

# MANURING OF TEA AND POSSIBLE CONNECTIONS WITH SHOT-HOLE BORER ATTACK

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Let us be quite clear at the outset that my contribution to this symposium is an indirect one, and that the aim of our agricultural chemical research is to obtain and to maintain the best possible state of nutrition for the soil and the tea bush. I do not believe that manure can cure an attack of any pest or disease, but I do believe that the methods of prevention and control can be assisted greatly by a proper state of nutrition of the plant, and may be just as surely negated if the plant is already weakened by a struggle to obtain the right kind of diet.

I intend to tell you why I am of the opinion that there is a nutritional upset already evident in a lot of tea in the mid and low country, and how my programme of research into that problem may help my colleagues in tackling shot-hole borer. First of all I must summarise the past work which has been done on relations between manuring and shot-hole attack.

This has concentrated on the possibility of building up the branch strength and thickness mainly by means of increased potash manuring. In several instances this has been achieved, and the bush has appeared to withstand the damages of the borer.

Examinations by my colleagues in past years, have, however, shown that where the wood has been improved in such a way, the actual number of galleries per bush has often increased. A change in the nutrition of the bush has allowed it to gain the initiative over the pest. How long this favourable balance would persist we can not say, nor can we say how the pest would be able to adapt itself to the new environment, and perhaps renew the attack with increased vigour.

Increased potash has not always improved the growth of wood, and the main reason for this is undoubtedly to be found in the fact that under certain soil conditions only a proportion of an application of manure may ever become available to plant roots, the remainder being chemically fixed by the soil. I am not going into details on this point, but this question of availability of nutrients in the soil is of great importance in considering the next aspect of nutrition.

All over the lower elevations the tea tends to show a definite chlorotic pattern on the leaves, and this is more pronounced in some districts than in others, and worse in dry seasons than in wet ones. Planters are familiar with this yellowing, and the usual reaction has been to describe it as one of the symptoms of shoot-hole borer attack. I am not prepared to accept such a simple explanation.

Even in the course of brief tours I have seen severe chlorosis with no trace of shot-hole borer in the bushes, and I have also seen bushes riddled with galleries but with none of this yellowing on the leaves. It is true that the chlorosis and the effects of the borer are both worse in dry, sunny periods; it is true that both tend to become worse as the tea ages from pruning; but all this is not sufficient to over-ride the fact

that the chlorosis can occur independently of the borer. It is highly probable that where both occur in the same bush each accentuates the harmful effect of the other. It is quite certain that a leaf which is more yellow than green, as often happens, is not pulling its weight in food production, and that the whole of the bush must suffer as a result. Any further interruption in the physiology of an already weakened bush would be expected to have a more severe effect than if the bush had been healthy in the first place.

Unfortunately the sorting out of this type of problem can not be settled in a few weeks. I have already mentioned the effect of pruning and season on the chlorosis, which involve the matter of shade, and there would have to be a more precise examination of the direct relation between the borer and the chlorosis. Before any of this could be settled we should have to know what caused the chlorosis itself, and how to cure it, and this promises to be a tricky problem.

I can not say much more than I did at the 1955 Conference, except that a few chemical analyses have strengthened my idea that we are dealing with some of the trace elements, and that soil pH and organic matter are going to be intimately connected. Over the last eighteen months we have done a few thousand pH and organic matter analyses and we can begin to see a connection between the organic matter and elevation which seems to support my theories on trace elements in relation to this chlorosis. The next step will be a field survey of the chlorosis, with leaf and soil samples for chemical analysis.

I am not going to take up any more of your time with speculation on the future, but you may be interested to hear of a field experiment which I started a year ago on Sapumalkande Estate, Dehiowita, with the enthusiastic co-operation of Mr. Whitfield.

The tea was then seven years old, from seed on old rubber land, the jat being very uniform. Plucking is to the fish leaf and the pruning cycle eighteen months. Estate manuring is at a rate of 10 lbs. nitrogen to 100 lbs. made tea, using T.175 manure thrice annually, with no cultivation. Shade, with gliricidias only, is very uniform and moderately heavy. The experimental plots, twenty four in number and one fortieth acre each; lie on an almost level area.

The soil pH was very low, and some plots were treated with lime, calcium hydroxide, to raise the pH; other plots had equal dressings of calcium in a form which did not affect the soil pH; other plots were left as they were. In each of these three groups four plots had the normal estate potash manuring and four had extra potash, the whole being arranged in one of the recognised patterns for field experiments.

Thus there are several important points which are covered by this experiment, but the most interesting one to mention now is that this tea had only slight evidence of the chlorosis and no sign of shot-hole borer when the experiment started. There is a trace of borer appearing now, and it will be interesting to compare the increase in the borer in the different plots with any change in the chlorosis. There is also the obvious comparison with the Endane manurial experiment where the borer attack was severe before the manurial treatments began. The Endane experiment also contains various ratios of potash, but here the plucking is to the full leaf, which will give us yet another interesting comparison with the Sapumalkande experiment. Neither of these experiments can be wholly interpreted without chemical analyses, and, of course, chemical analyses would be of little use without such field experiments.

I think we have already got a very good foundation for studying the connection between shot-hole borer attack and several different aspects of manuring and soil conditions, and even if the entomologists decide they can cope with the pest on their

own, as I hope they can, the work which I have outlined will still have its own value. I must end with a word of warning. Field surveys followed by laboratory examinations take a considerable time, and no one manorial problem can be considered as a thing apart, since all aspects of plant nutrition are linked together in one way or another. While this will mean that we shall accumulate a lot of inter-related information, a useful process in itself, it must also mean that we must go carefully before making too definite pronouncements.

*Mr. Portsmouth.*—Mr. Tolhurst's paper concludes the contributions to this symposium which are being made by the scientific officers of the Tea Research Institute, but before we go on to the planting contributions I think this will be an appropriate time to ask Mr. Ananda Rau of South India to tell us a little about the pest in South India. I therefore call upon Mr. Ananda Rau, who is the entomologist of the United Planters' Association of Southern India.