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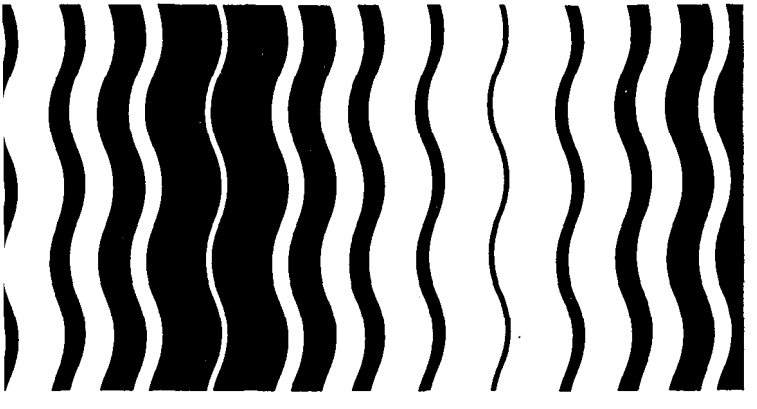
# Integrated Pest Management from Concept to Reality



# Integrated Pest Management from Concept to Reality

Remarks by
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before the
State of California Integrated Pest Management
Conference

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I appreciate this opportunity to participate in the State of California's Integrated Pest Management Conference.

This Conference is designed to explore many of the most fundamental topics on integrated pest management facing farmers, researchers, educators, government officials, and others today. Those who conceived, planned, and sponsored this event deserve our congratulations for their comprehensive approach.

This Conference demonstrates once again that California—the Nation's richest agricultural state—is a national leader in promoting—and using—innovative agricultural techniques like integrated pest management, or IPM.

As the planners of this Conference know, it is no coincidence that high agricultural productivity and the application of new technology go hand in hand.

IPM is not new, however. IPM methods of one kind or another have been used for years—and farmers tend to get a little annoyed, and understandably so, when government bureaucrats talk about "integrated pest management" as if it is the first agricultural improvement since the horse-drawn plow.

Ecologically oriented pest-control strategies were pursued in the United States long before today's widespread use of petroleum-based pesticides. Entomologists working on the boll weevil during the first few years after its invasion into this country from Mexico in the early 1890s, for example, made exceptional contributions. Without insecticides, they employed tactics that included use of resistant varieties, phytosanitation practices, and various biological controls. While we do not know how effective this system was by today's standards, it was effective enough to be used even after calcium arsenate was introduced in the early 1920s.

As we all know, the advent of petroleum-based pesticides, along with aerial applications, halted or greatly reduced the use of ecologically oriented pest control techniques in cotton and other crops.

Today, there are some very good reasons for us to take a new look at some of these past practices to control pests and stimulate agricultural production and productivity. We are beginning to see that there are limits to the advances that chemical pesticides have created. IPM techniques—vastly improved and expanded in recent years—offer one way to go beyond these limits, to better serve a world that is constantly in need of more food.

A number of factors suggest that there are sound economic, social, agricultural, and public health reasons for exploring and utilizing alternatives, substitutes, and supplements to petrochemical-based pesticides:

First, petroleum-based pesticides have become, and will continue to be, dramatically more expensive. Eighty percent of the billion pounds of pesticides used in the United States each year are petrochemically based—that is, the active ingredient is a petroleum derivative. This figure does not include pesticides whose production or extraction processes require petroleum-based solvents,

nor does it account for the use of petrochemicals as "inert" ingredients in non-petrochemical pesticides.

Second, the ability of pests to develop resistance to chemicals continues to erode the effectiveness of conventional pesticides. As California farmers know very well, scores of insect species no longer succumb to the chemicals that were originally designed to eliminate them. Other pests have become economically important because chemicals have eliminated their natural enemies.

And third, there is growing public concern over health and environmental hazards resulting from the extensive use of chemical pesticides. Science is improving our ability to identify and quantify these health and environmental risks, thereby generating a constantly growing body of hard evidence to back up this public concern.

There is an extraordinary consensus on these points, as illustrated by the following three views:

President Carter's Environmental Message to Congress last May encouraged pest management techniques that "emphasize the use of natural biological controls like predators, pest-specific diseases, pest-resistant varieties, and hormones."

Secretary of Agriculture Bob Bergland, in a speech last September before the National Agricultural Chemicals Association, or NACA, stressed the Department's leadership role in offering American farmers an alternative to applying pesticides to crops at set intervals. He said that USDA will "give special emphasis to the development and use of alternative tactics in integrated pest management systems."

