

COPPER DEFICIENCY OF ROSES

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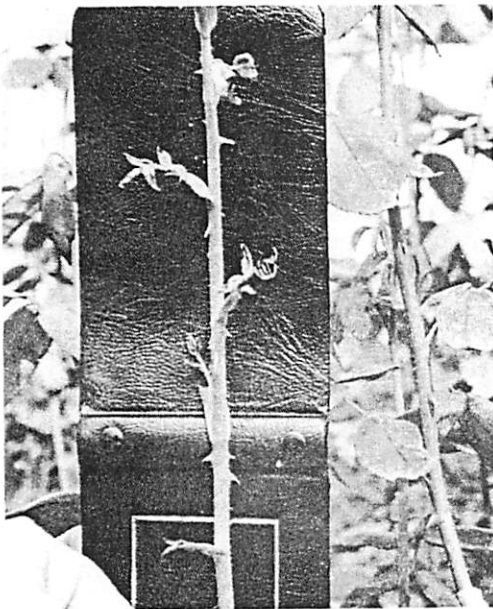


Figure 1. Cu deficiency symptoms of rose showing wilting and dying back of young leaf blades near the terminal end of young shoots.

This past summer a set of unusual symptoms developed on 'Forever Yours' rose plants at one of our commercial North Carolina greenhouse ranges. While touring the greenhouse establishments in Minnesota this past August I observed the same symptoms in two rose ranges. In all cases the symptoms are prominent in the summer and nearly disappear in the winter. This problem has been diagnosed as copper (Cu) deficiency through foliar analysis and application tests of various micronutrients.

SYMPTOMS - Interveinal chlorosis appears on young foliage. The blades of leaves two to four nodes down from the top of these shoots wilt and burn back leaving only the petiole and a thin margin of leaf blade tissue (see Figure 1). In some cases death of leaf blades occurs at a younger stage so that it appears that blades never fully developed. Finally the rate of shoot growth, and consequently flower production, is severely curtailed.

These symptoms closely parallel another nutritional problem and can easily be confused. Calcium deficiency causes the same leaf blade malformation; however, at the same time, flower bud formation stops, thus resulting in bud abortion (3,4). This is the distinguishing feature of the two deficiencies.

CAUSES OF COPPER DEFICIENCY - There are several causes of Cu deficiency which are common to most crops. Copper, just like iron, manganese and zinc, becomes unavailable as the pH level of the soil rises. Levels of pH above 7.0 are often associated with Cu deficiencies in North Carolina greenhouse soils. Even below pH 7.0 soils become deficient

in Cu because it is no longer customary to add organic sources of Cu such as manure, and Cu which is already present is both leached from the soil and taken away with the harvested portions of each crop of plants. Copper deficiencies tend to be more prevalent among some plant species than others. Azalea and rose plants are very susceptible to iron and manganese deficiencies. Cu deficiency is frequently linked to the former two deficiencies. We have well substantiated this relationship with the azalea crop in North Carolina and feel that the same will be discovered for the rose crop when the aforementioned symptoms are sought and foliar analysis are used to a greater extent.

DIAGNOSIS - It is an uneconomical practice to wait for symptoms to appear to diagnose a CU deficiency. While soil tests do not include an analysis of Cu, foliar analysis tests do. The minimum critical level for Cu in rose foliage is apparently unknown. A level of 5 ppm has been suggested in the literature (1,2); however, my own work with commercial rose crops in North Carolina suggests a higher level. A temporary minimum standard of 7 ppm tends to be in line at this time.

CORRECTION - The longest lasting correction is accomplished through a soil application of either copper chelate or copper sulfate at the rate of one quarter pound per 1000 sq. ft. of bed. It may be necessary to repeat this application after four weeks. Uptake of Cu tends to be inefficient in older crops (4-5 years old) and in these cases foliar applications of one quarter pound of copper chelate or tribasic copper sulfate per 100 gallons will be necessary at 10 to 14 day intervals until the problem is solved. The best program; however, is one in which a mixture of micronutrients is applied according to manufacturer's recommendations in advance of problems.

LITERATURE CITED

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