HORTICULTURAL MANIPULATIONS TO MODIFY BRANCHING HABITS IN HEVEA

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Various workers have found evidence that trees which branch earliest increase their girth fastest (Wright 1908, Cramer 1911, Yoon 1973). Early growth in a tree is determined to a large extent by its leaf area. The objective of horticultural manipulations is to induce earlier branching if they do not do so naturally. This would lead to greater leaf area and hence, result in better girthing rate, and earlier maturity.

HORTICULTURAL METHODS

In the early 1900's trees have been topped in order to induce them to branch (Wright 1908, Cramer 1911). This method has been used in recent times (Vollema 1949, Garot and Subadi 1958). A modification of this method is thumbnail pruning in which the terminal shoot bud is pinched away with the thumb and fingers. Both these methods, though easy and cheap, resulted in heavy crowns with no leaders and many heavy branches with weak unions which tended to become broken by wind. Because of these disadvantages both methods are not recommended (Anon 1967). Cramer (1911) also reported that when the terminal leaves of the trunk shoots were removed, branches grew out from the leaf-axil buds. Similar result was obtained by Baalen (1948). However, work in RRIM (Yoon 1973) had shown that removal of the terminal leaves gave poor and discouraging results unless the trees were completely defoliated. Complete defoliation is not advisable as this would result in a severe shock to the tree. Mulder (1941) obtained success with the tip-capping method to induce branching. This method consisted simply of covering the top of the new flush with a brown paper cap coated with wax. It was removed after eight days and two weeks later a bunch of shoots was formed. A disadvantage of this method is that it has to be applied before the young leaves were far developed.

Recently, RRIM made a study on horticultural methods to induce branching (Yoon 1973). The methods included bending, notching, nicking, wire girdling, ring-barking, ring-cutting, defoliation and pollarding. Among the methods investigated, branch induction by ring-cutting using the double-blade ring-cut device was found to be the best. It gave good branch induction successes and minimum shock to the tree. This method of induction has been described in detail elsewhere (Anon 1974) and only brief description of it is given below.

The double-blade ring-cut device comprises of two V-cut mild steel blades sharpened at the same side of the blade and separated at a fixed distance of 20 cm by two separators made from aluminium or other good quality materials. In the cutting operation the V-cut steel blades are pushed gently towards the trunk of the tree, cutting only the bark and just reaching the wood. The device is then rotated around the trunk with even pressure applied throughout the whole operation to ensure a complete ringing of even depth. The method is suitable for brown or green brown tissues. On younger tissues, the apical buds would be adversely affected and may stay dormant for a much longer period so much so that the induced branches tend to overgrow the terminal shoots and would require corrective pruning later.

For younger tissues, RRIM have tested 'tip-capping', and folding of terminal leaves. The 'tip-capping' method was as described by Mulder (1941). Folding of terminal leaves involved enclosing the terminal shoot bud by folding the topmost flush of leaves over it and tying it with a string and releasing it after two weeks.

SOME RESPONSES TO HORTICULTURAL MANIPULATIONS

Branch Production

Results of the horticultural methods tested to induce branching have shown that ring-cutting with the two cuts spaced 20 cm apart was the most promising. It resulted in a

large number of trees branching and minimum shock to the tree as indicated by the shorter time to recover from yellowing (Figure 1). The method can be applied either within a flush of leaves or between flushes of leaves. In a trial application within a flush of leaves gave higher branching success of 97% compared with 92% when application was done between flushes of leaves (Table 1). The number of branches per tree increased from 5.7 for application between flushes of leaves to 6.8 for application within a flush of leaves.