NACA's own policy is to "endorse and urge support of programs that have as their ultimate objectives the achievement of pest suppression based on sound ecological principles that integrate chemical, biological, and cultural methods into a practical program, where necessary and when possible."

And EPA, under the Federal Insecticide, Fungicide, and Rodenticide Act and the new Toxic Substances Control Act of 1976, is firmly committed to reducing the serious health and environmental risks created by hazardous chemical substances.

As the President's Environmental Message also said:

"The presence of toxic chemicals in our environment is one of the grimmest discoveries of the industrial era. Rather than coping with these hazards after they have escaped into our environment, our primary objective must be to prevent them from entering the environment at all."

IPM is an important component in these goals. It is an environmentally protective approach to meeting our needs for food and fiber. It is an approach that emphasizes the use of natural control factors and de-emphasizes the rote use of chemical pesticides. It does not mean the elimination of chemicals from the farmer's battery of tools to control pests. It does mean emphasis on using a variety of tools for pest *control*—not for pest *eradication*.

Some people contend that the IPM revival is simply a return to past practices that cannot meet today's needs. Those who question the current interest in IPM development charge that its proponents are rediscovering techniques that many wise farmers have known about for years, and that farmers do not want to go back to methods that were overtaken by the development of effective and economical pesticides.

The present concept of IPM, however, does not mean a return of the hoe and mule.

As an advanced scientific system, IPM relies on the best experience of many disciplines to develop modern pest management strategies that are practical, effective, economical, and protective of both public health and the environment. Classical farming practices such as use of pest-resistant varieties, crop rotation, irrigation techniques, and tilling methods certainly are important components of IPM. But these techniques must be coupled with modern strategies possible through sophisticated scientific, economic, and technical skills.

Foremost among these new strategies is awareness of the status of each pest problem at a given time. The temporal and localized nature of pest management programs require a carefully tuned and sensitive approach that uses knowledge and information about the pest itself, the condition of the host, the prevailing climatic factor, the potential for biological and natural controls, and the proper timing of chemical application.

While we still have a lot to learn from research, many of the means necessary to implement IPM strategies are available and are being used. Others will become accessible in the near future. But none of this will count if farmers fail to adopt IPM techniques and instead rely wholly on chemicals as crop "insurance." Farmers are realistic business people. They need hard evidence from a credible source that IPM will produce adequate pest control and be economically feasible. The evidence is there, and it is growing.

The fact is, integrated pest management programs, employing IPM consultants, almost always save growers more money in insecticide application costs, as opposed to conventional chemical control, than the cost of their services.

Large-scale field programs have demonstrated the practical feasibility of using IPM on major agricultural crops. These have demonstrated that there is no reduction in crop yield or quality, and that greater net profits can be realized than would have been possible with conventional pesticide-control programs.

In 1970 and 1971, for example, two California crops—cotton and oranges—provided some of the best evidence of IPM feasibility. Using services of IPM consultants, cotton growers in San Joaquin Valley saved, relative to conventional control costs, 53 cents per acre in 1970 and $8.62 per acre in 1971 on insect control, including IPM consultant fees. Also in San Joaquin Valley, orange growers showed relative savings of nearly $2 per acre annually over this 2-year period. Growers who did not use

IPM consultant services spent more than twice as much on insecticides in these same years.

Other, more recent examples illustrate that IPM is more effective, less costly, and less hazardous to people and the environment than pesticide-based, conventional pest-control strategies. But IPM development and implementation continue to move at a snail's pace. Only a small percentage of U.S. farmers have adopted modern IPM technology. For the most part, IPM has been used only in areas where high levels of insecticide resistance have developed in insect pests, thereby forcing farmers to seek alternative solutions to conventional pesticides.

Even in California, surveys indicate that IPM has not been used to any significant degree, except perhaps in a few resource categories such as certain parts of the citrus industry, certain cotton districts, and pears.

A variety of factors contribute to this slow development and implementation. Although many researchers have made significant contributions to IPM, there remains a widespread lack of understanding and support for multidisciplinary IPM research and for companion educational and demonstration programs. Also, there still are a number of major crops for which reliable IPM techniques have not been developed. This work will require more researchers, educators, and others who really understand the IPM concept.

Even when an IPM strategy is developed, it is very difficult to translate its advantages and necessity to farmers and others, including commercial credit institutions, who often remain bound to chemical control techniques by faith and tradition. Many perceive the risk from pest damage to be much higher than is warranted by actual circumstances. They continue to use pesticides on a preventive, often needless schedule as a form of insurance rather than risk making a wrong decision based on actual need. This use is fostered by those who traditionally provide the information that growers use to make decisions on pesticide use.

