

USE OF FUNGICIDES IN ROOTING COMPOUNDS

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The use of fungicides, either as a drench or as additives in rooting compounds, is a very important part of the nursery cycle during propagation. The favorable results obtained through their use can be very decisive to future crop successes or failures. However, the commercial horticulturist should be very careful to realize that fungicides are only a small part of an overall program of nursery sanitation. He should not rely on them to solve all disease problems.

In the book, "The UC System for Producing Healthy Container-Grown Plants," there are two statements that I think are pertinent to fungicide use, and I quote: "Fungi may be suppressed under the controlled condition of the seed bed or flat only to appear again when the plant is in the pot, the five gallon can, or in the largely uncontrollable environment of the commercial or homeplanting. It is important that the stock produced be not merely disease-free — that is, healthy appearing — but that it be pathogen-free as well." These points emphasize that the use of fungicides in rooting compounds is only a small part of the comprehensive program necessary to maintain clean nursery stock, and it has a very decisive role in the propagation stage.

In looking through the history of chemical fungicides, it seems that Dr. Chadwick was the first to report the beneficial results of such chemicals. This was reported in 1932 using potassium permanganate. At that time Dr. Chadwick was using this material to induce rooting and found that it also controlled damping-off. He was using potassium permanganate as a drench of 2qt/sq ft of soil surface. The solution was made from 1 lb./15 gal of water.

More work was done on the use of chemical fungicides in the ensuing years, mainly by chemical firms in the hope of producing a commercially sound product. We have formulations of metallic compounds of copper, mercury, zinc, and also aluminum sulphate and iron sulfate. Modern chemicals that are now in use are Zineb, Captan, Dichlone, Dexon, Sevin, and Thiram. Most of these are used as drenches. In the mid 1960's a breakthrough in research in systemic fungicides produced formulations known as Vitafax, Plantax, and of course the most common ones used now, Benlate and Truban.

The most common fungicides being used in combination with rooting compounds are: Captan, Dexon, Phygon, and Benlate. Our

experience on our nursery has been with Captan, Dexon, and Benlate. We have compiled extensive research during the last few years on these fungicides and through this research we have come to the conclusion that Benlate and Captan are the best fungicides for our rooting compounds.

One of the most critical areas in the use of fungicides as additives, is the mixing of the rooting hormone with a fungicide. I'd like to take this time to briefly explain how we do it using Benlate as an example.

A 10% Benlate mixture is first made. To make a 10% Benlate powder we start with 1 measure of 50% Benlate powder and add 4 measures of talc. This is shaken well. Then we take a double strength of the hormone that we want to use. By combining equal parts of the 10% Benlate and the double hormone, we now have the proper hormone rate with a 5% Benlate additive.

We have found that the use of Benlate at rates of 5% or lower have tended to do the following on our rhododendron crops: 1) reduce callusing. 2) reduce the incidence of disease, especially water mold diseases, 3) decrease the time for initiation of roots, in some instances to 17 days from insertion into the medium, 4) increase the survivability of the cutting while it is maintained in the rooting bench, and 5) improve the quality of rooting substantially. We feel that these are the most important advantages of Benlate for us.

The disadvantages we have found are that there is a tendency 1) to increase the application rates of fungicides to a lethal level for the crop, 2) to rely on fungicides to cure and control disease without any other application of sanitary procedures to the crop, and 3) safety procedures tend to be dropped in the use of fungicides as they are felt not to be a health problem. This tends to make people not follow other safety procedures with chemicals that are much more lethal.

In weighing the advantages and disadvantages we feel that the expense of a fungicide program is well worth its cost, especially in the protection of a potentially valuable crop. We do feel that it is imperative that all growers experiment under their own conditions to determine what fungicides are best for their own crops and also what is the proper rate for their own operation. In most instances the rate should be well below that printed on the bag.

In closing I believe that there is a future for systemic fungicides in rooting compounds. However, in the long range future it is very probable that chemicals may not be extensively used to control disease in any part of the nursery operation. We learned of a new development this summer from a visiting nurseryman from Australia. There, quite extensive experimentation is being done on biological control of all fungal diseases, particularly *Pythium* and

Phytophthora. As I understand it, the experimentation is being done with beneficial pathogens to attack soil-borne and water-borne fungi. We all should watch these future developments from Australia for I feel that this well may be a major break-through in propagating procedures.

MODERATOR FLEMER: Thank you, Jeremy. Our next speaker is Mr. J. Henrietta and he is going to tell us about propagating rhododendrons.