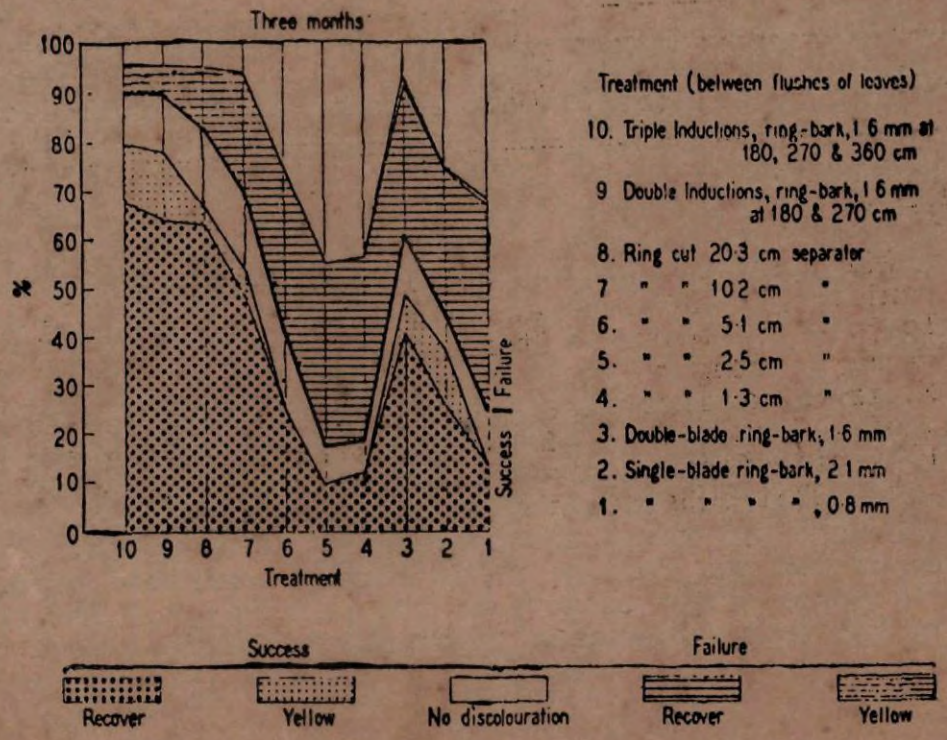

Figure 1. Effect of branch induction treatments on success/failure, yellowing and subsequent recovery

Table 1

Effect of site of application on success and number of trunk shoots (Clone RRIM 600)

Treatment	Success after two months (%)	Mean No. of Trunk Shoots per Tree		
		Below lower ring cut	Within ring cuts	Total
Within flush	96.8	4.1	1.6	5.7
Between flushes	92.3	5.7	1.1	6.8

In a trial with younger materials, comparisons between tip-capping and folding of terminal leaves showed that the latter method was more effective in inducing branching but the number of branches per tree was lower (Table 2).

Table 2

Effect of tip-capping and folding on percentage of trees with branches and the mean number of branches per tree (Clone RRIM 600)

Treatment	Percentage (observed one month after application)	Mean Number
Tip-capping	41	7.8
Folding	79	4.4

Girth

Girth results of one trial where induction was applied on 14 months old budded stump of RRIM 600 are summarised in Table 3. At 6 months after induction the gain was negligible. Generally during this period the tree is recovering from the shock from the induction operation. At 9 months there was a gain of 0.8 cm. The gain was further enhanced with time. At 1½ years after induction, the gain was 1.7 cm and it is expected that subsequent gains may continue.

Table 3

Effect of branch induction on girth (cm)

Treatment	Months after Branch Induction 0	6	9	12	18
Control	9.4	13.9	16.1	18.1	21.3
Branch Induction	9.1	13.7	16.6	19.1	22.7
Nett gain		+ 0.1	+ 0.8	+ 1.3	+ 1.7

Height

The height was also affected with modification to the branching habit of the tree. Trees which were branch-induced increase in height less than the non-branch-induced trees. A height increase of 2.1 metres in the branch induced trees and 2.9 metres in the non-branch-induced trees resulted in the branch induced trees being shorter than the control trees (Table 4).

Table 4

Effect of branch induction of height (M)

Treatment	Months after Branch Induction 0	12
Control	4.5	7.4
Branch Induction	4.5	6.6
Nett reduction		-0.8

CONCLUSION

By horticultural manipulation the branching habit of a tree can be modified. Several methods to induce a tree to branch are available. Of these methods, it has been found that the ring-cutting method using a double-blade ring-cut device with a 20 cm separator is the best as it is quick and easy and gives consistently good results with minimal shock to the tree. For younger materials, the method of the folding of the terminal leaves appears promising. Benefits obtained from branch induction are better girthing rates and shorter trees.

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