

## Effect of Tapping Rest at Different Seasons

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*In the lower Ivory Coast, where the seasons follow one another with regularity, the tapping of rubber trees is made in full-spiral, twice a week, with a two-month rest period around February/March during wintering.*

*In a polyclonal area, trials are under way to study the effect on yield and growth of such a 'rest period' being enforced at different times of the year: at the same time, the clonal phenology is also being examined.*

*For the first two climatic cycles, the results are comparable for any one clone, but differ from one clone to another. The effect of wintering and refoliation are evident on clone PR 107 for which the most favourable tapping rest period corresponds to a later wintering. LCB 1320 gives significant increase in yield on resumption of tapping, in comparison with the control clone tapped throughout the year — when the rest period and the resumption of tapping take place during the time of increasing yield. This 'springboard' effect on yield curves conceals the influence of wintering. The treatment giving the best yield has often led to the least growth. However, some treatments ensuring the best growth have also given a good yield.*

In Viet-Nam and Cambodia, the practice of continuous twice-weekly tapping followed by an annual rest period at the time of wintering arises from practical and social considerations (e.g., decrease in yield during refoliation, religious festivals of the Buddhist New Year, etc.). In view of the climatic conditions on the Ivory Coast resembling, to some extent, those of Viet-Nam and Cambodia, this system is also in vogue on the lower Ivory Coast, where the first *Hevea* plantations were opened in 1961.

The climate in fact exercises a direct influence [on yield] by determining the water balance of the tree on the day of tapping. It is possible to predict the output from a tapping by taking into account the wind speed and the saturation deficit of the air, both of which affect the transpiration of the tree, during the two days before tapping (NINANE, 1967).

It [also] exercises an indirect effect, as has already been demonstrated for other rubber-producing regions (BOUYCHOU, 1962) by influencing the annual physiological cycle of the tree. When the change of season is well defined, all the trees in the same population are at the

same physiological stage at a given instant. Certain phases of the vegetative cycle must be considered as critical periods insofar as the production is concerned.

It is also relevant to take into account the influence of the rainy season on tapping and collection. On certain plantations, repeated collection difficulties can curtail production for a whole month.

In I.R.C.A. experiments (Nos. 34 and 48) to which references are made here, physiological production (the capacity of the tree to yield latex, as distinct from the industrial yield which is the amount actually collected) is being considered in relation to the incidence of morning rain.

### *Seasonal Variations in Industrial Output*

In Table 1 and Figure 1, data on rainfall are presented together with the monthly yields recorded on I.R.C.A. Station at Anguededou.

A fall in yield occurs during the two dry seasons in December – February and August – September, giving rise to two peaks in July

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TABLE 1. MONTHLY RAINFALL AND PRODUCTION

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Average rainfall* (mm)	59.4	52.9	117.2	148.2	251.8	583.6	346.8	49.0	83.4	155.2	140.0	95.5	2083.0
Average production† (g/tree/tapping)	29.3	23.6	16.0	29.0	33.7	37.5	40.9	37.2	35.0	35.1	44.0	35.2	396.7
% of annual production	7.4	5.9	4.1	7.3	8.5	9.5	10.3	9.4	8.8	8.8	11.1	8.9	100

\* Over 10 years (1957–1966 inclusive)

† Production: 5 clones for two years (July 1965–June 1967)

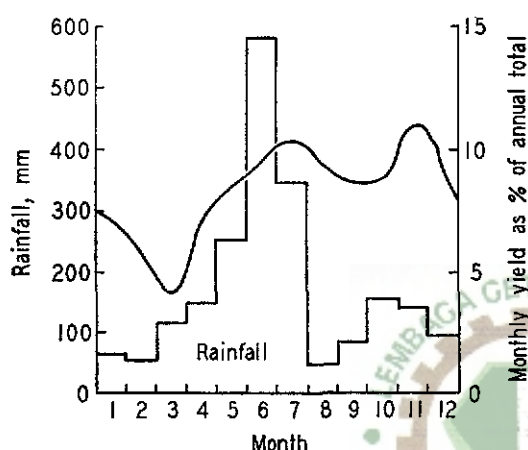


Figure 1. Monthly rainfall and yield.

and November. Although the greatest yield does not coincide with the heaviest rainfall, the relationship is clear and dominant.

