FIELD OBSERVATIONS ON THE PEST IN THE LOW-COUNTRY

T. E. Walter

Note.—*Mr. Walter left the service of the Institute on August 16th 1956, and his paper was read by Mr. Webster.*

It is unfortunate that Mr. Walter, having left Ceylon, is unable to be present today, and he expresses his regrets, but it is particularly unfortunate as he will be unable to elaborate certain of the personal opinions based on his observations. However, I shall do my best to stand in for him and wish to make it plain, at the outset, that these views and suggestions are intended to stimulate discussion, and are purely subjective, being based on observed secondary effects of infestation.

Mr. Walter first put forward the case for a pruning cycle of approximately 18 months at the Tea Research Institute Conference last year, and was somewhat disappointed that his proposals were received with considerable reserve, not to say scepticism. However, a certain amount of experimental evidence is now available to support the original contention, namely, that a cycle of 18 months, plus or minus a month or two, is a feasible method of limiting loss of crop due to shot-hole borer. I will now continue in Mr. Walter's own words.

"It is, of course, of the utmost importance to realise that these remarks refer specifically to the low-country; I have not been able to define the range of elevation with any precision, but an 'informed guess' places this range as being up to at least 2,000 feet. The main criterion appears to be whether die-back—usually accompanied by sun-scorch—occurs, and low-country planters are all too familiar with these symptoms. In my opinion, the fact that these symptoms do not occur in, say, Uva largely explains why entirely different cultural methods of control have been found to be applicable there, as a result of the experiments carried out over many years by Gadd and Austin.

Before going any further it would be as well to give some rather more detailed observations on the effects of shot-hole borer in the low-country, with particular reference to the age of the tea from pruning. These effects appear to be at their maximum in the dry weather months of the second year of the cycle; the exact number of months from pruning does not appear to be significant in itself, and as there is a pruning period extending over 9 months in those parts of the low-country which receive both monsoons, the actual age from pruning at which shot-hole borer effects are at their maximum may vary between 14-23 months. In practice, fields pruned in May-July can expect to suffer set-back from shot-hole borer at 18-20 months onwards, at which stage the tea is particularly vulnerable, probably because the new wood developed has reached the most attractive stage for the beetle. On the other hand, fields pruned in September-November may expect a less severe attack at a correspondingly earlier stage in the cycle. It can also be stated without much fear of contradiction that the tea appears to be at its most susceptible stage during the second year of the first and second cycles in bearing.

Apart from these rather general observations, I have not been able to find any definite pattern of incidence which might account for the very wide variations of incidence on neighbouring estates, and even different fields on the same estate.

Following these observations—which are intended only to give a broad outline of the problem—I now come to the question of variations in cycle lengths as a means of limiting the effects of the borer (and hence of limiting loss of crop). Dealing first with the experimental data as supplied by the Ingiriya pruning cycle experiment, the information which this gives can best be visualised by referring to the graph showing the yields of the various cycle lengths to date. (Figure 1).

The salient features of this composite graph are as follows:—

(i) The yield graph of the 18 month cycle plots rises very steeply after the first prune; in spite of being pruned into the dry weather and the slow recovery entailed, we find that at the end of their second cycle they are 400 lbs. ahead of their nearest rivals (the 3 year cycle plots).

(ii) The two year cycle plots reached the end of their first cycle without the die-back previously observed being reflected in any appreciable loss of crop. This is emphatically not usually the case in severely affected areas, and merely emphasises that the attack experienced at Ingiriya was not a major one.

(iii) After 2 years, however, the yield of the plots which remained unpruned fell off markedly.

(iv) After 3 years the 18 month and 3 year cycle plots maintain identical rates of increase to date. The same applies to the 2 year and 2½ year cycle plots, but their rate of increase is not so rapid as the others.

The preliminary results of this experiment after running for 4 years are summarised in the table below.

