WAYS TO ECONOMIZE ON INSECT AND MITE PEST CONTROL

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The cheapest form of pest control available to us is biological control. We have achieved this successfully in the control of the Tea Tortrix Caterpillar. The introduction of the parasite *Macrocentrus homonae* in 1935 and 1936 has enabled estates to avoid expenses involved in using chemicals against this pest, except on the rare occasions when localized outbreaks occur for various reasons. We have not yet been fortunate in developing biological control methods for other important tea pests, particularly for the Shot-hole Borer and mites. The prospects of using biological control agents against mites are bleak at present. Intensive work carried out until recently at the South Indian Branch of the Commonwealth Institute of Biological Control on the tea Red Spider Mite did not produce the desired result. The project has, therefore, been given up. For controlling Shot-hole Borer, we, in collaboration of the Commonwealth Institute of Biological Control, are at present engaged in obtaining suitable biological control agents to be tested against the beetle. The control of the pest by this means is, however, no easy task. We are now testing a fungus called *Beauveria bassiana* for possibilities of controlling the Shot-hole Borer biologically. This fungus is pathogenic to some insects, but not harmful to other animals and plants. In the laboratory we have been able to obtain a high level of infection of beetles exposed to the spores of this fungus (see Figure 1). The next step in this work will be to find ways of disseminating the spores to obtain the maximum kill of the borer under field conditions ; but to achieve this, many practical difficulties may have to be overcome. Figure 1 shows beetles attacked and killed by the fungus, and the subsequent development of the fungus to varying degrees.

The control methods available for the more important tea pests are, at present, predominantly chemical. I intend to discuss below the reduction of the expenses involved in controlling pests by chemical methods. This can be achieved in a number of ways, some of which you may already know. Although individually, they may not indicate a significant degree of saving, collectively a substantial reduction of the expenses involved may be achieved. I shall briefly list the important points. Insect and mite pests can be economically controlled by :

1 – Taking control measures during the initial stages of a pest attack before it gets out of hand,

2 – Timing of chemical sprays to synchronize with the active stages in the life cycle of the pest,

3 – Resorting to spot spraying when the distribution of the pest is obviously uneven,

4 – Selection of the cheapest formulation of the chemical or the cheapest chemical when more than one is recommended,

5 – Resorting to mistblowing wherever applicable.

Chemical control with acaricides is the only method of controlling the four species of mites. The Yellow Mite is a species which attacks the flush and the youngest leaves, causing a direct loss of crop. The development of an outbreak of the

Yellow Mite is usually very rapid but the decline is just as fast and the attack is very often over before the planter gets down to spraying. The duration of an attack is about four weeks and during this period it is estimated that more than 80% of the crop is lost. It is important that preventative chemicals must be applied before the attack builds up, because the time of occurrence of this pest is short and the damage is great. The question is how can this be done ? There are several clues to an answer : one is that the Yellow Mite usually occurs on tea recovering from pruning and on young tea and another is that the attacks develop during the post monsoon periods from August to October and January to March. By keeping newly pruned and young tea fields under close observation during these times of the year it is possible to detect signs of a build up in the yellow mite population. A hand or pocket lens with a magnification of ten may help those who are not able to notice the mite with naked eye.

Climatic factors affect mite pests of tea directly and we can use this to our advantage in obtaining mite control with relatively less expense. Figures 2, 3 and 4 show how the seasonal changes in weather affect the abundance of some pests in different districts. By keeping fields, especially those that are known to be prone to mite damage under close observation during the early stages of the mite season, a considerable saving can be obtained because the area of occurrence is always small at the beginning. In the same way spraying operations against the Tea Tortrix and the Nettle Grub, carried out when the outbreak is first seen, make it unnecessary to repeat spray applications, thereby bringing about a saving on additional costs. Natural outbreaks of both these pests are seasonal. Figure 4 shows that in the south west monsoon zone there is one peak occurrence of Tortrix a year. In the case of nettle grubs, there is a single peak period in the Uva districts. With the approach of the tortrix or nettle grub season preparation must be made to control these if outbreaks do occur. As DDT, the recommended insecticide for both these pests has a long residual action, control lasting a whole season can be obtained with one application, provided it is done during the initial stages of the attack. Neglect of initial attacks of caterpillar pests can become very expensive in terms of loss of crop as well as in the expenses involved in spraying larger areas later on, because infested fields are a source of infection to others.

