

## A Viewpoint on Integrated Pest Management

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Let us examine first what Integrated Pest Management (IPM) is not and then what it is. I believe IPM means different things to different people, depending on their own backgrounds of training and experience as well as their personal agendas for action. Here are some of the things IPM is not: 1) a synonym for biological control of insect pests, 2) a nonchemical control method for plant pests, 3) a simple tactic to eliminate pests and diseases of plants or animals, 4) a single recipe or formula for pest control, 5) a substitute for sound judgment, and 6) solely an entomological program.

Although the term is most commonly accepted to mean a methodology for controlling insect pests of plants, it should be understood that when used in a much broader context it includes the control strategies applied to a wide range of plant and animal pests and diseases that cause damage to their hosts. Thus, the term has meaning for plant pathologists, nematologists, weed specialists, and crop and animal specialists as well as entomologists. When I say that IPM is not any one of the above concepts, I mean it is not any one of them acting independently of the others. There is an integration of many actions and biological activities in the IPM approach of reducing or eliminating plant damage due to pest and disease attacks.

IPM is not a panacea for pest and disease control. It is an ecological approach to maintaining plant health. It is an attitude evolving into a concept for controlling pest and disease damage to plants. It is based on an understanding of the entire ecological system to which the host we are interested in keeping healthy belongs. The concept assumes that we see the value in maintaining an equilibrium among all beneficial biological and physical forms in that ecosystem. The concept places the plant or animal host, rather than the pest or disease affecting it, at the center of attention. It recognizes that numerous factors of the environment and the host make the host more or less susceptible to a particular pest or disease. It recognizes also that these factors often influence the actions of each other. IPM takes into account the fact that individual plants and animals are only members of a community of plants and animals that exerts an influence on pest and disease occurrence. It acknowledges the significant role that weather plays in this interacting environment. The IPM concept also accepts the premise that some damage to plant and animal individuals or populations is economically and/or aesthetically tolerable.

Thus, one might say that IPM is a concept employing many strategies to maintain plant and animal health by minimizing damage caused by pests and diseases through the use of tactics that will vary according to the presence of a variety of modifying factors. The strategies include minimum use of chemical pesticides when and if necessary to reduce pest and pathogen populations to nondamaging levels; employment and encouragement of beneficial biological forms to counter the

pest species; use of resistant and/or tolerant host species and varieties; modification of cultural practices to reduce or avoid exposure to pest and pathogen attack; and use of any other strategy that will interrupt the successful interaction between a host and its pest or pathogen.

There are a few actions and attitudes I believe are required for successful IPM program development. Just as successful development of a sound IPM program requires the analytical integration of data from a variety of factors in the ecosystem, the epidemiological studies and data accumulation require multidisciplinary team participation in often tedious and mundane activities. Modeling of systems and interactive evaluations are essential to reducing the massive quantities of data to manageable components for further analyses and drawing of conclusions. Finally, once derived, conclusions must be packaged and transmitted in a form that can be understood and implemented by the practitioner. To get this far in an IPM developmental program requires the scientific community to accept a different system of research management than that to which the scientists and faculty members of universities have traditionally been accustomed. Success will be achieved only through creative scientists working together as a team toward a common goal.

IPM program development is followed by implementation. This is not as easy as it might appear to persons unfamiliar with the concept. It requires establishment of a system to monitor the factors of the ecosystems that are a part of the IPM model. It also requires a team of scientific experts who can modify the model according to current data when such action is deemed appropriate. Successful implementation requires timely (which usually means rapid) analyses of data used in forecasting events, and then timely transmission of the forecast information to the practitioners or users of the information. It is my view that trained practitioners are required for the successful implementation of IPM programs because interpretation and exercise of sound judgment will be necessary to utilize forecasted information most effectively.

I see an opportunity to develop a profession of crop managers and plant health specialists. I am particularly enthusiastic about developing private sector specialists with a professional doctoral degree in plant health. Practical internships would replace the thesis research program now required for the Ph.D. degree. The professional doctoral degree would clearly indicate that the holder was a practicing professional rather than a research specialist. For starters, I suggest the advanced degree be identified as a doctor of plant health—D.Pl.H. Universities with departments of entomology, plant pathology, nematology, botany and plant physiology, weed sciences, and crop and soil sciences, together with other supportive disciplines, would be the sources of this new professional doctorate program. Finally, there should be a state- and professional association-managed program to license holders of this professional doctorate so that minimum standards could be maintained and some control of who would be eligible to practice this profession would prevail.

It is my belief that the widespread adoption of IPM programs for plant pest and disease control will develop and flourish only after such a profession gains a foothold in our private sector economy.

I do not mean to paint an overly complex and discouraging picture to describe what I believe is required to achieve successful integrated pest managed control systems. However, I do want to be realistic in describing the not insignificant commitment of financial and human resources necessary to develop and implement IPM programs. To do less will lead to discrediting an important advance in pest and disease control of plants and may even lead to a backlash of legislation outlawing pesticide use altogether.

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