Table 1. *Ingiriya experiment. Crop yields*

Cycle length	Total yield after 4 years (to end June 1956) in lbs/acre	Yield expressed as a percentage
18 months	4,550 lbs.	100%
3 years	4,142 lbs.	91%
2½ years	3,830 lbs.	84%
2 years	3,802 lbs.	83%

So much for the direct experimental evidence regarding varying cycle lengths, and I now come to the rather more complex question of whether these results can be expected to be applicable to other low-country estates which are more severely affected by shot-hole borer. I am well aware that there is strong divergence of opinion on this point, and in the absence of complete experimental data covering all conditions, I can only put forward my own observations to support my case.

In my opinion undoubtedly the most important factor which determines whether an 18 month cycle length is applicable to any severely affected low-country estate is—*the type of pruning*.—To illustrate this point, I would mention that I have been informed in no uncertain terms that an 18 month cycle was tried on some low-country estates, while I was still in the cradle, and was found to be a complete

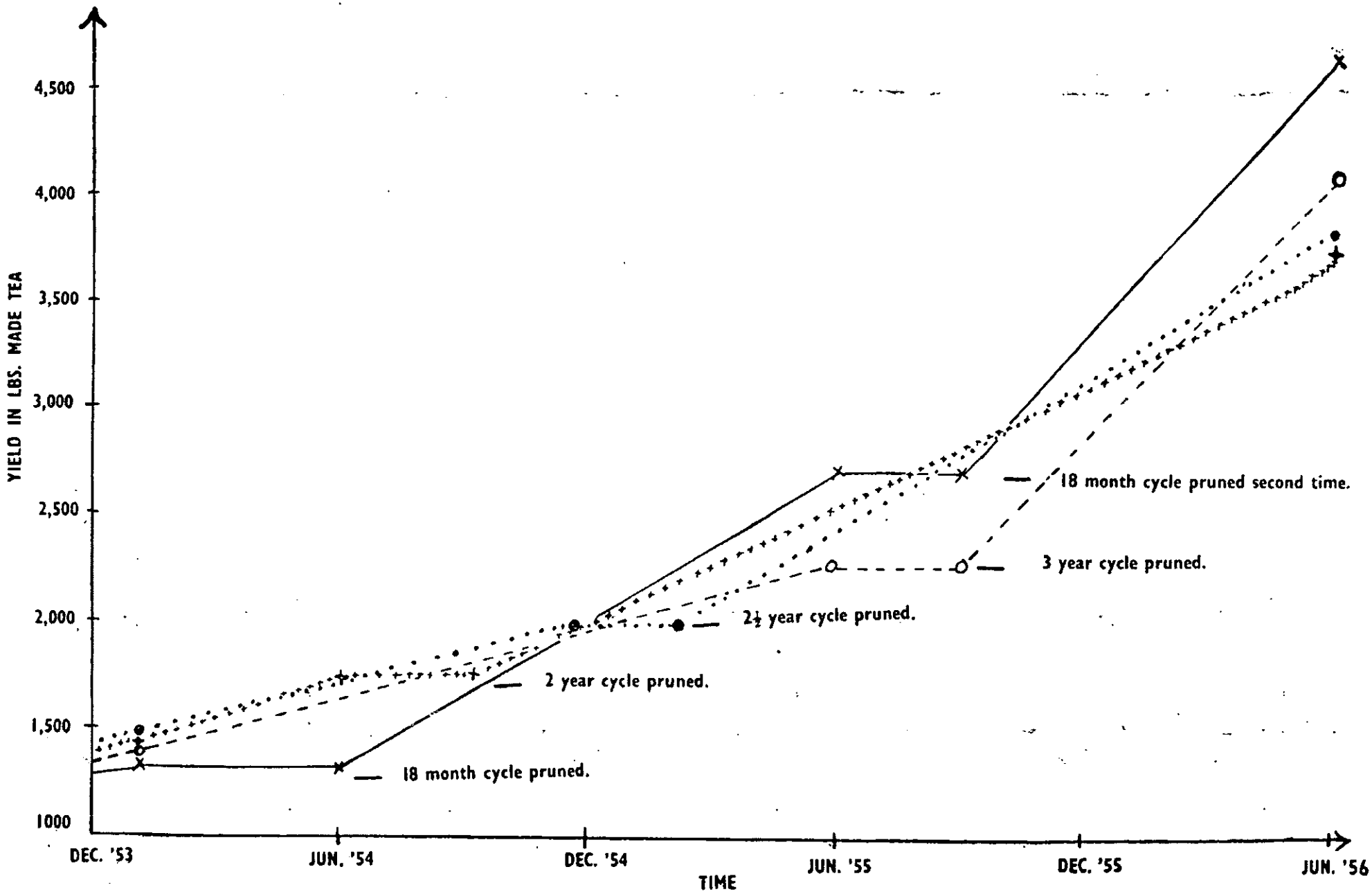

Fig. 1. Yield graph of the Ingiriya experiment. Note consistent lead maintained by the 18 month cycle.

failure'; further enquiries, however, revealed that this conclusion was reached as a result of combining an 18 month cycle with the clean prune then in vogue, and moreover that the pruning height was about 12 inches and even less! True the number of beetles may well have been greatly reduced by this drastic method, but my impression is that most planters are concerned more with increasing yields than reducing borer population! In fact, it is a matter of considerable surprise to me that any of the bushes treated in this way are still alive!

One cannot, of course, place too much reliance on such ancient records, and I would, therefore, record an incident, which has only recently taken place and which confirms my view that the success of the 18 month cycle depends almost entirely on the adoption of sound pruning technique. A field was pruned (after a period of rest) on an 18 month cycle in August last year, following a severe attack of shot-hole borer. In the absence of the manager, a clean prune at 18 inches was given—with no rim-lungs; the consequences of this were firstly that most unusual chlorosis symptoms were observed following the second tipping, which necessitated further resting. This almost certainly resulted from the rapid new growth draining the mineral resources of the first formed shoots following recovery. That is, that the early growth acted as "lungs" for the post tipping growth. Then almost as soon as the tea recovered from the chlorosis symptoms another severe attack of shot-hole borer was experienced, necessitating yet another prune. As similar set-backs have not been observed on any estate where sound pruning methods have been adopted, the inference is apparent.