Another aspect worthy of mention concerns the [actual] monthly yield, which fluctuates to the extent of about 1 : 3. This fact acquires special importance at times when the price of rubber is low and attempts are being made to reduce the costs of tapping and collection, which represent approximately 50% of the production cost, by increasing the output per tapper. When the market price for the amount collected by a tapper each day falls to less than twice his wages it becomes logical to cease exploitation altogether temporarily.

The daily collection per tapper calculated from the data in Table 1 is as in Table 2.

#### *Influence of Wintering on Yield*

The fall in yield in March coincides with the end of the main dry season and the period of

TABLE 2. WEIGHT OF RUBBER (KG) COLLECTED PER TAPPER AND PER DAY

Task (No. of trees)	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
350	10.3	8.3	5.6	10.2	11.8	13.1	14.3	13.0	12.3	12.3	15.4	12.3
450	13.2	10.6	7.2	13.1	15.2	16.9	18.4	16.7	15.8	15.8	19.8	15.8

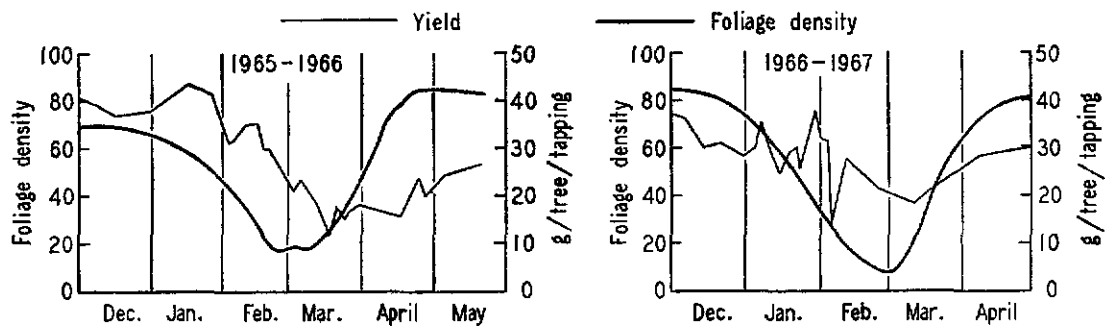


Figure 2. Variations in yield of clone PR 107 during wintering.

