PEST MANAGEMENT POLICY

A Discussion Paper Prepared by the ad hoc Committee on Pest Management Policy of the Entomological Society of Canada

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Introduction

The rational goal of pest control is to increase the quantity and quality of crop and timber yields, to protect human and livestock health, and to reduce aesthetic or nuisance damage. How and when this is accomplished affects costs for materials, labour and equipment and has an impact on non-pest organisms, including humans, and the surrounding environment. At a time when concern for environmental quality and sustainability are public issues and when many pest control strategies, especially synthetic pesticides, are regarded as having a negative impact on the environment and human health, it is appropriate that an impartial body of experts, such as the Entomological Society of Canada, prepare a discussion document on pest management. This document is not a technical review of the subject, rather it is intended to provide information for non-entomologists and background information and recommendations to those involved in setting policies and research priorities in pest management.

Rational pest management, or as it will be referred to in this document, integrated pest management (IPM), refers to a trend over the last 30 years in the development of systems designed to protect crops, commodities, people and livestock from damage by pests. It is an approach in which all available and appropriate methods are integrated into a unified program for managing pest populations. It aims to maximize the effects of natural suppressive forces against pests, such as predators and parasites, and to minimize environmental disturbance, effects on human and beneficial organisms and economic damage. These are also properties of sustainable agriculture systems, of which IPM is an important component. IPM concepts can be used to manage most pests, whether weed, arthropod, disease or vertebrate, in any sector or on any host.

The philosophy of integrated pest management is based on three key concepts. The first is that pest populations can be tolerated up to a certain point and that it is only necessary to suppress populations of pest organisms sufficiently to prevent economic or aesthetic damage. Medical pests, particularly vectors of human diseases, are an exception to this because there is no tolerable level of disease, but the IPM approach, of integrating a variety of suppressive measures into one program, still applies. The second concept is that corrective measures should be applied only when necessary as determined by the relative numbers of pests (and beneficials), rather than on a regular schedule without regard to the above relationships. The third is that the pest management intervention should have minimal negative impacts on humans and other non-target organisms, particularly beneficial species.

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[1] Prepared by the ESC ad hoc Committee on Pest Management Policy

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Promoting Integrated Pest Management

The successful implementation of pest management systems that have resulted in lower costs, higher protection, or both, has furthered the development of all the components of IPM. The stringent requirements of IPM have led to the development of narrow spectrum, less-toxic pesticides as well as restricted use of more toxic, broader spectrum pesticides. IPM requires practitioners to examine carefully both the strategies and the tactics used to reduce damage. The result has been a trend towards minimal impact tactics that tend to be less disruptive to the systems to which they are being applied than was the case with previously used methods. One requirement for successful (= sustainable) pest management will be the continuous generation of new knowledge that will allow for the design and development of systems that are self-regulating or that require minimal intervention consistent with the goals of sustainable agriculture systems. The development of such systems involves major research efforts requiring substantial funding, thus many of the best integrated pest management systems in practice are those associated with large or valuable crops.

Another requirement for successful implementation of pest management is considerable expansion of extension activities and grower or pest manager training. This stage of implementation may, in fact, now be at least as important as further research. This is because workable IPM programs now exist for several crops throughout the country, but they are not being used by all of the growers who could benefit from their use. This is largely because of a lack of information on the benefits and the economic feasibility of using IPM, a shortage of information and training in IPM methods, as well as a lack of access to scouts or pest managers who know how to monitor for pests and make recommendations.

Benefits of Adopting IPM

1. Preliminary estimates suggest that the net profit to farmers adopting IPM is high, and studies show that if the technology is adopted it can reduce insecticide use by 30-50% with resulting monetary returns to growers. Profits can arise from a net saving in pesticide and labour costs, from increased yields or quality through the better timing of treatments and/or a reduction of phytotoxic effects from pesticides use.

2. Society benefits by reduced contamination of the environment with pesticide residues. This is impossible to quantify, but would save, in the short-term, on costs of monitoring, cleaning up and prosecuting cases of misuse and spills as well as on the long-term or unforeseen effects of environmental contamination, including decreasing biodiversity and negative effects on health.

3. New skills and labour markets are opening in the agriculture industry for pest managers. These could be in government extension programs, in private pest management companies or as employees of private farms, nurseries and forest companies.

