NATIONAL ROADMAP FOR INTEGRATED PEST MANAGEMENT
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INTRODUCTION

Integrated Pest Management, or IPM, is a long-standing, science-based, decision-making process that identifies and reduces risks from pests and pest management related strategies. It coordinates the use of pest biology, environmental information, and available technology to prevent unacceptable levels of pest damage by the most economical means, while posing the least possible risk to people, property, resources, and the environment. IPM provides an effective strategy for managing pests in all arenas from developed agricultural, residential, and public areas to wild lands. IPM serves as an umbrella to provide an effective, all encompassing, low-risk approach to protect resources and people from pests.

KEEPING A STEP AHEAD

Pest management systems are subject to constant change, and must respond to a variety of pressures. For example, pests may become resistant to chemical pesticides, crop rotation, or trapping methods. Regulatory agencies may restrict or phase out certain pesticides when their risks outweigh their benefits. Environmental concerns, consumer demands, and public opinion are significant influences in the marketplace related to pest management practices. IPM Practitioners must now, more than ever, strive to implement best management practices and tools to incorporate a pest management regime where strategies work in concert with each other to achieve the desired effects while posing the least risks. Current and evolving conditions clearly signal the need for the increased development and adoption of IPM practices. The justification for a national IPM Roadmap, which serves to make these transitions as efficient as possible, has never been greater.

THE IPM ROADMAP

The goal of the IPM Roadmap is to increase nationwide communication and efficiency through information exchanges among federal and non-federal IPM practitioners and service providers including land managers, growers, structural pest managers, and public and wildlife health officials. Development of this document began in February 2002. Continuous input from numerous IPM experts, practitioners, and stakeholders resulted in the current IPM Roadmap.

The Roadmap for the National Integrated Pest Management (IPM) Program identifies strategic directions for IPM research, implementation, and measurement for all pests, in all settings, throughout the nation. This includes pest management for all areas including agricultural, structural, ornamental, turf, museums, public and wildlife health pests, and encompasses terrestrial and aquatic invasive species.

NATIONAL IPM PROGRAM GOALS

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

IPM originally began in the agricultural area; however, in recent years, federal and state governments have broadened their focus on the interface between pests, pest management, and people in the human environment, including residential, recreational, institutional facilities and in natural wild land areas. Through state and federal cooperation, a successful IPM in Schools program exists. The impact of exotic, invasive species in natural environments has received tremendous support with the 1999 Invasive Species Act. Federal and state agencies are developing Exotic Plant Management Teams towards this effort. IPM programs are under development at all levels to mitigate the impact of pest organisms.

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.

IPM FOCUS AREAS

Production agriculture

IPM experts, practitioners, and stakeholders expect that 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, these 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

Our nation’s natural resources and ecosystems are under constant pressures from encroaching invasive species. Invasive species diminish habitat quality and diversity for wildlife. Additionally, Americans spend large amounts of leisure time in natural and recreational environments such as lakes, streams, and parks. Greater efforts are required to develop and quantify the impact of IPM programs in these environments. It is critical to protect public

health and ecosystem function 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 waters used for human consumption or for recreational purposes, as well as minimizing the effects of pesticides on non-target species.

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 institutional facilities. 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.

FUTURE DIRECTION

Improve cost benefit analyses when adopting IPM Practices

Improving the overall benefits resulting from the adoption of IPM practices is a critical component of the National IPM Program. Conducting a "cost benefit" analysis of proposed IPM strategies is not based solely on the monetary costs. It is based on four main parameters: monetary, environmental/ecological health and function, aesthetic benefits, and human health.

While there may be many benefits from adoption of IPM practices, if new IPM programs do not appear to be as economically beneficial as practices already in place, they are not likely to be adopted. Risks and benefits need to be determined. A major factor in the adoption of IPM programs is whether the benefit to humans and the broader natural systems, outweighs the cost in implementing an IPM practice. Evaluation of the short and long term risks and benefits is needed.

Reduce potential human health risks from pests and related management strategies

IPM plays a major role in human health. Public health is dependent upon a continual supply of affordable, high quality food. IPM protects human health through its contribution to food security by reducing potential health risks 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, and more advanced systems of measurement are required.

Minimize adverse environmental effects from pests and related management strategies

IPM programs are designed to protect agricultural, urban and natural resource environments from the encroachment of native and non-native pest species while minimizing unreasonable adverse effects on soil, water, air and beneficial organisms. For example, in agriculture, IPM practices promote a healthy within crop environment, and conserve organisms that are beneficial to agricultural systems, including pollinators and natural 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. IPM practices are used to suppress invasive species in natural wetlands ecosystems; the non-native invasive purple loosestrife for example is managed using a spot application of low risk, herbicide application for short-term control in conjunction with the release of biological control agents for long-term management

RESEARCH, TECHNICAL DEVELOPMENT, EDUCATION, IMPLEMENTATION

In order to continue IPM development and adoption it will be critical to enhance investment in: 1) new options for pest management, 2) public and private education infrastructure, and 3) implementation and adoption of IPM.

Research Needs

Research needs in IPM range from basic investigations of pest biology to the development of new pest management tactics in specific topics 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 action thresholds for vector borne diseases; provide mechanisms for local vector borne disease control agencies to adequately monitor pest populations to predict possible outbreaks and implement low risk approaches to prevent outbreak levels
- 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.

Technical Development

While there has been dramatic improvement in pest management practices during the last three decades, there continues to be a critical need to devise new options that provide effective, economical and environmentally sound management of pest populations. A parallel

need is to provide science-based information concerning the risks and benefits of IPM to the public. Meeting this need will facilitate support and informed discussion and involvement from stakeholders and consumers who understand the benefits of public investment in IPM programs.

Education

A diverse and evolving pest complex requires a cadre of trained individuals with enhanced management skills that ensure human health and environmental protection. It is important for practitioners to acquire new skills to implement targeted IPM strategies using new technologies, including genetic engineering, reduced risk pesticides, cultural practices, and biocontrols.

The Federal Agency Core IPM Certification Training Program should be installed. This program will provide state of the art, highly advanced training to federal IPM Practitioners preparing them with basic IPM Principles skills and advanced courses in different technical categories.

Implementation and Adoption of IPM

Agricultural producers, natural resource managers, and homeowners must willingly adopt IPM practices for these programs to reach their full potential. And the public must have information to fully understand these programs. 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) and other farm program payments to fully incorporate IPM tactics as rewarded practices.
- 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.
- Spotlight successful IPM Programs

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, federally funded IPM program activity performance 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.

Outcome: The adoption of IPM practices improves economic benefits to users.

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.

Outcome: Potential human health risks from pests and the use of pest management practices are reduced.

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.

Outcome: Unreasonable adverse environmental effects from pests and the use of pest management practices are reduced.

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 Resource 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.

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 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, the Federal IPM Coordinating Committee will require a dynamic system of information flow and feedback that provides an up to date, 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 USDA Regional IPM Centers. The USDA IPM Coordinator will be responsible for preparing an annual report documenting the status and performance of the IPM program nationally and distributing the report to Congress, Federal and State IPM partners, and the general public.

USDA 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 practices.