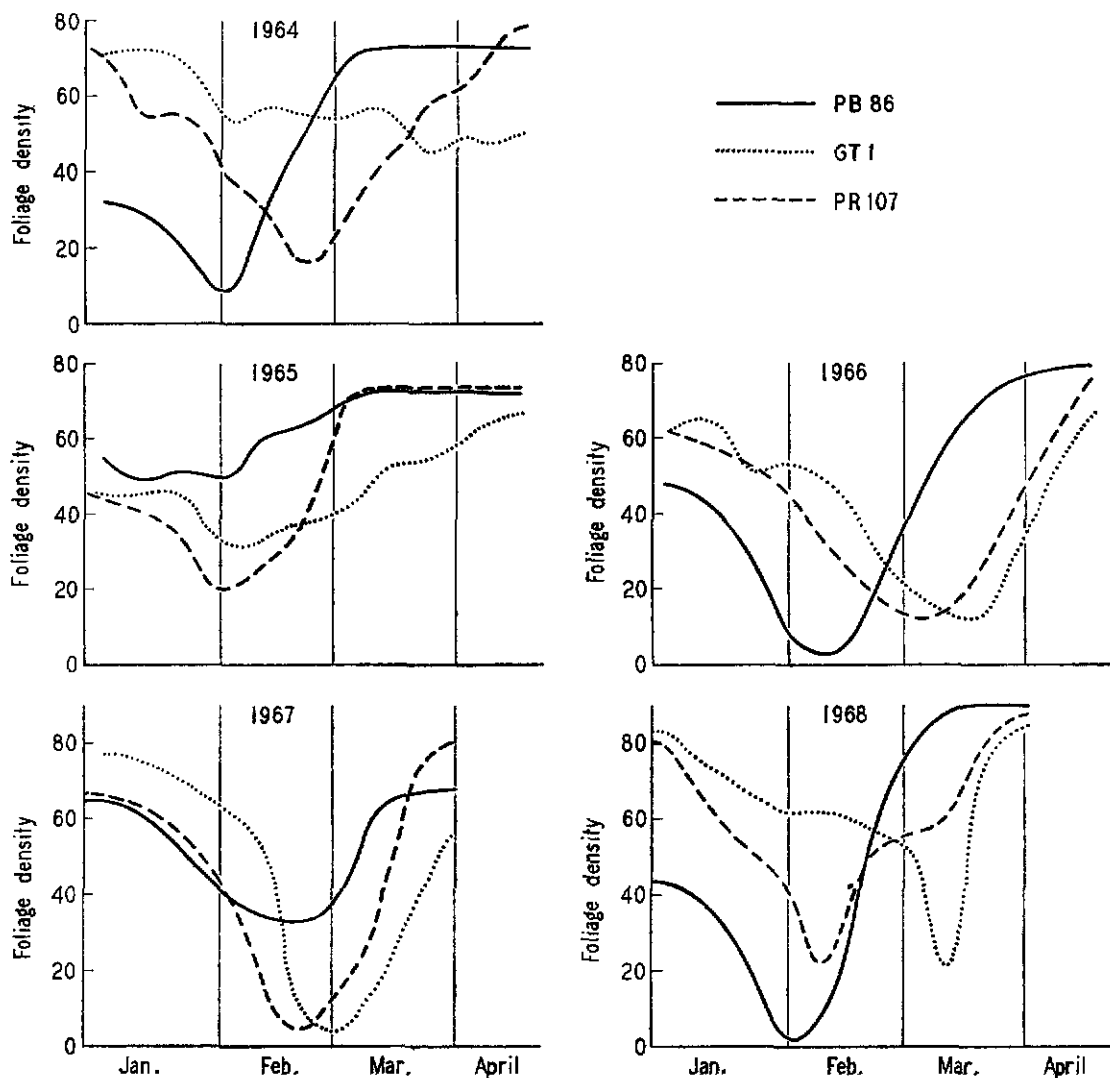


Figure 3. Wintering of clones PB 86, GT 1 and PR 107 from 1964 to 1968 (inclusive).

defoliation and refoliation of the rubber trees. This is apparent from *Figure 2*, which shows the curves for yield and foliage density, on the Chantler scale, measured for clone PR 107 through two consecutive wintering periods. There is a certain time lag between the two curves. The type of wintering, whether rapid and intense or persisting for a more or less extended period, and the time at which it appears, are characteristics which can vary from one clone to another. Defoliation of PR107 thus occurs approximately twenty-five days later than that of clone PB 86 (*Figure 3*).

*Influence of Timing of Tapping Rest on Yield on Resumption of Tapping*

If they correspond to a time of the year when the yield is increasing, the timing of the rest and above all of the resumption of tapping can have a beneficial effect on the yield of some clones. However, when the rest periods are enforced at the time of diminishing yield, there is no observable difference by comparison with trees which have been tapped without interruption. A similar investigation has already been made in Malaysia (RUBBER RESEARCH INSTITUTE OF MALAYA, 1962); but, so far as the author is aware, it has not been carried out on an experimental scale.

This 'springboard' effect is readily apparent in *Figure 4* containing curves for the yield from uninterrupted tapping together with that corresponding to different resting periods.

This explains the results sometimes obtained in certain regions where the climate shows little seasonal variation, or for certain clones which are able to withstand drought conditions better, and by virtue of this, show a less pronounced fall in yield during wintering when imposition of a tapping pause outside the wintering period leads to an improvement in yield.

In an analogous fashion, it appears logical to apply stimulation only at times known to be favourable, with respect to climate as much as to the physiological state of the tree.

The results from these field experiments, which have been under way since 1965, are in accordance with recent results obtained *in vivo*

in Cambodia, where it has been shown that the extent to which latex metabolism is promoted [as a consequence of tapping] is primarily dependent on seasonal factors; from this point of view, the period August–September appeared least favourable, whereas at the end of the year, the trees exhibited an enhanced capacity for latex regeneration (CHAI KIM CHUN *et al.*, 1968). Seasonal variations in the composition of latex with respect to organic compounds and inorganic constituents have already been investigated (D'AUZAC, 1965).