That brings me to the question of what type of pruning is the most suitable for an 18 month cycle. While again there is no direct experimental evidence on this point, observations tend to show that a light cut-across is undoubtedly the most suitable for these conditions, and this view can easily be supported on physiological grounds. It so happens that on the Ingiriya plots it was not feasible to adopt a cut-across, as this type of prune is obviously not applicable to a 3 year cycle length and uniformity of treatment was essential; the Ingiriya experiment, therefore, shows that a rim-lung prune is perfectly practicable (provided it is not lower than 18-20"), but I consider that in general a light cut-across should give even better results,—more especially of course in young tea; this can, however, only be confirmed by a separate experiment.

Another factor, which is undoubtedly of significance, is the type of plucking carried out. In this connection I would merely record that with an 18 month cycle hard plucking appears to be feasible in some places in the high rainfall areas of the low-country; on an estate where this combination has been in practice for the last 20 years or so, yields continue to be exceptionally high—yet no new wood has been put on during that period and consequently there is virtually no shot-hole borer. However, it stands to reason that hard plucking is only feasible on tea which already has well developed frames and a good cover at the start of the operation, and where adequate attention is paid to other cultural operations, particularly to adequate manuring.

Reverting again to the subject of the comparative yields of different cycle lengths, the question may well arise as to whether the experimental data which I have produced has been confirmed in practice on other estates where shot-hole borer damage is greater. While time does not permit me to go into too much detail, I would just like to quote one instance, which is of particular interest in that about half the fields on the estate are on a 2 year cycle, and the other half on an 18 month cycle. A comparison can thus be drawn between the loss in crop caused by shot-hole borer in respect of these two cycle lengths—the basis of the comparison being the yields obtained during the *dry weather months of the first and second years in the cycles*. Extracts of these yield figures are summarised in Tables 2 and 3.

