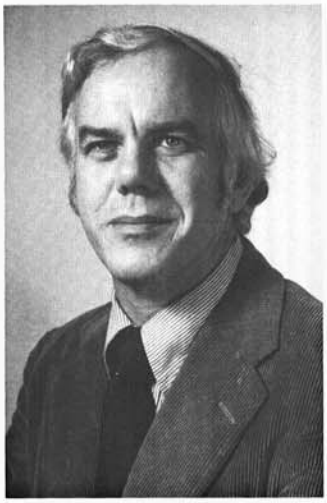
Editorial

Exotic Plant Pathogens—Who's Responsible?

CHARLES L. WILSON
Lead Scientist, Fruit Pathology Unit, USDA-ARS, Appalachian Fruit Research Station, Kearneysville, WV



Diseases caused by introduced exotic pathogens have had a major impact on the science of plant pathology. Chestnut blight and Dutch elm disease and other diseases caused by introduced pathogens have occupied center stage among destructive plant diseases in the United States. Although plant pathologists have devoted much attention to introduced exotic pathogens and their diseases, they have given little attention to *potential* exotic pathogen introductions.

Accelerated international trade has increased the odds of exotic pathogen introductions into the United States. Particularly alarming is our increased trade with China and other Asian countries. Many of our most destructive introduced pathogens, e.g., Dutch elm disease, have come from Asia by way of Europe, and we have had Europe as an "observation post" to see what some of these pathogens might do. Direct trade in agricultural commodities with Asia takes away this advantage and increases the likelihood of some unpleasant "surprises."

Entomologists have done a better job than plant pathologists of analyzing past exotic pest introductions and predicting future developments. The late R. I. Sailer of the University of Florida indicated that of the important insects introduced into the United States, two-thirds would not have been expected to be major pests on the basis of their behavior in their native habitats. This argues that we need means of assessing potential pest introductions more sophisticated than just direct observations.

Attempts are being made in this country to assess the potential impact of exotic pathogen introductions. The main federal effort is at the USDA Foreign Disease-Weed Science Research Unit in Frederick, Maryland, where containment facilities allow detailed examination of such disease-causing organisms as the soybean rust pathogen *Phakopsora pachyrhizi*, exotic downy mildews of corn, and maize streak virus. The problem is that only a very small percentage of potentially hazardous exotics can be examined in this manner. Also, we cannot pick our potential enemies on the sole basis of performance in native habitats.

Is there some logical basis for predicting where our major exotic pathogen threats are in the world and what plants are most vulnerable to their attacks? I believe there is. On the basis of ecological principles, I submit that:

1. Continuous, perennial ecosystems are more threatened by exotics than are discontinuous, annual agroecosystems (annual crops).

2. Organisms from larger landmasses (e.g., Eurasia) are apt to replace native ones in smaller areas.

3. Organisms are limited in distribution and spread by climatic conditions in regions where they evolved.

If these are valid statements, we would expect the greatest threats to come from exotic pathogens of forests, rangeland, and orchards in areas of Eurasia with climates comparable to ours. My thesis is supported by the fact that, indeed, many of our most destructive and costly epidemics have been caused by exotic pathogens affecting forests and shade and orchard trees, e.g., Dutch elm disease, chestnut blight, white pine blister rust, and citrus canker. The 1973 McGregor report prepared for APHIS on potential emigrant pests also supports this contention. Nine of the 10 pathogens listed as most dangerous if introduced were pathogens of trees. Clearly, in studying potential exotic pathogen introductions, our emphasis should be on tree diseases. This has not been the case.

Who has the responsibility in dealing with potential exotic pathogen introductions? The heavy part of the load has fallen on regulatory agencies—at the federal level, APHIS. Regulatory agencies formulate their quarantine decisions and procedures after consulting with the scientific community. The McGregor task force was charged in 1973 to assess the effectiveness of U.S. quarantine and inspection procedures in regard to foreign pests. Shockingly, the report does not affirm our quarantine system. McGregor states: "Worldwide quarantine programs appear to be based on authority without scientific support or verification. Quarantine actions are a matter of public policy and the usefulness of these activities has not been verified."

Plant pathologists have not given the exotic pest problem the attention it demands. Consequently, knowledge on which to devise and implement defensive strategies is often scanty. The different scientific disciplines with the expertise to deal with this problem have just not been challenged to carry their full load. Hence, we find conflicting and confusing advice for combating exotics.

Recent advances in plant pathology should be of considerable help in detecting foreign pathogens at ports of entry and plant introduction stations. Serological methods, with the advantages of speed and specificity, could be used to a greater extent to detect exotic pathogens. Also, genetic manipulation could be used to develop plants with less vulnerability to exotic pathogens. M. D. Simons and J. A. Browning have indicated that one way we can buy insurance against possible exotic pathogen introductions is to build more diversity into our crop genetics. So, there is much that plant pathologists can do to attack the exotic pest problem—but not enough are doing it.

Exotic pest introductions are a two-way street. Other countries are concerned about pest introductions from the United States, and this interferes with the export of our agricultural commodities. Recent examples are the Chinese concern over introduction of *Tilletia controversa* on our grain and the Japanese concern over introduction of *Erwinia amylovora* on our apples.

Most of the communication between countries concerning exotic pest threats is through regulatory officials and agricultural administrators. The scientific community impacts indirectly when asked for advice. I would like to see research scientists take a more direct and active role in determining regulatory policies for foreign pathogens. One way would be for major trading countries to establish scientific panels, with representatives from both countries, that meet periodically to exchange information on pest developments in their respective countries. These panels should have experts on major plant pest groups (insects, pathogens, and weeds) and could issue policy recommendations concerning the import and export of certain agricultural commodities. The panels could study any new proposed imports or exports and make recommendations.

The operation of such a panel might be construed as providing information that might restrict free trade. Sometimes the threat of a pest introduction can become a political and economic weapon. Reason and the true biology of the situation do not always prevail. However, a panel of scientists representing both countries should allow a clearer picture to emerge as to the biological soundness of regulatory decisions.

Whose responsibility is the exotic pest problem? All of us who are paid by the public to protect their plants from disease are responsible, not just the regulatory people who have to fight the battle in the trenches. As research plant pathologists, we need to supply regulatory agencies with better strategies and tools to fight the good fight.