Tree No.	Cut	Height of the cut in metres	Sector	Yield per tapping in grammes	Yield of the upper cut in percentage of the yield of the lower cut.
53	lower	$\frac{1}{2}$	—	7.0	—
	upper	$2\frac{1}{2}$	same	3.95	57
68	lower	$\frac{1}{2}$	—	11.5	—
	upper	$3\frac{3}{4}$	same	5.4	47
76	lower	$\frac{1}{2}$	—	6.4	—
	middle	$2\frac{1}{2}$	same	3.2	50
	upper	$3\frac{1}{4}$	same	4.4	69
78	lower	$\frac{1}{2}$	—	8.6	—
	upper	$2\frac{1}{2}$	other	6.1	71
79	lower	$\frac{1}{2}$	—	6.1	—
	middle	$2\frac{1}{2}$	same	2.6	43
	upper	$3\frac{3}{4}$	same	4.05	67
80	lower	$\frac{1}{2}$	—	6.15	—
	middle 1	$2\frac{1}{2}$	other	2.9	47
	middle 2	$3\frac{1}{2}$	same	2.65	43
	upper	$3\frac{1}{2}$	other	2.8	46
81	lower	$\frac{1}{2}$	—	7.0	—
	upper	3	other	5.0	71

In this case the average yield of the lower cut was 7.55 gm. The yield of the upper cut was 43 to 71% of that of the lower cut, and on an average 61%. No essential difference could be seen between the upper cuts at different heights or between the upper cuts in the same sector and those in another sector. As a preliminary conclusion it can be stated that an upper cut of a budded tree at a height of $2\frac{1}{2}$ to 3 m. produces still about 60% of the yield of the lower cut.

Vrolyk published results of a similar experiment. Four plots were used in this experiment, viz. R1, W1, R2, and W2; they consisted of 13, 10, 10 and, 12 budded trees. The trees were tapped on 1/3 every other day from Nov. 1927 to May 1928. The average yield of dry rubber per tapping was in that time as follows :

R 1 :	13·1 gm.
W 2 :	14·97 gm.
R 2 :	22·03 gm.
W 1 :	15·45 gm.

On 1st June 1928 the plots R 1 and W2 were used for a two-cut tapping, while R 2 and W 1 were used as control and tapped as before with one cut. At the beginning of the experiment the lower cut on the trees of the plots R 1 and W 2 was situated at a height of 30 to 50 cm. above the soil; the upper cut was applied at a distance of 1·5 m. above the lower cut.

A comparison of the yield obtained on the four plots, before and after the two-cut system was applied in plot R 1 and W 2, is given in the following table :

Table VII

	Yield per tapping in grams of dry rubber					
	Control plots			Experimental plots		
	W 1	R 2	Average	R 1	W 2	Average
Preliminary tapping (one cut in the four plots) ...	15·45	22·03	18·74	13·1	14·97	14·035
Experimental tapping (one cut in the control plots and two cuts in the experimental plots) ...	16·13	24·28	20·20	23·70	26·13	24·9
Yield of the experimental tapping expressed in percentages of the yield of the preliminary tapping	104%	110%	108%	181%	174%	177%

The surplus of yield of the experimental tapping above the preliminary tapping is therefore 69% higher in the experimental plots than in the control plots.

While in the experiment described by Vrolyk the upper cut was located in the same sector as the lower cut, Heusser and Holder applied on budded trees a system in which the two cuts are placed on two adjacent tapping areas, each of which occupies one quarter of the circumference, the vertical distance of the two cuts is 1 m. The left hand cut (panel 2) was started at two metres, the right hand cut (panel 1) at 1 metre above the union of stock and scion (quite near the surface of the soil). When (panel 1) will be tapped up to the union of stock and scion (near the soil), the panel 3 will be opened at a height of two metres, and when panel 2 will be finished, panel 4 will be opened at a height of two metres.

With this system with alternate monthly tapping and with a bark consumption of 45 mm. ($1\frac{1}{2}$) per month (27 cm. per year) a bark renewal period of $14\frac{1}{2}$ years is provided for.

This new system was applied to 300 five-year-old budgrafts, 100 of each of the clones 51, 80 and 65. For control budgrafts and seedlings were tapped with one cut over $\frac{1}{3}$.

