

THE IMPORTANCE OF THE TIMING OF PRUNING IN RELATION TO RECOVERY

U. Pethiyagoda

Unsatisfactory recovery and excessive die-back from pruning appear to have become more prevalent in recent years. Several such cases have been examined and the symptom pattern has been found to be of two types. An attempt has been made to assemble together the features which appear to be common to fields that have suffered particularly badly. Considering such features, a hypothesis is postulated which it is felt, accounts for most of the observations. The timing of the two fertilizer applications which straddle pruning is likely to be of critical importance. Too close proximity to pruning, particularly when associated with dry weather conditions, would predispose the bushes to die-back and slow recovery. Until the fullest proof of factors causing this condition is forthcoming, it is suggested that the gap between the last pre-pruning and the first post-pruning applications of fertilizer be extended as much as practicable and that pruning in dry weather be avoided.

During the last two years the attention of the Institute has been drawn to several cases of excessive die-back and non-recovery from pruning. The problem appears to be distinct from that of low carbohydrate reserves which led to many such cases in the low-country in the past, and which resulted in the introduction of the practice of rim-lung pruning. In contrast, the present problem seems to be also prevalent on estates at higher elevations and has been encountered in such widely separated localities as the Badulla, Dimbula, Kandy, Lunugala, Maskeliya, Nilambe and Pussellawa Districts. Many more were perhaps not reported. Although the causes underlying the problem are not as yet fully understood, it is of sufficient importance and urgency to justify this preliminary note to enable Superintendents to adapt their field operations to minimize the risk of trouble.

Unsatisfactory recovery seems to occur in association with two distinct symptom patterns. Firstly, there is the situation where the pruned frames apparently fail to sprout buds. Instances have been noted where pruned frames have remained alive and fresh in such a quiescent form for as long as six months after pruning. Secondly, in some instances apparently normal, but often somewhat retarded buds appear on the frames. Rather early in their growth they show symptoms of scorch—the shoot tips and young leaves show brown discolouration and progressive death. The familiar appearance of 'rim-blight' (or marginal scorch) in the young shoots of bushes just recovering from pruning is probably a milder manifestation of the same symptoms.

The failure of buds to grow normally results ultimately in the death of the frame—beginning at the pruning cuts or in weak regions of the frames where wood-rot has earlier set in. Incidentally, it might be stressed that die-back is not the cause of non-recovery; the situation is, in fact, the other way about—failure to recover results in die-back.

The following features appear to be common to several cases examined:

- 1 - The distribution of dead bushes and those with much die-back, appears commonly to be in irregular patches. Although groups of affected bushes do sometimes occur, they bear no evident relationship to topography or proximity to shade trees, drains, rocks or paths.

- 2 - The problem is often most severe on the better fields—that is, those that have shown yield improvements in the recent past. It therefore occurs on fields that receive generous applications of fertilizer and on bushes of generally better jat.
- 3 - Dry periods following pruning are almost invariably associated with the problem.
- 4 - The retention of 'lungs' at pruning does not seem to help recovery in the present situation.
- 5 - Die-back often occurs on apparently strong, healthy, new wood. Affected bushes sometimes succeed in putting out a few new shoots from near the base of the trunk. There can, therefore, be serious losses of potentially valuable parts of the frame—even when apparently reasonable recovery has occurred.
- 6 - It was remarked on more than one occasion by Superintendents on affected estates, that harder pruning seemed to reduce the extent of die-back.
- 7 - Some affected areas showed evidence of heavy Shot-hole Borer infestation. Although there is no regular association between unsatisfactory recovery and the occurrence of the pest, such attacks may aggravate the problem.
- 8 - A few examinations have failed to reveal a consistent relationship between starch reserves in roots and the nature of recovery from pruning. There also appeared to be no evidence that shallow or limited root systems were responsible.

Possible causes underlying the problem

Two features immediately strike one as being important. Firstly, the better and more generously fertilized fields appear to be those most affected. Secondly, dry weather for prolonged periods close to pruning is commonly associated with the problem.

A well-known instance of elaborated organic compounds limiting recovery from pruning and increasing die-back, was the demonstration of the importance of carbohydrate reserves in supporting recovery from pruning in the low-country. In the present instance, the evidence does not suggest that low carbohydrate reserves are responsible. For instance, the retention of lungs which is known to increase levels of carbohydrate reserves does not seem to eliminate the condition.