Timing of spray applications to synchronize with the active stages of the life cycle of a pest has been found to minimize or obviate the necessity of subsequent rounds of spraying. This was recently demonstrated in the case of the Twig Caterpillar where it was shown that timing the spray application in such a way that it is made after all the eggs have hatched, but before larvae migrate into the soil for pupation, can substantially reduce the caterpillars of the next generation. This method of control requires keen field observation, but the benefits of excellent control with fewer rounds of spraying makes it economically worthwhile.

A reduction in the expenses involved in controlling certain pests can also be obtained by spot spraying when the attack is restricted to patches. The transport of insect and mites through air is partly governed by air currents which deliver these organisms to different parts of a field. Near ground and near trees, hedges and other obstacles, the friction between the moving air and the solid surface slows the air flow causing the insects and mites to accumulate. The mites and some insects are thus delivered to sheltered zones or to edges of fields by the activity of wind. For these reasons a heavy build up of pest populations are often noticed towards edges of fields, near road sides, drains or similar places and even on shade trees. In such situations, spraying can be restricted only to the areas affected by the pest, rather than spraying the whole field.

DDT is still the best caterpillar killer suitable for use on tea. One disadvantage with DDT is that in certain areas or in certain fields it can induce red spider and scarlet mite attacks. When it is known that a particular field or an estate

