

## Integrated Pest Management (IPM) Courses and Curricula: Regaining Momentum

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Academic integrated pest management (IPM) programs represent rare opportunities for students to deal with interdisciplinary issues and problems. Students enroll in IPM programs for many reasons, including an interest in agriculture and concern for the environment and the consequences of human activity. Students who persist in IPM courses and curricula seem to thrive on the subject matter and its challenges.

IPM graduates have a breadth of information and experience unique to interdisciplinary programs. They are capable of making rich and diverse contributions to society beyond their career selections. They are well prepared for a variety of careers. Yet, while need for such graduates is increasing in view of the complexities of modern agriculture and other world problems, enrollments in IPM curricula are decreasing even in institutions that made genuine commitment to program success.

I have served as coordinator of North Carolina State University's academic IPM programs since 1977, and I am proud that among graduates of our IPM curricula (B.S. degree, M.S. minor, M.Ag. concentration), individuals are meeting societal needs as extension agents, marketing specialists, farm advisors, farmers, IPM consultants, research assistants, Peace Corps volunteers, landscape specialists, agriproducts salespersons, federal and state regulatory inspectors, and farm loan officers. Many have completed advanced degrees. A few have redirected their capabilities, interestingly, toward medicine and the ministry. Only a few are not working in areas relating to their IPM major. None, to my knowledge, regret their choice of major. I believe that IPM faculty and program coordinators at other institutions are equally proud of their graduates and equally disturbed by the current, hopefully temporary, disinterest in IPM study.

Why are IPM programs suffering enrollment decline when the societal importance of the IPM approach to pest problems is so widely acknowledged? Both national and institutional reports have recognized the need for individuals who either alone or as team members can identify, diagnose, assess, predict, and manage pest populations or complexes, while taking into account both long- and short-term economic, environmental, and social effects of management decisions. While recognizing that these objectives of IPM curricula are extensive in scope, they address the approaches necessary for effective pest population management, i.e., IPM, today.

### Some contributing factors

I see several factors contributing to the loss of momentum in IPM academic programs:

1. Many IPM programs were established during the 1970s when federal and institutional support for IPM generally was strong, especially as we tried to recover from the pesticide era. Now, federal support does not exist in a tangible way and institutional support generally has waned.

2. IPM is not recognized as a true discipline, founded, as many others, on interdisciplinary information. It has not

achieved clear institutional identity—i.e., departmental status and corresponding support, including a visible and permanent faculty—and this confuses student perceptions of IPM. Furthermore, IPM is not, as students frequently hear, synonymous with integrated crop management, nor is it equivalent to pesticide management.

3. We are in a period of low enrollment in the agricultural sciences as a result of numerous, varied, and converging demographic, social, and economic trends. Fewer and fewer individuals (young people and their parents, teachers, and counselors) understand our agricultural and forestry industries and their support systems. We have failed to impress all these populations about the details of these industries and the merits of IPM information and approaches relative to their survival and success. The current “farm crisis” is an additional deterrent to students' perception of and enthusiasm for agricultural studies.

4. Another factor in the decline might be a lessening of concern for environmental issues. Today's students have grown up with Love Canal, acid deposition, Three Mile Island, air and water pollution, overpopulation, and a multitude of problems of such immense scope that I believe many feel hopeless about these issues and unmotivated in becoming involved in seeking solutions.

### Possible external and internal causes

IPM cannot, of course, solve all of the world's problems, but its underlying principles and strategies are applicable to many situations. IPM can and should be combined with other academic programs in the social and physical as well as biological and agricultural sciences to help prepare students to meet some of the challenges ahead. Agriculture, we have learned, is not an industry that can be separated from the rest of the world.

At most land-grant institutions, only a handful of undergraduate students in the biological and agricultural sciences voluntarily enroll in IPM courses, or courses in ecology, ethics, pesticide application technology, meteorology, or alternative agricultural systems. I find this lack of enthusiasm for germane information and holistic approaches *that usually are not required in traditional curricula* disturbing. I submit that faculty attitudes, fierce competition for FTEs, rigid curricula perspectives in traditional departments, and the reward system contribute to student perceptions and attitudes. Small interdisciplinary programs are especially vulnerable during periods of declining institutional enrollments when strong traditional departments are competing among themselves for students.

These factors are possible external causes for decline in IPM programs. We should also look closely at internal causes for lack of program support.

What is the quality of the IPM programs offered? Are they truly interdisciplinary and clearly focused on IPM? Are they well taught? Do courses transcend definitions and descriptions of “count and spray” programs for insect pests? Is IPM instruction well supported administratively? Do IPM students have their own study rooms to foster disciplinary identity and overcome the lack of a departmental home? Do they have

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scholarships and access to field facilities? Do advisors recommend IPM courses? Do departmental requirements include IPM courses?