*Experiment Results Relating to Effect of Tapping Rest, Imposed at Different Times of the Year, on Yield and Growth*

Experiment No. 34, initiated in April 1965, included seven treatments:

1. Tapping rest in April – May
2.     "     "     "     June – July
3.     "     "     "     August – September
4.     "     "     "     October – November
5.     "     "     "     December – January
6.     "     "     "     February – March
7. No tapping rest

All the trees are tapped on full-spiral, d/3–d/4, and the Experiment includes clones Tjir 1, LCB 1320, PR 107, OY 1 and Djas 1.

Experiment No. 48, started in April 1967 on a recent extension planted with PB 86, was reduced to Treatments 1, 3, 4, 5, and 7.

Summarised results for the yields from four clones are outlined in *Table 3*.

The fact that in Experiment 34, the best treatment in terms of yield over three consecutive years is the same for Tjir 1 and PR 107, confers a certain degree of certainty on these results.

The best yield is given by clone Tjir 1 rested in February – March.

Clone PR 107, as has already been indicated in connection with wintering, is better adapted to a later tapping pause in April – May. The

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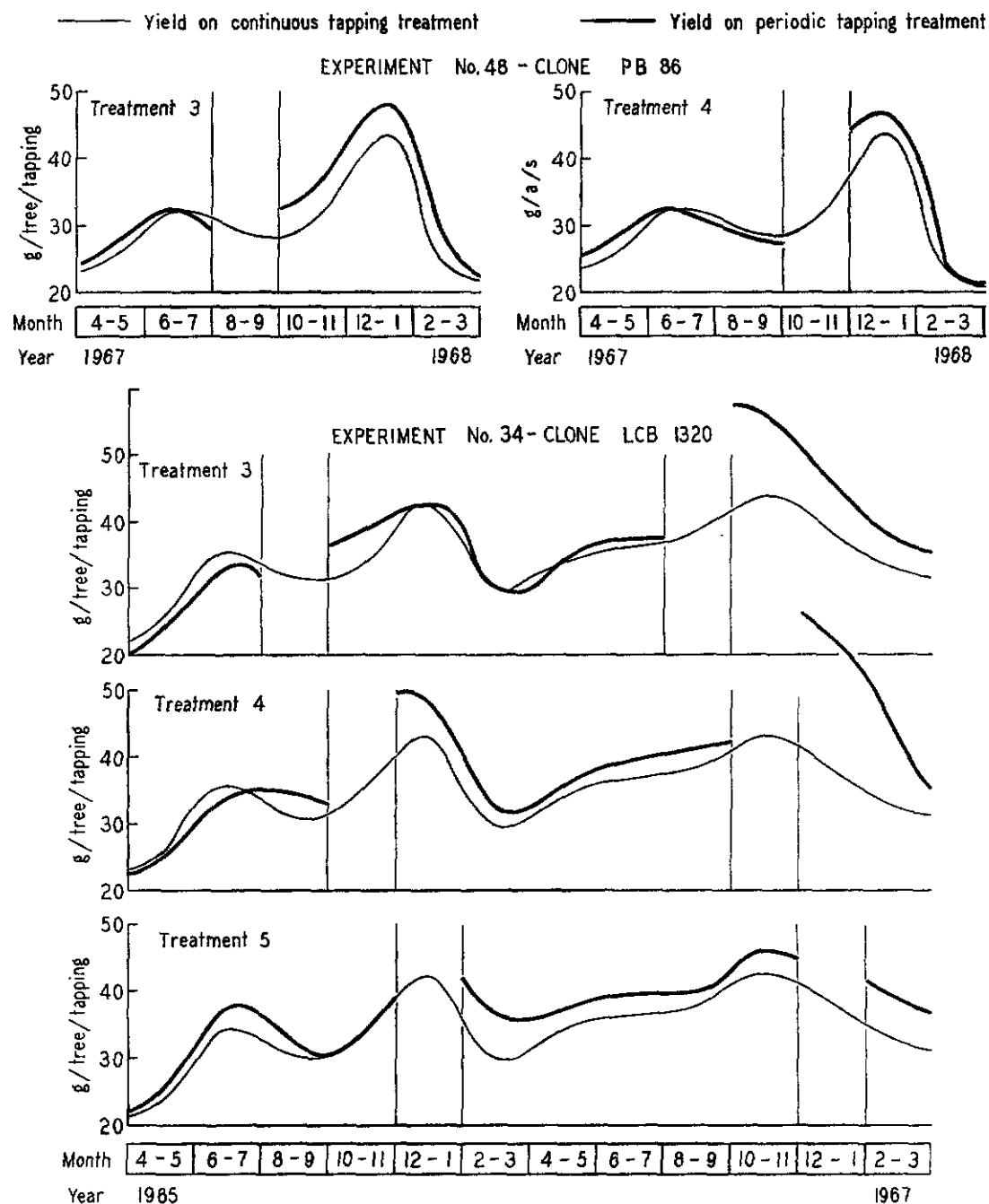


Figure 4. Comparison of yield curves for continuous and periodic tapping — 'springboard' effect.

