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Plant Pathology: Where are We Headed Beyond 2000?

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Where is plant pathology headed beyond 2000? As we stand on the threshold of a new century, the challenges facing our discipline are greater than ever. The new tools of biotechnology and molecular biology offer exciting possibilities, and, yet, we are confused and apprehensive about the future directions of plant pathology, about the mission of Land Grant universities, and, indeed, about all of agricultural research, teaching, and extension.

Today several of us will explain how we see this situation and describe our vision of the future. None of us have collaborated. Each comes from a different background and with a different viewpoint. I do not know whether we will generate any consensus, but I hope we will pique your interest and stimulate you to become involved in what I see as the necessity of carefully moving our discipline into the new environment in which it must operate in the next century.

So, what really is the problem? Why can't we just continue to do what we have done so well in the past? The symptoms of the problem are apparent to us all—level or declining financial support for agricultural sciences, low undergraduate enrollments in agricultural disciplines, low numbers of quality applicants for our graduate programs, and declining job opportunities for our graduates. But these are only symptoms. The root causes of these trends lie in current public opinion about the role of agriculture in modern society, the mission of public universities, and the priorities for spending limited tax revenues.

The United States is no longer the agrarian society that the Land Grant University system was founded to serve. K. Allen, of the University of Wisconsin Rural Development Institute, stated in a recent essay in *Choices* (1) that the Baby Boomer generation has now come to power: "They are skeptical and used to being heard. They are largely urban and suburban dwellers, generationally and psychologically a long way from their agrarian forebearers. . . . They question agricultural production and processing practices. . . . Their questions are based on health, environmental, and philosophical concerns and contain the seeds of change for American farmers and processors. . . . They want cheap food produced by a system that uses fewer chemicals, preserves more resources . . . and produces less waste. At the same time, they are highly suspicious of many of the biotechnologies that may hold the greatest hope of meeting these often conflicting goals."

In a recent essay in *Science* (4), J. Meyer, Chancellor Emeritus of the University of California, Davis, outlined the problems facing colleges of agriculture: "The public tends to see agriculture as a competitor for natural resources . . . and fails to appreciate that these same natural resources ensure a reliable supply of high-quality food at reasonable prices. . . . Thus, colleges (of agriculture) find themselves between a rock and a hard place—dependent on traditional clientele for assured support, yet aware that they need to do a better job of serving the interests of the general public." I recently expressed the view in *Phytopathology News* (6) that we may be in the midst of a revolution in agricultural science because of changing priorities in the public sector resulting in the decreased willingness of the public to pay the bill for agricultural research and extension.

Our discipline of plant pathology now finds itself caught in this web of changing public opinion and expectations. I am acutely aware of this situation, not only because of my activities as APS president, but because my own university is now undergoing a mandated university-wide restructuring, with colleges downsizing, altering priorities, and realigning departments.

When struggling to see a vision of the future in a cloudy crystal ball, it is sometimes helpful to look at the past. In 1982, J. A. Browning titled his APS presidential address "Whither Plant Pathology? Whither Plant Health?" (2). He stressed the importance of a sustainable agriculture, the need for more interdisciplinary team research, the need for broadly trained plant-health professionals, and the need for scientific societies to work together on common issues. These priorities in Browning's vision of the future are still valid today, and some progress has been made in these areas. His crystal ball too was cloudy, however, because he did not mention biotechnology, the environmental movement, or problems with declining financial support and student enrollments.

Looking even further back, we can see that the situation today has evolved from patterns that have been in place for decades. In the 1971 *Annual Review of Phytopathology*, W. C. Snyder wrote an article entitled "Plant Pathology Today" (7). He said "Today the sciences, including plant pathology, and even the universities are in trouble. . . . Terms such as agriculture and plant pathology are a bit 'out', while ecology and environment are 'in'. . . . One of plant pathology's problems today is to survive this era of the 'instant ecologist' and the 'too much food' propagandist and to ready ourselves for the enormous responsibility of the future." Well, the future is here. It may not be just what Snyder had in mind, but the challenge facing all of us is to recognize the political realities of today and then position ourselves and our discipline to move confidently into the 21st century.

