

FUTURE CONSIDERATIONS IN THE NUTRITION OF THE TEA BUSH

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Although the theme of this Conference is the future of the tea industry in Ceylon, I intend to begin by taking you back some thirty or forty years to apple orchards in the United Kingdom.

At that time, following the first war, there was much concern over a damaging leaf scorch in fruit trees, and this was soon diagnosed as potash deficiency, largely through work done at the research station at Long Ashton. The cure was easy, and as at the same time it was found that increased potash manuring improved wood growth and fruit quality, potash was used liberally, often to excess. Potash manures became more concentrated and the older low grade kainit, which had a good content of magnesium, went out of favour. Too high potash manuring only aggravates the plant's problem of obtaining magnesium from soil which is already low in this latter nutrient.

In the 1940's, magnesium deficiency was recognised as a widespread problem in fruit orchards, and as it was not so easy to put right as potash deficiency in fruit trees, considerable research was devoted to it. That was my first experience of applied research when I joined Long Ashton and I had plenty of contact with magnesium problems by the time I left there and transferred my attention to the nutrition of the tea bush.

We come back to more familiar ground now, and I make no apology for the foregoing digression. Although it is hardly that, because the analogy seems to fit quite closely; potash deficiency in tea some years ago has been followed by higher manuring in general and often much higher potash manuring in particular. Yields have risen, carrying off more and more of all the nutrients essential to healthy growth, and the manures most favoured by the tea industry do not contain much magnesium.

Above all, the soil conditions in Ceylon are those which would be expected to produce magnesium deficiency. High rainfall, highly acid soils, and low or very low magnesium in the parent rocks from which these soils derive.

With all this in mind I was on the search for signs of the deficiency and in the last few months I have found several occurrences over a wide extent up-country. Many crop plants, of which tea seems to be one, often develop characteristic patterns on their leaves and shoots depending on which nutrient is lacking or, sometimes, is in excess (SPECIMENS EXHIBITED). Making due allowance for other factors which can discolour or distort the foliage, the diagnosis of nutritional disorders by visual symptoms can be very useful. But they are not infallible, and they must be taken as evidence that the plant is now fighting a losing battle.

One interesting point in regard to magnesium symptoms is that they seem to be masked to a large extent by nitrogenous manuring. This is well known in magnesium deficiency, but do not let it mislead you in to thinking that the trouble can be cured by high nitrogen, because there will come a stage when the magnesium deficiency is so severe that the symptoms can not be masked by anything except magnesium.

A further point to note, especially in view of the present emphasis on clonal material, is that different clones of some plants make different demands on nutrients. I have now seen three separate clonal plots where this is very evident in tea, some clones being well marked with the magnesium symptoms, others less distinctly and others with no symptoms at all.

Let me assure you that magnesium deficiency in tea is not merely an exercise in scientific research. It has been a serious economic problem in many crops in many parts of the world, and the effects can sometimes be disastrous. The first record of the deficiency in tea was made in a field where patches were getting weaker every year. The exhibits shown were taken from a field, on another estate, a few acres of which had been put out of cultivation because the yield fell to an uneconomic level after years of steady decline.

Let me also assure you that my references to the antagonism between potash and magnesium do not constitute an argument against high potash manuring. What they do suggest is that if potash is to be increased, for one reason or another, then the already existing necessity to consider magnesium as a normal constituent of manurial mixtures, as of course it should be, will be brought home more sharply. It would have been a pity if tea had gone the way of some crops, out of potash deficiency into magnesium deficiency. There is now no need for that to happen.

We are beginning trials with magnesium sulphate and dolomite as commercial manures for magnesium, and at the moment we favour dolomite, which is obtained locally, is cheap and is not too soluble. It also contains a high proportion of calcium, which is just as essential to the nutrition of plants as magnesium and which is nearly as often overlooked in the growing of tea. I find it rather interesting that the tea bush contains so much calcium when the soil it grows on is so acid. I cannot believe that the calcium goes into the bush just by chance.

Saprophosphate too is high in calcium and it may be that much of its value is due to that fact. It may be that more attention to the calcium status of the soil would prove of value, especially where the actual availability of other nutrients to the roots of the tea bush is concerned.

This is as yet, conjecture and is related to the interesting subject of soil pH with the well known danger of exceeding a certain pH value.

It may therefore be of interest if I mention a deficiency of manganese which I found on a few bushes growing near bonfire sites where the soil pH had risen to between 6 and 7. Manganese is yet another essential nutrient, but whereas magnesium and calcium should be considered with the major nutrients, manganese is definitely a trace element. I do not want to say too much about manganese deficiency because I do not want you to assume that high pH invariably causes such a deficiency. It will only do so if the soil is low in manganese to begin with, and this particular soil was of that nature. It may be worth bearing in mind that if one area of soil has been found low in manganese there may be others as low or lower.

I will not describe the symptoms of manganese deficiency and I can not show you any specimens because I cured them in the process of diagnosis. But I will digress again in describing the diagnostic technique I used for this and for magnesium deficiency.

It is now standard commercial practice in several of the major crop systems of the world to spray the foliage with nutrient solutions where the necessity arises. This is usually done in conjunction with pathological sprays, for reasons of expense, and usually with trace elements, for reasons of plant physiology.

To generalise, many plants seem to absorb most nutrients if suitable solutions are sprayed on to their leaves under suitable conditions. There are snags, but where the method works it gives a quick and definite response to a known nutrient. The two deficiencies I mentioned responded very rapidly to selected sprays, chosen so that I was able to decide without doubt which nutrient had cured the symptom, and restored more vigorous growth.

I am not, under any circumstances, recommending the commercial use of foliar nutrients on tea at this stage of our knowledge. I will offer advice as far as I can, but the responsibility will rest with the user.

Another reason for not stressing manganese deficiency is that, with the one exception, our analyses have shown an amazingly high content of this trace element in the old leaf. Whether or not this is desirable we have yet to learn, and I have made a start on this problem.

The last visual symptom which I wish to discuss (SPECIMENS EXHIBITED) has a very widespread occurrence, but so far the cause remains a mystery. From my own observations and from specimens sent in it would seem that the yellow or orange chlorosis with a network of green veins in contrast is very common at lower elevations and in the drier districts. It seems to be connected with sun scorch quite often, and it has been reported to occur in conjunction with shot-hole borer. Such correlations need very careful substantiation, and even if we succeed in establishing one we have still to decide which trouble came first.

Until I can get detailed chemical analysis I can not do more than guess at the cause of the chlorosis, even to whether it is nutritional or not. From the appearance I would suspect that one or more trace elements are out of balance, and if so, then the relation to certain climatic conditions becomes more feasible. It would then be connected with my earlier remarks on calcium and the availability of soil nutrients. Any work on these lines would in turn be connected with the effects of soil pH on nutrient uptake and, in view of the importance of magnesium, we should consider the possibility of using magnesium instead of some of the calcium, to kill two birds with one stone.

The reason I introduce this 'thinking aloud' is to suggest to you that the seemingly disjointed subjects, which I have only been able to sketch in, may be more closely connected after all, and the solution of a problem which at the moment looks like a rather pretty pattern on the leaf may lead us to considerations of far greater practical importance.