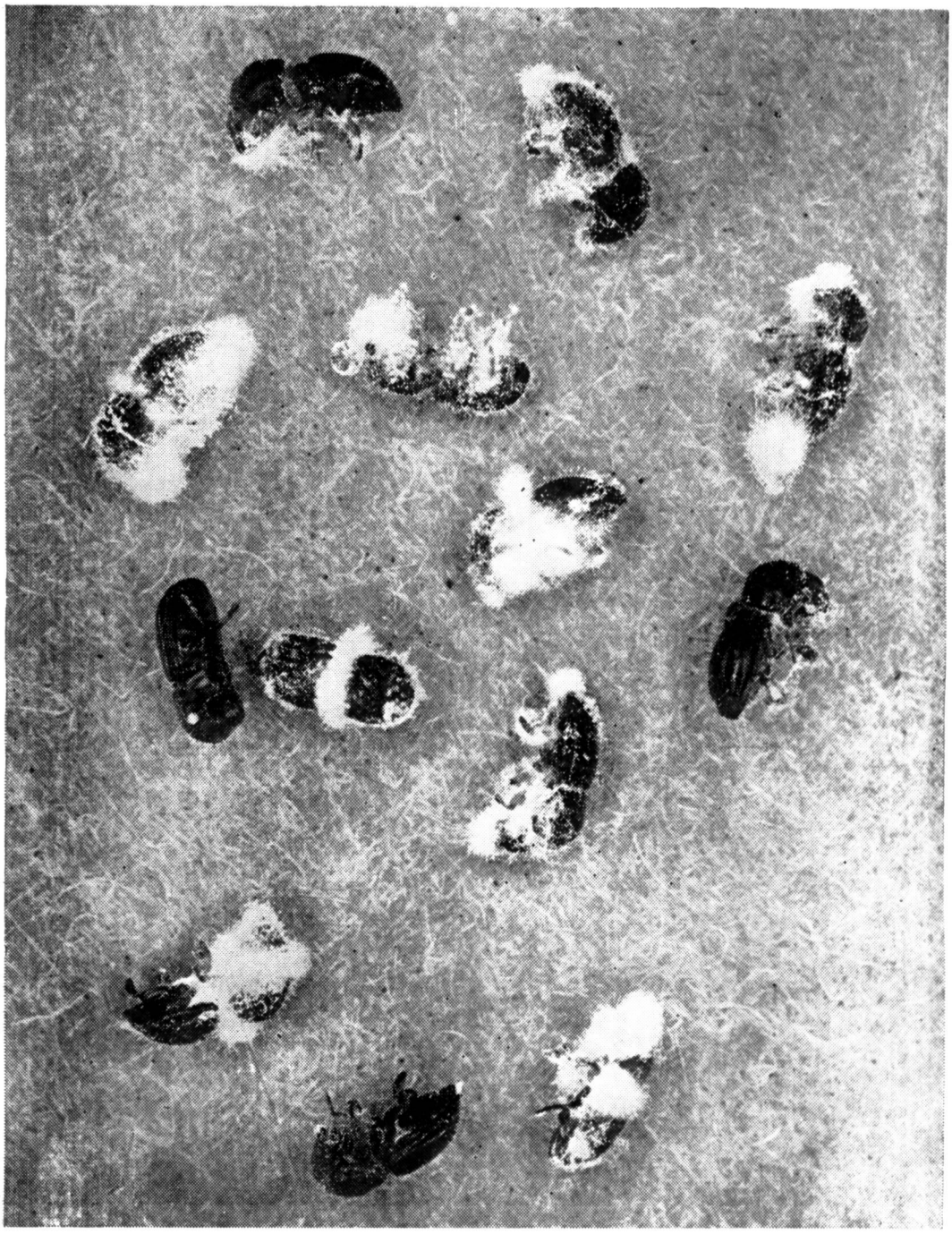

FIGURE 1 — *Adult females of the Shot-hole Borer* (Xyleborus fornicatus *Eich.*) *attacked and killed by the pathogenic fungus* (Beauvaria bassiana *Balsamo*) *and the subsequent growth of the fungus on the dead bodies of the borers*

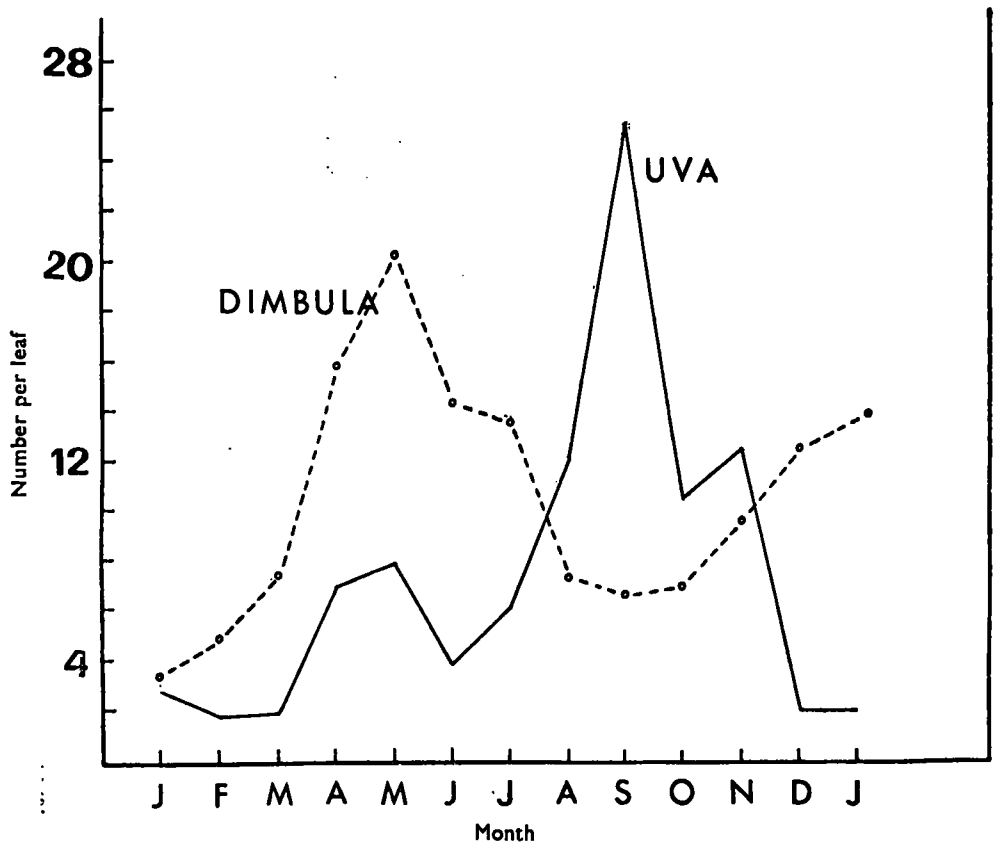

FIGURE 2 — *Seasonal changes in the numbers of the Scarlet Mite* (Brevipalpus californicus *Banks*) *on tea in the Dimbula and Uva Districts*

