

NATIONAL ROADMAP FOR INTEGRATED PEST MANAGEMENT (IPM)

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INTRODUCTION

The National Roadmap for Integrated Pest Management (IPM) identifies strategic directions for IPM research, implementation, and measurement. These are needed to insure that the economic, health, and environmental benefits of IPM adoption are realized. Development of this Roadmap began in February 2002 and the resulting document has evolved through continuous input from numerous IPM experts, practitioners, and stakeholders. This document also provides a positive response to the recommendations made in the U.S. General Accounting Office (GAO) report on IPM that was issued in August 2001 (Agricultural Pesticides: Management Improvements Needed to Further Promote Integrated Pest Management).

Global markets for agricultural products demand high quality at competitive prices. Growers are challenged with meeting these market demands in the face of increasing production costs and decreasing or unstable commodity prices. A diverse and evolving pest complex requires enhanced management skills that often increase production costs. It will be important for growers to acquire skills in order to implement new technologies, including genetic engineering, biological control, and precision agriculture. The justification for a national IPM Roadmap, which serves to make these transitions as efficient as possible, has never been greater.

Pest management systems are subject to constant change and must respond to a variety of pressures. For example, growers require access to a diverse array of pesticides because numerous pest species have developed resistance. Regulatory actions are, however, restricting or phasing out the use of some broad-spectrum insecticides and fungicides, and growers face uncertainty as to which pesticides will continue to be available. There is considerable interest in the development of non-chemical means of pest management, but some pest species have recently evolved to overcome cultural management tactics such as crop rotation. New targets for IPM programs arise constantly as exotic, invasive species are creating unanticipated challenges in both agricultural and non-agricultural environments. Finally, consumer demands and public opinion are driving changes in the marketplace related to pest management practices. All of these clearly signal the need for the increased development and adoption of IPM practices in agriculture.

In recent years, federal and state governments have focused more attention on the interface between pests, pest management, and people in non-agricultural environments, including residential, recreational, and institutional facilities. A highly successful IPM in Schools program has been developed through state and federal cooperation. In addition, the impact of exotic, invasive species in natural environments has received increased attention and IPM programs are under development to mitigate the impact of these organisms. These and other programs need major enhancements to adequately protect human health and the environment from the impact of pests and pest management tactics.

While there have been dramatic improvements in pest management practices during the last three decades, there continues to be a critical need to devise new options that serve user needs for economical management of pest populations while simultaneously protecting public health and the environment. In parallel with this lies the need to provide unbiased information about both the costs and benefits of IPM to the public. Meeting this need will facilitate informed discussions involving stakeholders and consumers who understand the benefits of public investments in IPM programs. In order to continue IPM development and adoption it will be critical to enhance investments in: 1) new options for economic pest management and 2) public and private education infrastructures.

NATIONAL IPM PROGRAM GOALS

The goal of the National IPM Program is to improve the economic benefits of adopting IPM practices while reducing potential risks to human health and the environment caused by the pests themselves or by the use of pest management practices. The component goals for IPM are further described below.

Improve economic benefits related to the adoption of IPM practices

A major determining factor in the adoption of IPM programs is whether economic benefits outweigh the costs of implementing IPM practices. While there may be many benefits from adoption of IPM practices, if new IPM programs are not as economically beneficial as practices already in place, they are not likely to be adopted without other incentives. Therefore, improving economic benefits from the adoption of IPM practices is a critical component of the National IPM Program.

Reduce potential human health risks from pests and the use of IPM practices

IPM plays a major role in food security. Human health is dependent upon a continuous supply of affordable, high quality food. IPM protects human health through its contribution to food security by reducing potential risks to human health and enhancing worker safety. Success in reducing the health risks from pest management practices themselves were measured in the past by tracking changes in the annual amount of pesticides used in the United States. While pesticide use information is relatively easy to collect, when used alone it is a poor indicator of human health risk, so more advanced systems of measurement are needed.