The association with prolonged dry weather following pruning is probably highly significant. Apart from the possibilities of sun-scorch on frames and its consequences, adequate supplies of water are of primary importance in providing for the enhanced growth which follows pruning. Although pruning itself conserves water by reducing losses by transpiration from the leaves, the increased exposure of soil will tend to counterbalance this advantage. At any rate, a shortage of water will certainly retard recovery. Once again, the first symptom picture described above could result as much from a deficiency of water as from any other. It is important to appreciate that a bush beginning to recover is particularly vulnerable for several weeks. Rainfall, adequate to stimulate the commencement of recovery but insufficient to sustain the needs of continued growth, will result in the wilting and death of the tender buds that have begun to grow.

The second type of symptom complex is probably associated with both fertilizer practice and inadequate rainfall. The high yielding fields which are most often the sufferers are also those which receive higher levels of fertilizer. Since the number of applications possible is limited by practical considerations, it follows that individual doses of fertilizer may be relatively large for such fields. Coupled with unsatisfactory weather following pruning, a situation which might adequately explain the symptom picture could develop.

Consider for instance a hypothetical case of a field yielding 2000 lb made tea per acre and receiving 200 lb N in a NPK mixture (say T 700) per annum; the fertilizer being applied in three equal doses every year. Each dose will therefore comprise nearly 450 lb of mixture per acre. The last application of fertilizer may become due in November and the field is pruned in January. In areas not receiving rain from a North-East Monsoon, the first quarter of the year may be relatively dry. The first good showers may come in March/April—as also the first application of fertilizer in the new cycle!

Now, it is a fair assumption to make that not much of the last pre-pruning application of fertilizer could be made use of by the bushes before they are pruned. They are probably declining in efficiency towards the end of the cycle and whatever they absorb from the soil may in large part be returned to the soil in the pruning leaf. The absence of rain may retard recovery, with just a few buds succeeding in breaking through with the limited moisture that becomes available. Too often the Superintendent, eager to remove any possible factors limiting recovery, meticulously applies the next dose of fertilizer due—perhaps advancing the application a little, just to make sure. Little use has perhaps been made of the $2 \times 450 = 900$ lb per acre of fertilizer mixture placed on the soil in these two applications. When the first showers arrive to break the dry spell, they dissolve and make suddenly available, this enormous amount of mineral salts in the root zone. To aggravate matters further it is known that drying of exposed soil prior to its wetting increases its capacity to rapidly release the nutrients it contains. At this stage the retarded shoots are still small, sappy and tender. When the nutrients absorbed by the roots are passed up into these, the familiar symptoms of scorch and death of shoots results. Indeed, it may even be that delicate feeder roots are themselves damaged by the sudden contact with a strong solution of salts.

Poorer fields receive less fertilizer and therefore are less likely to suffer on the above hypothesis.

Possible preventive measures

It is evident that two measures should be adopted to safeguard bushes from excessive die-back or non-recovery from pruning:

- 1 – pruning into dry weather should be avoided as far as possible.
- 2 – adjustments should be made to the immediate pre- and post-pruning applications of fertilizer.

Dry weather pruning

In discussions with Superintendents it appears that there are two reasons for pruning into dry weather:

- 1 – to guard against severe attacks of Blister Blight which are often encountered by pruning into wet weather, and

- 2 – for administrative and economic reasons such as the maximum employment of labour in tasks like pruning at a time when other field works make minimum demands, and also to even out crop intake in subsequent rush periods, to ensure maximum productivity of fields in the flavoury season *etc.*

Valid as these reasons may be, it is clear that they must take second place in view of the over-riding necessity to give the best chance for satisfactory recovery from pruning. It would seem that control of Blister Blight in the tipping fields should not be an insurmountable problem. Some planning should indicate means of minimizing the administrative inconveniences that may result from altering the practices of pruning, in or into dry seasons. For instance, rush crops exceeding factory capacity may be coped with by extending plucking rounds, resting successive fields for short periods of time *etc.*

In any event, it is imperative that Superintendents on estates which have faced this trouble in recent years and those whose cultural practices (high rates of application of fertilizer, pruning in the drier season) make it possible that unsatisfactory recovery might result, should experimentally prune small areas in anticipation of wet weather and visually assess the degree of recovery. They will then have a standard of potential recovery for the field if they are forced by circumstances to prune at a less satisfactory time of year. They will also then gather information at first hand and directly applicable to their own properties of problems that may arise, if a decision to alter the customary time of pruning is made at some time in the future.

Adjustments in fertilizer application

It is certain that the levels and frequency of application of fertilizer would have been decided after careful consideration of several relevant factors. It is not the intention here to discuss these aspects but merely to point to the timing of fertilizer applications as a possible cause of the second type of symptoms herein described.