Perhaps some institutions could say “yes” to most of these questions, but I believe that many more could not. The failings are not only institutional, they are also disciplinary. IPM faculty have not produced an abundance of quality IPM textbooks, curriculum materials, and educational films to undergird IPM instruction. We have not persuaded our colleagues that IPM contributes significantly to students’ knowledge of the ecological dynamics of sustainable agricultural systems. We have not done well in exposing employers to the merits and competencies of IPM graduates, although in my experience and that of other IPM program coordinators, employers of IPM graduates are very impressed with graduates’ abilities—and come back looking for more. With a constantly diminishing IPM student pool, employers simply hire others.

### **Commitment to the holistic approach**

IPM has been tremendously successful in many ways, and of this we should be proud. IPM pervades much biological and agricultural research and many extension programs. Acceptance of many of its parameters, e.g., monitoring and use of thresholds, is obvious in most gardening, farm, and trade journals. The IPM *concept* is taught in many departmental courses. Although this approach has merit in enlarging the scope of traditional disciplines, it does not provide for the needed integration of concepts, information, and techniques. The departmental approach leaves students knowing that pest problems should be anticipated, analyzed, and solved in a holistic manner, but it does not teach them *how* to do this.

Only truly interdisciplinary IPM courses offer students the opportunity to study in depth the principles, objectives, components, application systems, and interaction potential among pests and IPM strategies. It is in IPM courses that students have opportunities to test their interdisciplinary knowledge and skills in real as well as simulated situations. It is in IPM courses that interdisciplinary innovations are formulated—and interdisciplinary innovations are going to be increasingly necessary to achieve agricultural stability and sustainability along with social and environmental stability and sustainability. Students with increased sophistication about computer modeling will further applications of systems science to IPM.

Commitment remains at the national level to the holistic approach embodied in IPM. The National Agriculture and Natural Resources Curriculum Project, funded by the USDA, the educational community, and U.S. businesses, plans to oversee development of undergraduate courses and supporting teaching materials on problem solving, agricultural sociology, energy use, leadership development, and IPM. Immediate focus is on two curriculum areas: 1) systems approaches to food and agricultural problems and 2) ethical aspects of food, agriculture, and natural resources policy. Literature from the project’s first Faculty Workshop on Systems Approaches to Food and Agriculture Problems (summer, 1986, Fort Collins, Colorado) emphasizes that “learning to manage the complexity

of modern agriculture involves concepts and abilities rarely included comprehensively in typical programs of higher education.” Agriculture and many other human industries need IPM; consequently, it is our responsibility to insist that our students study IPM. IPM is too important to be subject to whims of academic fashion or federal funding. We cannot tolerate or risk, at any level, unnecessary economic, social, or ecological crises that result from unilateral approaches until the consequences catch up with us.

### **Several steps to take**

What can we do to regain the momentum? As a beginning, we need to take several steps:

1. We who identify ourselves as IPM faculty need to meet on a regular basis and establish our identity as a discipline. A formal IPM teaching newsletter or other written organ could be a logical outgrowth of these meetings.

2. We need to encourage individuals to write textbooks and committees to create up-to-date curriculum materials. We should enlist the support of the national curriculum project to provide the focus for these efforts. Techniques that have worked in successful IPM or other interdisciplinary programs need to be publicized so that they can be adapted to new situations.

3. We need to convince our colleagues and administrators and potential employers of our graduates about the unique usefulness of IPM instruction. Systems agriculture is deservedly attracting current attention, and it cannot be implemented without IPM.

4. We need to work harder to fund scholarships for IPM students, and then we need to recruit top students for our programs.

5. Where IPM cannot continue as independent curricula, we need to require a two-semester IPM overview course in *all* undergraduate agricultural disciplines. An advanced IPM seminar should be required for credit toward graduate degrees in IPM-related disciplines. Some institutions now are developing undergraduate and graduate curricula in plant health, agricultural systems, sustainable agriculture, and alternative agriculture. IPM instruction must be an integral part of these programs.

Time will only reinforce the validity of the principles of IPM and the urgency of IPM teaching, research, and extension programs. Population increases in certain world regions, escalating urbanization of developing countries, and the ongoing need to help both small- and large-scale U.S. agriculture will continue to confront us with a multitude of economic, social, and environmental problems. Ad hoc solutions will always be inadequate. Sound management practices based on well-founded principles of IPM will be essential.

I invite those who share my concern for the survival of IPM courses and curricula to contact me (Box 7611, North Carolina State University, Raleigh 27695-7611) so that we can begin to take these steps, not just for ourselves and our programs, but because IPM deserves the best academic support we can muster. Letters to journals of relevant societies referencing this article will broaden the scope of this invitation.