Farmers in California, for example, receive most of their pest-control advice from salesmen representing chemical pesticide companies. This is true in other states, too. Recent studies of California cotton farming concluded that only one percent of the control information originates with farm advisors from the agricultural extension service; in 70 percent of the cases, insect problem-solving decisions originate with chemical company employees. Pest management consultants are used in only 17 percent of the decisions.

Nationally, there will be about 200,000 registered commercial applicators of pesticides in 1978. These include aerial applicators, pest control operators, and others who apply pesticides for hire. By comparison, there are only about 500 extension specialists at public institutions with assignments in the areas of crop and animal health, including IPM. In addition, perhaps several hundred private consultants are working independently or for farm service firms and farmers' cooperatives to provide advice and make

recommendations on IPM. Most of the latter have been in practice fewer than 5 years.

As a former employee of the Council on Environmental Quality, I have been interested in IPM since the Council's 1972 report on the subject. At EPA, I am now able to help implement the concepts and policies recommended in that report and by CEQ's forthcoming new report on IPM. I am looking forward to working with CEQ, the U.S. Department of Agriculture, the land-grant university system, and the states in promoting the adoption of integrated pest management. There are at least three specific areas where I think EPA can have direct impact:

1. *Scientific Research and Demonstration.* IPM is a leap forward, not a step backward, using science and technology to work synergistically with nature's enormous productivity. EPA recognizes the lead role that the Department of Agriculture and the states must play in promoting IPM research and demonstration. But in close coordination with USDA and the states, EPA can also play an important role in this critical area. I am sure that many of you are familiar with the Huffaker project at the University of California, Berkeley, which has received about $7 million from EPA over the last 5 years and about $7 million from the National Science Foundation. We should continue to support this kind of research on IPM techniques.

2. *Regulation.* EPA has a mandate to review all pesticides—both chemical and non-chemical—to insure that they do not cause "unreasonable adverse effects on the environment." Obviously, ways to reduce risks from pesticides are an important consideration in arriving at our regulatory decisions. In our attempts to weigh the risks and benefits of a chemical's use, any approach that reduces exposure and risks to the point where the benefits prevail should be given serious consideration. IPM may provide just that approach. It may well be possible to continue a use of a given pesticide—one that might otherwise be cancelled—if continued use is carried out at significantly reduced levels as part of an IPM program. EPA recently issued two emergency exemptions—both involving experimental compounds for use in pears and cotton—contingent upon users adopting basic IPM techniques. We expect to do more of this in the future.

3. *Information and Implementation.* EPA is exploring a variety of concepts with the Department of Agriculture and with the states to speed the advancement of sound IPM programs. These include infusing information on IPM into the training and certification program, joint information programs and data systems, as well as more demonstration projects. Also, the Federal Government needs to fully examine—in conjunction with the Department of Agriculture's existing crop insurance program—the potential benefits of a new program to insure farmers against pest damage if they follow an approved IPM program.

No single Federal or state agency can make IPM work. We must all contribute. Collaborative efforts, R&D and demonstration projects, regulatory strategies, and educational programs must be made to accelerate the transfer of IPM technology from laboratory and field tests to widespread use. Practical data on IPM techniques are needed—better knowledge of the life cycles and habits of pests, of their natural enemies, of cultural practices, of scouting, of more efficient timing of chemical control, and so on. Farmers need to know what's in it for them before they can be expected to adopt an integrated system rather than continue their heavy reliance on chemical controls.

I think that it is equally important that government not compete with the private sector in providing IPM consultative services. The day must come when IPM will be as vigorously marketed and sold by the private sector as chemical pesticides have been in the past.

As demands for commercial IPM services grow, the university system will increasingly be challenged to offer innovative training programs especially designed for students entering this work, and to make sure that commercial consultants have the latest information in IPM technology.

Further, as state and Federal governments and professional societies move toward requiring greater professionalism of those who deliver services in pest control and IPM consulting, the demand for university-trained IPM specialists will increase. Several universities already offer B.S. and M.S. degrees specializing in IPM. More such programs will be needed.

Meeting the challenges I have just reviewed will not be easy. Today's demands upon agricultural specialists require new visions of the field and its problems. I look forward to working with you as we conceive and develop new ways to stimulate safe, economical, and productive improvements in our Nation's agriculture.

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