As has been earlier mentioned, the most productive and hence the most heavily fertilized fields are commonly affected by the problem of unsatisfactory recovery from pruning. It is now considered unlikely that such heavy cropping has led to deficiencies of reserves with consequent poor recovery. Rather, the pattern has been more suggestive of excessive uptake of mineral salts—a factor which has been dealt with in some detail in the foregoing. It might be mentioned that chemical analysis of young dying shoots in one of the first cases where the present problem occurred, revealed a content of nitrogen which was the highest ever recorded for tea flush by the Institute.

While maintaining the total application of fertilizer due for a cycle, it seems worth considering adjustments in the pattern of allocation to avoid the injurious effects of too much fertilizer being made available to bushes too early in the cycle. One of two approaches and perhaps a combination of both may be advisable. Firstly, a reduction (or omission) may be considered of the quantity applied as the immediate pre-pruning and immediate post-pruning doses. Secondly, the time intervals between those two applications and the pruning may be extended. Or of course, both measures could be adopted simultaneously.

Again considering a hypothetical case and ten months immediately preceding and ten months immediately following the pruning, adjustments may be made as indicated diagrammatically in Figure 1. **It is, of course, to be appreciated that the figures for fertilizer nitrogen doses (within circles) and time intervals are arbitrarily selected merely to indicate the principles. Actual figures will alter with individual cases.**

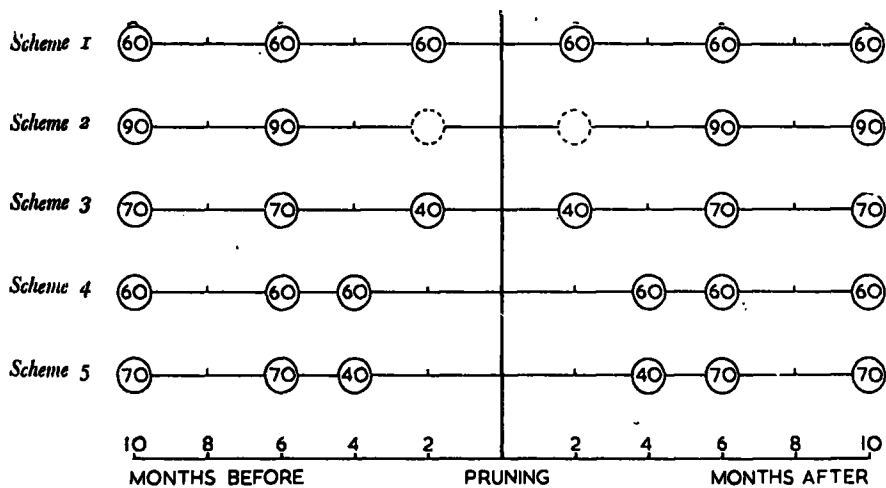


FIGURE 1—Hypothetical schemes for the application of fertilizer before and after pruning

Scheme 1—Present practice

Scheme 2—Omission of immediate pre and post-pruning applications

Scheme 3—Reduction of immediate pre and post-pruning applications

Scheme 4—Adjustment of time of application

Scheme 5—Adjustment of both time and dose

While the above diagram illustrates the manner in which any omission or reduction of fertilizer may be compensated for in the two applications immediately preceding and following such adjustment, it will be more satisfactory if the shortfall could be distributed in smaller amounts over a greater number of applications.

The amendments to the fertilizer programme that have been suggested have several effects.

- (a) They do not alter the totality of fertilizer applied in the cycle.
- (b) The immediate pre-pruning dose which can be expected to not result in a great return of crop is omitted, reduced or advanced to perhaps give a greater economic return for nutrients applied.
- (c) Similarly the omission, reduction or postponement of the immediate post-pruning application reduces the risk of damage from excess. Further, the bigger doses of fertilizer will now be given at a time when the bushes being in better foliage can be expected to make more profitable use of the nutrients applied.

The magnitude and timing of pre- and post-pruning application of fertilizer is a wide and important subject. *The present suggestions are of an interim nature and are put forward in the hope that their adoption may result in an alleviation of the immediate problem of unsatisfactory recovery from pruning.*

Summary and conclusions

In recent years there has appeared to be an increase in the incidence of increased deaths or die-back from pruning on several up-country estates.

Examination of the symptom pattern and other factors commonly associated with the problem are suggestive of lack of water and the timing of the fertilizer applications straddling pruning as being concerned.

As immediate measures for the probable reduction of the problem, it is suggested that pruning into prolonged dry weather be avoided as far as possible and amendments be made to the quantity and timings of the fertilizer applications on either side of the pruning operation.

Since the timing of pruning is determined by various administrative and other non-agricultural factors, it may be necessary to adapt some of these to fall in line with the over-riding need to minimize risks of post-pruning damage.