Minimize adverse environmental risks from pests and the use of IPM practices

IPM programs are designed to protect agricultural, urban and natural resource environments from pests and invasive species encroachment while minimizing unreasonable adverse effects on soil, water, air and non-target plants and animals, including beneficial organisms. IPM practices promote a healthy within crop environment, and conserve organisms that are beneficial to agricultural systems, including pollinators and natural pest enemies. By reducing off-target impacts, IPM also helps to maximize the positive contributions that agricultural land use can make to watershed health and function. Natural resources in many

non-agricultural areas are threatened by pest infestations. IPM contributes to the maintenance of ecological health through the development of low impact practices that suppress invasive species.

NATIONAL IPM PROGRAM LEADERSHIP AND COORDINATION

The National IPM Program is a broad partnership of governmental institutions working with many stakeholders on diverse pest management issues. Leadership, management, and coordination of these IPM efforts will occur at several levels to more completely address the needs of program stakeholders.

At the Federal level, the IPM program is a multi-agency effort that demands multi-agency coordination and collaboration. The Federal IPM Coordinating Committee will provide oversight of the federally funded programs. This committee will be made up of representatives of the major participating Federal agencies and departments. The role of the committee will be to establish overall goals and priorities for the program. To achieve this, a dynamic system of information flow and feedback will be required to provide an up to date and accurate assessment of the status of IPM and the evolving requirements of numerous IPM programs. Stakeholder input to the Federal IPM Coordinating Committee will occur through the Regional IPM Centers. The USDA IPM Coordinator will be responsible for preparing an annual report that documents the status and performance of the IPM program nationally. This report will be distributed to Congress, Federal and State IPM partners, and to the general public.

Regional IPM Centers will play a major role in gathering information concerning the status of IPM, and in the development and implementation of an adaptable and responsive National IPM Roadmap. These Centers will have a broad, coordinating role for IPM and they will invest resources to enhance the development and adoption of IPM.

NATIONAL IPM PROGRAM FOCUS AREAS

The National IPM Program will focus its efforts in three areas – production agriculture, natural resources, and residential and public areas. At the core of each area lies a requirement for building and maintaining research, education and extension programs that are tuned to the priorities outlined in the National IPM Roadmap. Priorities for each of these focus areas are identified below.

Production agriculture

IPM systems will be further developed for food, fiber and ornamental crops that harness the full diversity of cost effective pest management tactics, and improve their efficiency and effectiveness. By focusing on practices that prevent, avoid or mitigate pest attack, IPM systems will have reduced negative impacts on the production area and associated environment by minimizing impairments to water quality. An important priority is the development and implementation of economical and effective IPM systems for crops and commodities consumed by humans. IPM systems in fruits, vegetables and other specialty

crops will help to maintain high quality produce, to protect agricultural workers, and to keep dietary pesticide exposure within acceptable safety standards. These crops make up a major portion of the human diet and require high labor input for production. The priority in this area is to develop alternative tactics that have major economic benefits as well as protect public health including workers and the environment.

Natural resources and recreational environments

Americans spend large amounts of leisure time in natural and recreational environments such as lakes, streams, parks, and athletic and sports facilities. Greater efforts are required to develop and quantify the impact of IPM programs in these environments. The priority is to protect public health and minimize adverse environmental effects on natural areas while maintaining functional and aesthetic standards. Environmental and health benefits should include reduction of pesticide residues in water used for human consumption or for recreational purposes, as well as minimizing the effects of pesticides on non-target plants and animals.

Residential and public areas

The greatest general population exposure to pests and the tactics used to control them occurs where people live, work and play. IPM programs for Schools and Public Buildings have already been very successful and are excellent examples of education and implementation programs designed for the institutional arena. Priorities in this area include enhanced collaboration and coordination to expand these programs to other institutions and residential environments. Expanding IPM programs in these areas would reduce human health risks posed by pests and the tactics used to manage them, and also reduce or mitigate the adverse environmental effects of pest management practices.

RESEARCH NEEDS

Research needs in IPM range from basic investigations of pest biology to the development of new pest management tactics in specific crops or settings. The following list illustrates some of the research needs for the National IPM Program.

