

A Note on the Mandarin Orange Decline

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The mandarin orange is estimated to be grown over an area exceeding 10,000 acres in this province. Its cultivation is confined largely to the hilly tracts and extensive belts under this fruit are met with on the slopes of the Nilgiris, Shevroys, Lower Palnis and Wyanad between the elevations of 1,250 feet and 4,500 feet above sea level. The fruit is grown universally under rainfed conditions and more often than not as an associate crop mainly with coffee and to a less extent with tea. Being treated more or less as a plantation crop the production costs are low, and the fruit is therefore an important complement in the fruit wealth of the province.

Unfortunately, since 1945, the mandarin orange grower is facing a hitherto little known menace, popularly known now as the 'die-back' or 'decline' in oranges. Trees affected by this malady exhibit their shoots in various stages of drying up from tip downwards accompanied by severe defoliation of branches. They present a general appearance of unhealthiness which culminates within two or three years in a premature death of the trees irrespective of their age.

The incidence of this disease is becoming widespread and it has been observed to be prevalent in all the mandarin orange tracts. Since it is recognised that this affliction, if unchecked, might ruin this important fruit industry in the long run, a scheme for the investigation of its causes and cure is to be put into execution shortly. It is, however, felt that a brief analysis of the probable causes for the occurrence of this disease and listing out the steps that could be taken as a measure of first aid, would be of use to the grower in seeking some protection against the mandarin orange tree decline he is up against.

It must be admitted at the outset that no single causative factor responsible for the die-back, has yet been isolated.

The mandarin orange growers have numerous theories relating to the cause of the die-back; the more important of which are as follows:—
(1) Till 1945, the trees were invariably healthy; in that year, a most serious widespread drought occurred and this was associated with a bumper crop; in the succeeding year and thereafter decline set in,

resulting in die-back, which is therefore attributed to exhaustion due to drought and overbearing by the trees (2) The trees bear well in the first four or five years of cropping and then decline sets in, because at this stage the rootsystem strikes either the bauxite sub-soil or rock, the soils chosen for orange growing being characterised almost everywhere by these underground features (3) the decline is due to some undetermined fungus disease and (4) the decline is due to the exposure of the trees to sun; this is presumed from the fact that such of the orange trees which happen to be under shade in coffee estates, generally show no symptoms of die-back. The protagonists of this theory have now commenced to provide a shade crop of either *Erythrina* or silver oak in their orchards. All these theories, seemingly plausible, leave various relevant points unanswered. It seems possible that die-back is a summation of the effects of several adverse factors the tree has faced and has not been able to resist and overcome, and is therefore more a symptom of distress shown by the orange tree due to several causes. It is generally agreed that the coffee planter, who is one of the most important among mandarin orange growers, has invariably selected the poorest patch of his holding for this fruit, with a surface soil barely a foot in depth. More often than not, below this, rock abounds and severely restricts the root-feeding zone. The trees which have grown beyond the capacity of the surface soil begin, therefore, to suffer and die-back results. In coffee estates, where the orange trees are grown as a shade crop, it is possible that root competition between orange and coffee trees commences when the former have grown to a certain age and they fail in the struggle that sets in between the two crops. The fact that certain orange trees do not exhibit die-back under heavy shade may probably be due, more to the favourable soil environment in the particular site than to the direct benefit of shade. It is also possible that the mandarin orange at a particular age is not able to maintain itself under rainfed conditions, in regions where rainfall is only about 60 inches annually and where it is not distributed well. There is generally a long rainless period of three months from January to March in almost all the orange growing tracts during which the mandarin orange tree may not be able to sustain itself on the scanty water resources of the soil. There is again the widespread practice of digging the soil around the trees to a depth ranging from one to two feet twice in a year either for turning the manure in or for root pruning. This results in severing much of the fibrous roots of the tree resulting in incalculable harm to its general health.

With impaired health of the tree due to any or all of the above conditions, diseases such as mildew, sooty mould and others find no difficulty in gaining a foot hold. Die-back under such conditions rapidly follows and the grower, unsuspecting till the visible symptoms of defoliation and death of shoots face him, is prone to attribute the entire

rouble to the incidence of disease. The solution of the problem seems to lie in the following directions:

- (1) Selection of better sites for the mandarin orange where the soil is comparatively deeper and richer.
- (2) Provision of irrigation in times of necessity and of a soil cover in the form of mulches during summer.
- (3) Cessation of the harmful practice of root-pruning or digging deep around the tree basins which results in severing of the fibrous roots of the trees.
- (4) Adoption of a more liberal fertiliser programme employing organic manures and green manure crops in the monsoon period to be dug in later, which would increase the water holding capacity of the soils.
- (5) Adherence to a regular spray schedule to obviate the incidence of diseases. and,
- (6) Exploration of the possibility of a change-over from seedlings to trees grafted on a hardy, shallow-rooted, drought-resistant root stock.

The first five items above are such as can be adopted by the mandarin orange grower straightaway as steps leading to an improvement in general terms on the existing conditions. It is hoped, therefore, that this note will be of some use to him in tackling the problem of mandarin orange decline as it confronts him today.