Table 2. *Estate in K.V. seriously affected by shot-hole borer. Yields of fields on a 2 year cycle for January-March* 1955 *and* 1956.

Period	Year in cycle	Yields of fields in lbs. per acre
1955 January-March	1st	273 271 197 259 255 224 304 299
1956 January-March	2nd	185 164 177 162 181 184 158 151
Difference		-88 -107 -20 -97 -74 -40 -146 -148

Maximum decline in any one field during second dry weather period = 148 lbs. per acre.

Overall percentage difference = 65 per cent.

Comparative loss in crop during second dry weather period = 35 per cent.

Table 3. *Yields of fields on an* 18 *month cycle for January-March* 1955 *and* 1956 *from the same Kelani Valley estate.*

Period	Year in cycle	Yields of fields in lbs. per acre
1955 January-March	2nd	246 194 159 170 228 158 254 272
1956 January-March	1st	201 223 180 183 226 183 237 189
Difference		+45 -29 -21 -13 +2 -25 +17 -17

Maximum decline in any one field during second dry weather period = 29 lbs. per acre.

Overall percentage difference = 9.7 per cent.

Comparative loss in crop during second dry weather period = 3 per cent.

It will be seen from these extracts that in the case of the fields on a 2 year cycle, the dry weather months of 1955 happened to be the first year in the current cycle, while in the case of the fields on an 18 month cycle the same period in 1955 happened

to be in the second year (of the previous cycle). A direct comparison would, therefore, not be at all accurate, but for all practical purposes the figures speak for themselves. Note particularly that in the case of the 18 month cycle fields the greatest decline is only 29 lbs. per acre during the second dry weather period,—and in several cases there are actually *increases* recorded. I need hardly add that my advice that all fields on this estate should run an 18 month cycle has been accepted!

Although I have previously referred to an "18 month cycle" there is of course no particular significance attached to a cycle of this exact length. From the practical point of view, it will not be feasible to fit every field on an estate into an 18 month cycle, especially as this would entail periodically pruning some fields into the dry weather. However, it is quite a simple matter to get round this difficulty by varying the cycle length say between 18 and 22 months, so that fields pruned early in one cycle are pruned late in the next, and *vice versa*. A further shortening of the cycle may be considered in exceptional circumstances, though definite evidence on this question is lacking; on many estates the practice has been adopted of pruning fields as soon as a major outbreak of shot-hole borer becomes evident, the one drawback to this system being that it may necessitate pruning during the dry weather. I venture to suggest, however, that, on the basis of the data I have previously given, a major outbreak need not be anticipated once an 18 month cycle has been adopted.

In conclusion I would just add a few words on the question of the 3 year cycle in view of Gadd's and Austin's findings that a cycle of 3 years (or longer) was effective in reducing shot-hole borer incidence in Uva. As a general rule this extended cycle cannot be adopted under all conditions in the low-country,—the main condition under which it does not appear to be feasible being following a severe attack of shot-hole borer! It will be recalled that the attack of shot-hole borer on the Ingiriya plots was not regarded as a really major outbreak, and hence the yield graph of the 3 year plots does not provide a true indication of what may be expected (by way of loss of crop) following a more severe attack."

Mr. Walter's paper ends here, but I should like to say a few more words before closing this subject.

There is one possible secondary drawback to a short cycle in the low-country, and that arises from the effect of cycle length on quality. Little appears to be known about this, but I believe that Mr. Keegel intends doing considerable work, on quality and manufacture in general in the low-country on his return. It is general experience that quality improves as the cycle lengthens, but any specific information resulting from the use of short cycles would be appreciated.