Letters

Precision in the Use of Resistance and Tolerance

I am concerned about the increasing use of the term "resistance" when speakers and writers actually mean "tolerance." For example, several speakers at a recent phytopathology meeting talked about resistance of certain fungi to benomyl. The fungi do not resist benomyl, they tolerate it. Other speakers and writers refer to resistance to ozone or to salt when they actually mean tolerance of ozone or salt. I believe that they should be more precise in their terminology.

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Alternatives in Using Weather-Related Data

There can be little disagreement with the main objectives of the editorial by A. L. Jones and P. D. Fisher in the February 1984 issue of PLANT DISEASE (page 87): the utilization of weather-driven models for disease control strategies. From their research efforts they have developed a philosophy on methods to implement these objectives. As there are few absolutes in life, alternate approaches are available to achieve the main objectives of Jones and Fisher.

First, it is necessary to realize that agriculture is a highly complex system with direct and subtle interactions among its numerous, diverse components—soil conservation, government programs, urbanization, pests, fuels, fertilizers, soil resources, plant genetic pool, mechanical technology, irrigation, capital supply, labor supply, etc. Weather and climate influence many components of this system.

Jones and Fisher believe it is necessary that automated weather stations dedicated to predictions of a specific disease be located in each grower's field. In order to use the same weather data for a different pest, it would be necessary to replace a circuit board. If one carries this argument to an extreme, either there would be automated weather stations for insects, frost warnings, irrigation, etc., that is, one for each weather-related problem, or a large volume of circuit boards would have to be exchanged. It may be necessary to have several stations in nonuniform fields. Weather-related information should not be limited to one crop (apples) but should apply to all crops of economic importance. Finally, the grower may be ill prepared for the responsibility of maintenance and calibration of these stations.

The final decision to take any action against a pest rests with the grower. Thus, the information made available to the grower should be in a format that he can understand, perhaps by attaching probabilities to different courses of action. The grower need not understand the models; extension personnel or consultants are necessary to change data into useful information.

Networks of automated weather stations, ie, centralized systems, are a reality (1). Obviously, these stations cannot measure meteorological parameters in every field, but through the use of interpolation schemes, estimates of these parameters can be made available for any location within a network. These interpolated values can be combined with microclimate models (3) and pest models to make predictions. This type of weather-based information system can be extended to any type of agricultural model requiring weather data; thus, relevant models described in the latest journals can be incorporated into this system. Of course, it would be necessary to verify these models before they become part of an operational system. Revising programs with a centralized system is much simpler than reprogramming and replacing EPROMs or circuit boards in dedicated weather stations. In addition, short-term and long-term weather forecasts can be incorporated into models available on a centralized system so as to increase options available to the grower.

Information derived from these networks can be made available to growers via a computer tie-in to a centralized system; via early morning, noon, or late evening weather shows on educational or commercial television or radio; and/or by extension personnel or consultants.

Tschirley (2), defining integrated pest management (IPM) in the broadest sense as a total systems approach to crop protection from all pests, sees implementation as being at least another generation away. He attributes this situation to the relative ease of intradisciplinary research, evaluation, and funding as compared with interdisciplinary research. It seems to me that a centralized source of the data needed to support pest models could only serve to foster cooperation and appreciation of other disciplines and hopefully lead to a relatively rapid, broad implementation of IPM.

Any successful business constantly evaluates its operations, developing and pursuing promising areas and discontinuing areas that are not profitable. Successful universities will have to follow a similar path. One obvious need is more university strength in agricultural meteorology. Agricultural meteorologists have the skills needed to develop centralized weather networks. They can interact with a wide variety of specialists in converting research results into useful information. They can help develop methods for timely dissemination of such information. I hope these comments will open up a positive debate between plant pathologists and agricultural meteorologists so that synergistic relationships can be developed.

LITERATURE CITED

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