Improving the Regulation of Pesticides Will Require More Than Data

LARRY ELWORTH, Program Coordinator, Pennsylvania Apple Marketing Board

In his book, *The Structure of Scientific Revolutions* (University of Chicago, 1970), Thomas S. Kuhn suggests that shifts in scientific paradigms are at least partly the result of crises caused by the failure of a current paradigm to provide the basis for solving certain pressing problems. The current situation in pesticide regulation may not have provoked a paradigm shift or crisis of a magnitude comparable to Kuhn's description of the Copernican revolution. Even so, the present approach to regulating fungicides has caused problems that are large enough to indicate a need for basic changes in the method by which pesticides and their role in agriculture are analyzed.

Some extraordinary events have occurred during the past 18 months. Among these events was the removal of a number of registered crop uses of ethylene bisdithiocarbamate (EBDC) fungicides from the market by the registrants prior to regulatory action by the Environmental Protection Agency (EPA). This was accompanied by the registrants' commitment to conduct a comprehensive nationwide survey of residues of EBDC and its metabolite, ETU, in the food supply. Actions by the registrants were followed by the measured, but more Draconian, EPA proposal to cancel registrations for EBDCs. Underlying these actions has been an implicit recognition that the regulation of EBDCs may prove to be a landmark decision in the highly contentious debate over pesticides. This recognition is reinforced by the knowledge that EBDCs play a critical role in the production of dozens of crops.

The broad importance of EPA's action has also exposed crucial flaws in the process by which the agency analyzes the role of fungicides in crop production and the effects of proposed regulatory action. The so-called benefits analysis conducted in the special review process is hindered by a lack of both data and conceptual tools. Such shortcomings hamper the best efforts of economists and biologists to describe the role of pesticides in agricultural production.

The need for better information, particularly about minor crops, has been widely documented and, in all fairness to the agency, presents a daunting challenge. The National Agricultural Pesticide Impact Assessment Program (NAPIAP) was set up to address those data needs but, except for the major crops, has not provided sufficient data for regulatory decision making. The overall need for information on pesticide use and usage patterns has not been matched with adequate resources or direction to accomplish the task.

Unfortunately, even with much more complete data, the present conceptual framework for understanding fungicide use would still fail to accurately depict the role that fungicides play in raising crops. To the extent that a formal methodology for benefits analysis can be said to exist, it lacks the analytical rigor equivalent to that found in concepts of risk assessment. The methodology also falls short in evaluating a number of issues essential to an understanding of the use of chemicals in disease management. For example, the complex interactions that characterize the management of fungicide resistance in pathogen populations are scarcely considered during the evaluation of regulatory impacts. Even though a complete quantitative analysis of such factors may not be possible, a systematic effort should be made to describe their role as part of any evaluation of the effects of pesticide regulation.

Without an understanding of such basic problems as resistance management, the regulation of fungicides amounts to a simplistic intervention into a very complex system. Failure to preserve that complexity in the analysis of the EBDCs virtually ensures that overall pesticide use will increase and that resistance management will be hampered. The net result of the regulatory process will be, in that case, a decision that serves neither the welfare of producers nor the welfare of the public at large.

A basic change needs to take place in the way EPA goes about trying to understand the interaction of pesticides in agriculture. In essence, the need is for a change in paradigm from a reductionist model to a more complex model. At minimum, pesticide use should be evaluated over an entire production system rather than on a chemical-by-chemical basis. That would provide opportunities to balance alternative risks, consider complex relationships, and achieve an overall reduction of risk.

Many people at EPA acknowledge the wisdom of such an approach. But it is no simple matter for the agency to adopt a new way of thinking. Without a solid scientific basis for a more comprehensive approach, the agency is unlikely to take the risk of adopting a new methodology. The science not only must have an internal coherence but also must be able to withstand public scrutiny and challenges associated with the agency making a fundamental change.

The burden for doing the work to develop such a paradigm rests squarely on the scientific community. Plant pathologists and other researchers must undertake the basic and, more important, applied research necessary to develop the parameters and criteria for a more complex methodology. A major effort is needed to design and fund research that will provide methods for comprehensive evaluation of agricultural ecosystems. Without new methods, the current simplistic process will, of necessity, be the agency's default position. In the ever more complex area of agricultural and environmental policy, that position is simply untenable.

If, as many people contend, regulatory decisions should reflect more understanding of the complexities involved in growing crops, then it is up to the agricultural and scientific communities to articulate just how this might be accomplished. Of course, it will involve the building of political consensus to support a change in approach. It will also require a willingness to collect much new data for use in complicated analyses.

The time for hand-wringing and gnashing of teeth by those of us in agriculture over the inadequacies of the present system is finished. The next step should be strategic thinking on the part of the researchers most closely associated with agriculture to discover and explain a new—and more effective—way of evaluating the effects of regulation.