TABLE 3. AVERAGE PRODUCTION FROM FOUR CLONES ACCORDING TO TREATMENT (G/TREE/TAPPING)

Clone	Season	Treatments and months of tapping rest							Expt. No.
		1	2	3	4	5	6	7	
		Apr. -May	June -July	Aug. -Sept.	Oct. -Nov.	Dec. -Jan.	Feb. -Mar.	No rest	
Tjir 1	1965 - 66	34.6	33.2	33.1	30.5	31.5	35.3	33.2	34
	1966 - 67	43.6	48.7	47.0	42.5	47.8	50.6	44.2	
	1967 - 68	47.6	52.2	46.6	56.8	50.0	56.9	46.2	
LCB 1320	1965 - 66	32.8	31.8	33.7	34.4	32.4	33.8	33.1	
	1966 - 67	41.8	42.5	41.9	43.3	41.0	38.9	37.3	
	1967 - 68	47.7	45.9	41.6	41.5	41.4	42.2	40.1	
PR 107	1965 - 66	27.7	19.1	27.2	21.7	24.4	22.5	24.5	
	1966 - 67	31.3	21.8	26.7	22.2	25.2	21.8	27.1	
	1967 - 68	31.1	24.8	28.1	25.4	29.6	23.8	28.5	
PB 86	1967 - 68	30.6	-	33.2	31.9	-	32.2	30.8	48

increased collection from this treatment, relative to Treatment 6 (rest in February - March, which corresponds to the practice in industry) amounts to 32% on the total output for the three seasons, or an annual average yield of 250 kg/hectare.

The 'springboard' effect seems to have a dominating influence on the yield of LCB 1320. Furthermore, this clone is insensitive to the generally exacting conditions of drought during January - March: its resistance to dryness is in the form of a prolonged but gradual defoliation, so that at no time is the tree entirely without leaves. In two instances out of three, the best yield is given by the rest in October - November: for the third season, which was particularly dry during the last quarter, the best yield resulted from the rest in April - May preceding the first yield peak in June - July.

In Experiment 48, clone PB 86, which also seemed to respond to the 'springboard' effect, gave a yield for Treatment 3 (rest in August - September) slightly better (3%) than that for Treatment 1 (rest in February - March). However, these results will need to be verified in the years to come.

The influence of the tapping rest on growth is all the more obvious when the trees are

still young and show marked annual increases in yield.

In general, none of the treatments promotes optimal growth and optimal yield at the same time.

In the case of Tjir 1, the best growth is achieved by the rest in June - July and the least satisfactory by the rest in February - March, whereas resting in August - September and October - November gives the best results for PR 107.

The growth of LCB 1320 is virtually constant, whatever the treatment.

How far the search for conditions for optimal growth during the first year will result also in obtaining optimal production in the future is not immediately clear. With respect to PR 107, however, it is worth noting that the rest in August - September corresponds not only to optimal growth but also to a good yield.

#### REFERENCES\*

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\*The complete results of the experiments outlined in this paper appear in the Annual Reports of I.R.C.A. for the years 1966 and 1967.

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## DISCUSSION

Chairman: Mr. S. E. Chua

(Paper presented by Dr. P. Compagnon)

Mr. B.K. Tong asked if tapping was continuous throughout the year on the Ivory Coast. Dr. Compagnon replied that the practice of two months' rest from tapping each year had been introduced in the Ivory Coast following the pattern in Cambodia and Viet-Nam, because such rest was considered beneficial to the growth of the trees. In Southeast Asia, various factors such as wintering made February and March the most convenient period for rest. However, these factors did not all obtain in the Ivory Coast and the purpose of the experiment was to determine the best period to impose the tapping rest.