# MANGANESE DEFICIENCY SYMPTOMS OF TEA

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The occurrences of visual symptoms resulting from a deficiency of this nutrient are to-date two in number (Tolhurst, 1954; 1962). No reports of manganese deficiency in tea have yet been received from other countries, even though poor growth due to soil being insufficiently acid has been investigated many times.

The purpose of this illustrated note is to help in diagnosing a nutritional disorder which, by virtue of its striking foliar symptom, may attract undue attention. It is unlikely that manganese deficiency will ever be more than an interesting rarity in tea culture.

## Occurrence

The cause of the deficiency was, in each case, the dumping of wood- and weed-ash into mature tea adjacent to bonfire sites on paths. With replanting of old tea becoming increasingly common, there may be reason to expect further observations of manganese deficiency in the young tea, since bonfires often deposit large heaps of ash in the clearings. These heaps ought to be scattered as widely and as soon as possible, but this is often not done.

Young tea planted actually in a bonfire site will almost certainly die, or may stagnate without showing specific symptoms on the foliage. This has been observed often enough. Plants on the fringe of such a site may develop more normally until roots penetrate into the soil area where the ash has raised the pH value to an undesirably high level. It would then be possible for at least part of the foliage of the bush to show manganese deficiency symptoms. Again, if ash has been removed from the planting area and put into drains or spread on paths, later operations which transfer the affected, high-pH, soil into the tea may induce the deficiency in a few plants.

## Symptoms

The mature leaves develop patches of a pale yellow colour near the margins. These patches, or islands, later run into each other expanding along the margins towards the tip and base of the leaf, and at the same time penetrating towards the mid-rib. The main veins usually retain a broad green band on either side. At an early stage the centre of each yellow island breaks down into a dark reddish brown spot of irregular outline. These necrotic spots, especially those near the margins, join up and finally give rise to a brown, twisted, scorched edge and leaf tip. The centre of the leaf remains dark green and glossy, and shows little distortion until the necrotic margin is well developed.

Even without the necrotic spots to help in identification, this syndrome is distinguishable from that for magnesium deficiency of high-jat tea (Mulder and de Silva, 1959). The yellow tongues of manganese deficiency are narrower and have a more broken outline. Magnesium deficiency on many low-jat bushes (Tolhurst, 1954) results in an orange-brown mottled discolouration, but this has never been seen to develop into necrotic areas.

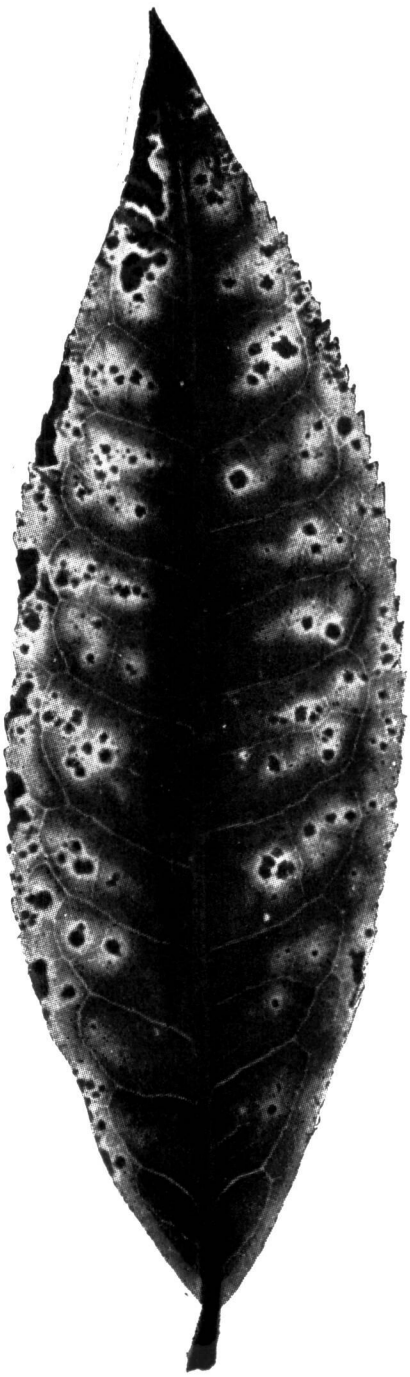

Fig. 1. The manganese deficiency syndrome of tea; photographed against transmitted light.

Potash deficiency, in those bushes which develop a brown marginal scorch rather than a grey one (Tolhurst, 1960) is rarely accompanied by a chlorosis. This, where it does occur, is usually of a dark orange-yellow colour, more or less uniformly distributed over the rest of the leaf. Potash deficiency results in premature leaf fall, whereas manganese deficient leaves can remain on the bush for several weeks after severe marginal scorch has developed.

## Cure

A drenching foliar spray, using a 2% solution of hydrated manganese sulphate plus a wetter, was effective in curing leaves which had just begun to show the chlorosis. This treatment had only a temporary effect, as was to be expected. The soil pH was, in both cases, mainly in the range 5.6 to 6.5 to a depth of 6-12 inches. A permanent cure could only have been effected by lowering the pH value by from half to one unit throughout a considerable volume of soil, thus allowing the immobilised soil manganese to revert to a form which could be taken up by the roots. In practice it would hardly be worth attempting to do this.

## Note

It may be of interest to repeat the observation that tea growing, albeit poorly, in soil of a similar high pH value, whether produced naturally from limestone or in an experiment by the addition of lime, has not been seen to show manganese deficiency symptoms. Nor has chemical analysis shown leaf manganese contents much below 200 parts per million Mn (on dry weight). Leaves from the individual bushes which did show such symptoms (and growing in soil to which ash had been added) contained between 12 and 45 ppm Mn. To-date, experiments designed to follow up this apparent peculiarity are in their infancy.

## References


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