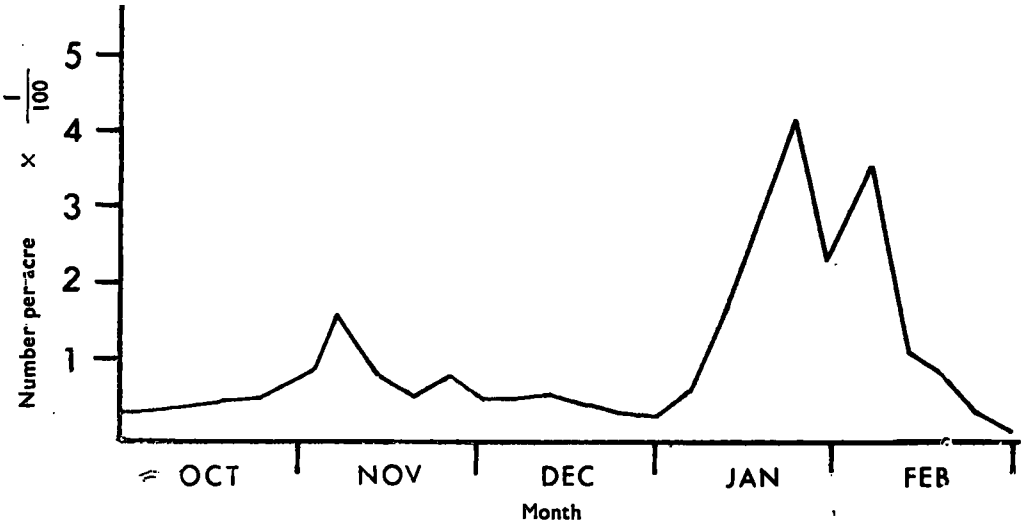

FIGURE 3 — *Seasonal changes in the numbers of tortrix egg masses on tea at St Coombs*

CLIMATIC ZONE	SCARLET PURPLE AND RED SPIDER MITES	YELLOW MITE	TEA TORTRIX	NETTLE GRUBS
S.W. MONSOON	DEC-MAY	AUG-OCT JAN-MAR	DEC-APR	
N.E. MONSOON	JUNE-SEPT	JAN-MAR		JULY-SEPT

FIGURE 4 — *Seasons of attacks of caterpillar and mite pests in the two climatic regimes, the South-West and north east monsoon zones*

is prone to mite damage following DDT spraying, the problem can be solved by incorporating a good acaricide into the DDT solution. Labour costs on a separate round of an acaricide later on, is thus avoided. The selection of the brand of insecticide itself could become useful depending on the cost of the different formulations available. Another way of achieving a similar saving when controlling mites is to use expensive acaricides only on fields that are in plucking. To control mites in resting fields or in new fields, where no plucking is done, it is always preferable to use sulphur formulations which are less expensive, but at the same time give a very good control of all four species of mites.

The selection of the method of spray application is a widely practised way of saving on labour costs. The two techniques of spraying commonly used in Ceylon today involve the use of pressurized knapsack sprayers and motorized mistblowers. The former is referred to as high-volume spraying, and the latter as low-volume spraying. The quantity of pesticide per acre by both methods is the same, the difference being mainly in the volume of water required to spread the pesticide. Mistblowing reduces the droplet size and carries the pesticide over a much larger area. The biggest advantage of mistblowing, however, is indicated by labour costs. With knapsack spraying for insect and mite pest control, usually two labourers are required to cover one acre in a day whereas a single labourer operating a mistblower can cover three acres a day. Saving on labour costs by resorting to mistblowing, therefore, amounts to about Rs 4/- per acre. Financial benefits of mistblowing can be greater in areas where there is a scarcity of water because the labour costs involved in the transport of large quantities of water are reduced. By mistblowing, therefore, we obtain a greater speed of operation with a reduced labour cost per acre. Mistblowing is practicable with DDT, Malathion and all acaricides except sulphur, but highly toxic chemicals and those that are known to taint tea should not be mistblown under any circumstances.

Although successful biological control is a cheap and a desirable form of pest control, the method has not been applicable to many of our pest problems. We have therefore, been forced to use chemicals against the more destructive forms of insects and mites on tea. The use of chemicals against the Shot-hole Borer created numerous side-effect problems in the recent past. This necessitated the withdrawal of the recommendations although the recommended method gave excellent control of the beetle. Until some other method of control can be perfected against the Shot-hole Borer, it is inevitable that we may have to revert to some form of chemical control, although minor side-effects may have to be tolerated, because the shot-hole borer problem is acute in many districts. Today many think that if the balance of nature is not disturbed, we would not have severe problems with insects. Perhaps the more practical outlook is to consider that man's way of life itself and his needs are such that a true balance of nature cannot exist.