- Clarify pest biology and host/pest/climate interactions to identify vulnerable cropping systems and vulnerable stages in the pest life cycle.
- Develop advanced management tactics for specific settings (e.g., crops, parks, the home, the workplace) that prevent or avoid pest attack.
- Develop economical high-resolution environmental and biological monitoring systems to enhance our capabilities to predict pest incidence, estimate damage, and identify valid action thresholds.
- Develop new diagnostic tools, particularly for plant diseases and for detection of pesticide resistance in pest populations, including weeds.
- Develop new generation low-risk suppression tactics including biological control and products of traditional breeding and biotechnology.
- Improve the efficiency of suppression tactics and demonstrate least-cost options and pest management alternatives.
- Develop new delivery methods designed to expand the options for IPM implementation.

IMPLEMENTATION AND EDUCATION NEEDS

In order to reach their full potential, IPM programs must be willingly adopted by agricultural producers, natural resource managers, and homeowners, and they must be understood and accepted by the general public. The following activities will contribute to the adoption of IPM.

- Develop user incentives for IPM adoption reflecting the value of IPM to society and reduced risks to users. Work with existing risk management programs including federal crop insurance, and incentive programs such as the NRCS Environmental Quality Incentive Program (EQIP) to fully incorporate IPM.
- Provide educational opportunities for IPM specialists to learn new communication skills that enable them to engage new and unique audiences having specific language, location, strategy, or other special needs.
- Create public awareness and understanding of IPM programs and their economic, health and environmental impacts, through education programs in schools, colleges, and the workplace, and through creative use of mass media.
- Leverage federal resources with state and local public and private efforts to implement collaborative projects.
- Ensure a multi-directional flow of pest management information by expanding existing and developing new collaborative relationships with public and private sector cooperators.

MEASURING PERFORMANCE OF THE NATIONAL IPM PROGRAM

Governments at the national and state levels through directives, rules, and laws are placing high priority on the development and implementation of accountability systems. Such systems are based on performance measurements, including setting goals and objectives and measuring progress toward achieving them. Accordingly, the performance of federally funded IPM program activities must be evaluated.

The establishment of measurable IPM goals and the development of methods to measure progress toward achieving the goals should be appropriate to the specific IPM activity undertaken. Performance measures may be conducted on a pilot scale or on a geographic scale and scope that corresponds to an IPM program or activity. Examples of potential performance measures follow.

Goal: To improve the economic benefits related to the adoption of integrated pest management practices.

Performance Measures:

- In cooperation with the National Agricultural Statistics Service (NASS), design a national IPM practices adoption survey based on IPM protocols designed for specific commodities or sites within program priorities.
- Evaluate IPM programs on their ability to improve economic benefits using pilot studies within specific program priority sites and project these economic results to a regional or national basis to predict large-scale impacts using results of the practices adoption survey.
- Develop measures of public awareness of IPM.

Goal: To reduce potential human health risks from pests and the use of pest management practices.

Performance Measures:

- Using EPA's reduced risk category of pesticides as the standard, document changes in pesticide use patterns over time and relate the changes to IPM practice adoption.
- Relate dietary exposure to pesticides to IPM practice adoption using USDA Agricultural Marketing Service (AMS) Pesticide Data Program (PDP) and any other available data.
- Relate cases of the negative human health impacts caused by pest incidence (for example, asthma cases related to cockroach infestation, insect vectored diseases, allergic reactions to plants) to IPM practice adoption.

Goal: To reduce unreasonable adverse environmental effects from pests and the use of pest management practices.

Performance Measures:

- Document and relate pesticide levels in specific ground and surface water bodies, including community water supplies, to IPM practice adoption using data from the US Geological Survey (USGS), the Natural Resources Conservation Service (NRCS) and others.
- Document and relate national indicators of natural resource health such as proportion of ground and surface water bodies with pest management-related contaminants and level of contamination to IPM practice adoption, using data from EPA and others.
- Measure the impact of IPM practice adoption on encroachment of selected invasive species in national park lands and other sites where data are available.