

THE TECHNIQUES OF TESTING FOR
INSECT AND DISEASE RESISTANCE IN FOREST TREES

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I have been asked to introduce for discussion the topic of techniques of testing for resistance, and to do so in about a 5-minute period. Since

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my statement merely is to introduce the subject, I am relieved of any responsibility for covering all the phases involved and am reserving the right to express opinions which may or may not be substantiated by facts. It follows that my statement will leave much unsaid and possibly ample room for disagreement with what is said. That's where the "discussion" part of this panel discussion comes in.

Before we start testing we must know for what we are testing. In this case it is labeled "resistance," As a beginning, we might define resistance as that faculty which enables a plant to withstand repeated attacks of a given pest to the extent that the plant's usefulness to man remains unimpaired, You pathologists may recognize that as a facsimile in reverse of an often-used definition of a plant disease. But for most practical purposes that is what we are after.

Given a plant of unknown reaction to a certain malady, how then can we determine its resistance? In each individual case, we must know the disease or insect concerned, The more we know about its natural life history, the more intelligently can we approach the search for resistance, Too often our work on resistance is delayed by the necessity of learning more about the life history of the pest. Be that as it may, the plant to be tested must be exposed to the particular pest in an environment where known susceptible plants succumb to attack, In some cases Mother Nature does a pretty effective job for us in what we call natural inoculation or exposure; in others we give her an assist in what is called artificial inoculation by natural means; and, finally, in the category of strictly artificial inoculation, we apply the pest in unnatural means and amounts, often under conditions of environment that favor the pest over the host plant.

In the methods just mentioned there are inherent dangers which must be kept in mind. With natural inoculation, are we sure the pest-free individuals are not "escapes," and with the types of artificial inoculation, are we eliminating individuals that would not have succumbed to the pest in nature?

With each of our individual programs, these generalities, plus the consideration of many details peculiar to the specific situation will determine the techniques we employ. The details of design of test, numbers of individuals, replications, etc., should, of course, reflect the best we can do with the materials, facilities, and manpower available.

I have listed, more or less in chronological order, a few forest pests which have received varying degrees of attention in this country from the host resistance standpoint and the general techniques of testing that have been employed:

<u>Pests</u>	<u>Techniques of testing</u>
Chestnut blight	Natural and artificial inoculation
White pine blister rust	Natural and artificial inoculation
Dutch elm disease	Artificial inoculation
Mimosa wilt	Artificial inoculation
Littleleaf disease of pine	Natural and artificial inoculation
Pine reproduction weevil	Natural and artificial inoculation
Fusiform rust of pine	Natural and artificial inoculation

We could list many more, However, this group shows two pests for which artificial inoculation has been emphasized as a testing technique and five in which both natural and artificial inoculation have been used. I'll venture a guess that if exposure to the malady in nature had given a severe enough test in a reasonable period of time, artificial means would not have been used.