In facing these challenges, I suggest we keep in mind the environmental bumper sticker we all have seen that reads "Think Globally—Act Locally". We need to develop a good understanding of the overall political landscape and then each take appropriate actions at our own local level. In doing this, I believe our efforts should be directed in three main areas—examining the priorities of our research and extension programs, realigning our curricula, and educating the general public.

In an editorial in *California Agriculture* (8), H. Vaux, Associate Vice President for Agriculture and Natural Resources at the University of California, wrote "We must change our research programs . . . to focus on ways of producing food and fiber that reduce risks to health, to biological diversity, and to the resource base itself. . . . In the future, our task will be less to improve than to maintain productivity and profitability in the face of constraints designed to preserve our natural resources."

It is my opinion that most Americans are relatively pleased with the products of modern agriculture, but they don't like the technology used to produce them. As plant pathologists, we should rise to this challenge to change our agricultural production sys-

tems. We need to direct our basic and applied research programs toward the development of disease-management systems that minimize the use of pesticides and maximize biological, genetic, and cultural controls. Our research also must lead to management strategies that can be readily integrated into holistic plant health-maintenance systems. If we clearly demonstrate to the general public and to policy makers that this is our goal, they will support our work. It is imperative that our research and extension programs be perceived as relevant to the broad-based concerns of society today rather than addressing only the priorities of agricultural producers or those of the scientific community.

With regard to curricula, plant pathologists need to decide who they are educating and for what purpose. Although the need for Ph.D-level research pathologists will continue, the present and future market for these people may not be sufficient to attract the numbers of high-quality students we need to maintain our programs. Reorganization of our curricula is crucial to the survival of plant pathology as an academic discipline in today's universities. Our curricula must be designed to teach what today's students really want and need as they prepare to pursue their careers in the next century. I recently suggested in *Phytopathology News* (5) that departments may have to specialize in the type of graduate programs they offer: "Some may move completely into the molecular areas of host-pathogen interactions, primarily educating students for research careers. Others may specialize in educating practitioners who will find careers in extension, industry, or private practice. Some departments may . . . develop an international curriculum with programs tailored specifically to the needs of students from foreign countries." I believe we must also move aggressively into the undergraduate arena, because "there is a considerable role for plant pathology at the undergraduate level in courses dealing with environmental issues, food production, integrated plant health management, and contemporary issues in science and public policy." Since we are broad-based biologists, we also can contribute to courses in biology, ecology, or general science.

In the area of public education, we must all take a greater role. In her essay (1), K. Allen pointed out that "the public generally is scientifically illiterate, with only the vaguest understanding of how food and fiber are produced and processed. . . . As agricultural professionals, we owe it to the agricultural community at large to make every effort to reach out to and listen to, to educate and to learn from, the general public." In a recent *Phytopathology News* (3), C. L. Campbell called for "a national campaign to educate people about what 20th century agriculture really is, what 21st century agriculture will be, and the vital role that Land Grant universities will play in the transition." Most of the problems that we face today are due to shifts in public policy. I encourage all of you to get involved in public education about plant pathology and modern agriculture. As you do, keep in mind that public policy is driven not by truth, but by the perception of truth.

APS also has an important role to play in all of this. Many of us have been working on an APS futuring document that will be sent to all of you sometime this winter. It outlines our vision of where the discipline should be headed in research, teaching, and extension. I hope you will find it useful in your departments and businesses and with policy makers at all levels. In the area of public education, I am chairing a committee studying the establishment of a new APS Office of Public Policy and Education. This office will help to focus and expand the efforts of APS members and staff to make the public more aware of the importance of plant pathology and agricultural science and to influence public policy. Once this is in place, there will be new opportunities for each of you to participate in this important effort.

In closing, I want to emphasize the importance of constantly seeking opportunity when sailing on troubled waters. We must be alert continually for new ways to position our discipline as an important part of the changes that are underway. Plant pathology has contributed immensely to the development of modern agriculture and has an equally important role to play in the post-modern period we are facing. While we "Think Globally" about the challenges facing agricultural science today, lets each of us "Act Locally" to focus our research and extension programs on developing the technology needed for a transition to 21st century agriculture, to educate students in creative ways as 21st century leaders, and to devote some of our time to educating the public at large on agricultural issues of general societal concern. If we accomplish this, plant pathology will continue to grow and prosper well beyond 2000. Thank you.

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