Putting the yield of the seedlings at 100 the following figures were obtained of the yield of the budgrafts:

Table VIII

			Old system ($\frac{1}{3}$ cut)	New system ($\frac{1}{4}$ double cut)
Clone 51	...	...	142	192
Clone 80	...	...	170	206
Clone 65	...	...	183	277

If we put the yield of the budgrafts tapped at $\frac{1}{3}$ at 100, the following figures are obtained:

Table IX

		Old system ($\frac{1}{3}$ cut)	New system ($\frac{1}{4}$ double cut)	Upper cut	Lower cut
			Total		
Clone 51	...	100	135	65	70
Clone 80	...	100	121	58	63
Clone 65	...	100	151	71	81

From these figures it is apparent, that the new tapping system has given very promising results. Clone 65—an average clone—produced with this system 870 kg. per hectare of 200 trees, a yield which has never been obtained with the ordinary tapping system of any clone in its sixth year.

Another new tapping system was described by J. Bosch. It consists in dividing the cut into two (or more) cuts, separated from each other by a small piece of bark. The length of each cut being shorter the system allows a less steep slope of the cut, which results in more latex per cm. The inventor claims that in tapping with this system, in which a narrow stripe of bark is left untapped between the two or more parts of tapped bark, the sap-flow of the tree is furthered, and he assumes that this will have a beneficial effect on the bark renewal. This system has apparently not yet been tested.

It has been suggested, that bast, treated for brown bast disease by the scraping method as advised in *Rubber Research Scheme Bull.* No. 48, would be after renewal more readily affected by this disease.

Mitchell is of opinion that this is not the case and gives a photograph of a tree which has been tapped for over two years on the third day system and is now continuing to give satisfactory yields, without any indication of brown bast development.

In this connection it may be remembered, that in Java and Sumatra the treatment of brown bast by removing the diseased part of the bark is no longer done, since it has been proved that the diseased tree recovers well, if only the cut is made shorter. After the tree has been tapped with a cut of $\frac{1}{4}$ to $\frac{1}{8}$ either every-other-day or with a periodical tapping system (for instance every-other-month) the tree recovers within a short time.

The question as to what period of tapping is the most profitable was the subject of an elaborate study of Schweizer. It was Hoedt, who pointed out a few years ago (*Archief voor de Rubbercultuur in Nederlandsch-Indie*, Vol. 10 (1926) P. 566), that in using systems of periodical tapping the yearly yield is different with different periods used; it may make a great difference whether the tree is tapped every other week or every other month.

This is the consequence of the so-called "wound response" *i.e.*, the fact, that after a period of rest a tree does not give immediately its highest yield, but only reaches its maximum daily yield after a certain number of tappings. After having reached this maximum we see a decrease set in. It is obvious that it is not economical to choose the tapping period so short that tapping is stopped before the maximum yield is obtained, nor continuing tapping so long, that the decrease in production has passed a certain limit. It is thus the course of the increase-decrease of yield which determines what length of tapping period is the most economical.

Schweizer shows, that the increase-decrease curve depends on the intensity with which the tree recovers its production. In fields with a high yield the trees reach a higher maximum after rest and take a longer time to reach this maximum; in fields with a lower latex-production the trees—speaking generally—reach a maximum which is lower and which is obtained in a shorter time (after a smaller number of daily tappings). As a general rule it may be said that under conditions which allow a high yield the increase in production lasts longer, and a higher maximum is obtained, than under conditions which do not allow of such a high yield.

It is well known that the yield of the trees, when tapped every day, or every other day, is not the same in different months: some three months after wintering—*i.e.*, generally in the month of October in Java—the tree gives the highest yield, then a decrease of yield takes place till about January, again an increase takes place and a second top of the yield-curve is reached in June; in July the yield decreases again and in August the yield is at its lowest. Accordingly, when the tree is tapped every other month, the increase-decrease curves are different in the different months: in the months of high yield the top of the increase-decrease curve is attained after a longer time than in the month of lower yield. This may be illustrated with the following figures:

A field, which gave its highest yield in October, followed by a decrease till February, followed by an increase till June, followed by a decrease till August, followed by an increase till October, was tapped every other month. The number of days the trees were tapped till the maximum production was reached was as follows:

	April	June	August	October	December
Maximum yield reached after:	13	16	9	21	10 days

In this case—which was published by Hoedt—it was not economical to tap every other month, because the last part of the month (sometimes, August, even the last 22 days) the yield decreased again, and it would have been better to stop tapping at an earlier date, *i.e.*, to make the tapping periods shorter. An experiment with tapping every other fortnight confirmed this supposition; indeed 19% more rubber was obtained than with the every-other-month tapping system.

The general rule is therefore: in fields with a low production a higher yield is obtained when short tapping-periods are used, in fields with a large yield a higher yield is obtained with longer tapping-periods. In theory the ideal would be to fix the most profitable length of period for each field, but this is practically impossible. We may be satisfied when each planter determines what is the most profitable average period for his fields; in some cases it will be advantageous to make a difference for two parts of the estate, if there is a marked difference in yield between one part and the rest of the plantation.