

## EXPERIMENTS WITH VARIOUS TREATMENTS TO CURE CHLOROTIC AVOCADO TREES

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Chlorosis of avocado trees may be a serious problem under certain conditions. Most common is the type present on calcareous soils, often called "lime-induced chlorosis." In most cases it is caused by iron deficiency; very often, however, there is sufficient iron in the soil or even in the plant, but in unavailable form (3).

Various methods may be used to avoid or cure lime-induced chlorosis. The best, of course, would be to avoid planting avocado orchards on highly calcareous soils. In many cases, however, when climatic conditions in a certain region are favorable and good quality water is available, growers do plant avocado orchards, even on calcareous soils. In such cases the use of those rootstocks which have been found relatively tolerant to lime induced chlorosis is suggested (3). In some cases where susceptible rootstocks have been used and the trees have suffered from chlorosis, good results were obtained by replacing the original root-stocks by inarch-grafted tolerant ones (1).

Some soil treatments with iron chelates to cure chlorotic avocado trees were described in a previous paper (2). In these and subsequent experiments, excellent results were obtained with iron sequestrene-138. In Israel today the practice is to treat chlorotic avocado trees by soil application of the latter chelate. But because it is expensive, it was decided to carry out more experiments in order to find a way to reduce the amount needed, and also to test other, cheaper materials which have a similar effect.

The present work deals with these experiments.

### Description of trials and results

Three trials were carried out during the summer of 1968, with soil-applied or sprayed iron chelates on chlorotic trees in avocado orchards in the northern coastal region of Israel.

a) The Spanish iron chelate 56 was injected into the soil in mid-July, 30 grams for each two-year-old tree. After one month, the treated trees greened, while controls remained chlorotic. The influence of the treatment lasted one year.

b) A different iron chelate, "Feron-F", was injected into the soil in July, 50 grams for each three-year-old tree. In August, all trees greened, including the controls, but the

treated trees had a peculiar bluish-green color.

c) Mature Ettinger, Fuerte and Nabal trees, all severely chlorotic, were sprayed with "Riplex" and "Fertilon" 0.1 #. Four branches on every tree were sprayed with each material and the rest left for control. After one month, the leaves sprayed with Riplex showed only green dots; Fertilon-treated branches showed only weak reactions. In another orchard, treatment produced green leaves and healthy new growth.

In two other experiments, iron chelates and Dimethyl-sulfoxide (DMSO) (A chemical which may bring about increased translocation of various substances.) were injected into the trunks of chlorotic avocado trees, following similar experiments in Florida (4).

a) On July 15, 1970, in the experimental avocado orchard of the Volcani Institute of Agricultural Research, eight trees of the Wurtz variety showing severe symptoms of chlorosis were treated with iron chelates injected into the trunks in the following manner: a single hole was drilled downwards into the trunk at an angle of 45°, to a depth of 25 millimeters, by means of a 4.5 millimeter-thick nail. Into each hole was pushed a number 16 injecting needle mounted on a 30 cc sealed plastic injector filled with 20 cc of one of the following solutions:

- 1) 1% iron sequestrene 138 solution
- 2) 1% iron sequestrene 138 solution plus 1% DMSO solution
- 3) 1% iron sequestrene 157 solution
- 4) 1% iron sequestrene 157 solution plus 1% DMSO solution



Iron chelates injected into the trunk of a chlorotic avocado tree.

Two chlorotic trees were treated with each solution and two left for controls. The injectors were kept on the trunks for the entire period of the experiment (Figure 1). Every second day, 2 cc of the solution was injected into the trunk by applying hand

pressure on the piston. After several weeks, some greening was observed on the treated trees. The effect was more pronounced on the trees treated with sequestrene 138 and DMSO and on that side of the tree into which the injection was made. On August 8, 1970, leaf samples were taken from treated and control trees for chemical analysis of iron and chlorophyll content. The results showed 55 ppm and 35 ppm of iron and 0.186% and 0.0059% total chlorophyll respectively for treated and control trees.

b) On June 24, 1971, another experiment was carried out in the same orchard and in a similar manner. This time, however, twelve chlorotic trees of three varieties, Wurtz, Edranol and Bonita, four trees from each variety, were chosen. A single tree of each variety was treated with one of the following solutions.

- 1) 1% iron sequestrene 138 solution
- 2) 1% iron sequestrene 138 solution plus 1% DMSO solution
- 3) 1% DMSO solution

A single chlorotic tree of each variety was left untreated as control. Up to the middle of August only slight improvement was observed in the treated trees, (including those trees treated with DMSO alone), with no change in the control.

## **Conclusions**

So far, none of the treatments tried in the present experiments have shown the same striking effect in curing chlorotic avocado trees as that of soil application of iron sequestrene 138, but there have been some promising results with some of the chelates, such as iron chelate 56.

Treatments with trunk-injected chelates involve much work, and the results, at least for the time being, seem unsatisfactory. It is possible, however, that through further experiments, a more efficient and cheaper method may be found.

## **LITERATURE**

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