4. Greater safety to farm and forest workers, through less handling of pesticides and decreased exposure to pesticide residues.

5. Produce grown and marketed under an IPM label may achieve a market advantage over imported produce, thus conserving Canadian agricultural incomes.

Impediments to the Use of IPM

1. The complexity and regionally specific nature of IPM requires much time and research. Most of the research has been conducted at public expense, as there is less scope for private industry to profit from the development of IPM on a scale equivalent to that of the synthetic pesticide industry. Because pest management is becoming increasingly species specific, there is less of an economic incentive for manufacturers to develop narrow spectrum products for limited markets.

2. Some farmers with less ability to adopt IPM may be placed at an disadvantage if they do not adopt it, just as farmers who did not adopt chemical technology when it was first introduced, were at a disadvantage.

3. IPM requires a substitution of expert knowledge and skills (service) for chemical insecticides (capital expenditure) in agricultural production and forest management, thus opposing a trend to reduce labour inputs over the last century. In some cases, producers will find they have more of a labour force, rather than less, to deal with.

4. IPM often requires cooperation between neighbours, which is contrary to the trend toward discrete production units. Two examples would be agreement to avoid pesticide drift that would interfere with biological controls in the area and agreement to adhere to a regional pest management strategy such as a sterile insect release program.

5. Farmers and foresters cannot abandon grading systems that require applications of pesticides to maintain cosmetic quality standards set by consumer and market demands.

6. The current registration process for pest control products in Canada prevents selective pesticides, such as insect growth regulators and insect pathogens, from being readily available for use in IPM programs.

7. Public indifference and ignorance of IPM and current pest management issues makes it difficult to obtain sufficient funding for research and extension projects.

Areas Requiring Further Research

1. Research and development is needed on efficacy of cultural, mechanical and physical controls, their integration with crop management practices, and their compatibility with other controls and beneficial species.

2. Research is needed on labour efficient, economical new technologies, and on equipment for mechanical and physical controls.

3. Continued investigation of new biological control species is required. This includes research on their host range, biology, effectiveness, climatic adaptation and follow-up evaluations of their long-term establishment.

4. Genetic improvement of natural enemies, through selection for pesticide resistance or for other desirable characteristics, is particularly important for crops with a complex of pests, some of which can be controlled biologically, but others of which must be controlled chemically.

5. Improved mass-rearing methods and long-term storage and quality control programs are needed for all types of biological control organisms. This includes devising tests and standards for defining and maintaining purity of strains, virulence in microbial controls, genetic characteristics, and health and vigour of arthropods.

6. Research on the economics of IPM is needed. It is not realistic to expect farmers and foresters to adopt a pest management system without clear economic benefits, especially if the pest management advice appears to trade off individual profits against general societal goals of environmental quality.

7. Continued investigation of synthetic, botanical and microbial pesticides is needed, with emphasis on assessing full ecosystem impacts and developing use patterns compatible with IPM programs.

8. Research is needed on how to make the transition from conventional, pesticide based programs to programs that use pesticides more efficiently (based on monitoring), and programs that eventually lead to the substitution of more benign controls for synthetic pesticides. Further research must be directed at developing programs based primarily on preventative strategies and changes in the design and management of agroecosystems.

Recommendations for Promoting IPM

1. Public policies must discourage complete dependence on chemical insecticides and encourage the use of IPM. Substituting biological, physical and cultural controls for chemicals should be promoted wherever possible to conserve native beneficial species and reduce impacts of toxic products on the environment.

2. Research should not be conducted in isolation from real systems. Applied research and research on non-chemical controls should be conducted with attention to the impact of integrating the methods into the whole cropping or production system.

3. Intensive training programs for growers and other pest managers are necessary to implement the current knowledge and experience with IPM in various crops. For example, ca. 430 ha of apples are grown in the Okanagan valley of B.C. under IPM programs delivered by private pest managers; lack of information and lack of access to pest management scouts is a major factor preventing growers of the remaining ca. 9600 ha of apples in the area from following suit.

4. Specific commodities should develop well structured programs and implementation plans, with appropriate regional and site specific modifications; these should be available to all practitioners. An example of this is the current development of commodity based plans in Ontario under the Food Systems 2002 program.

5. Improvement of the federal pest control product registration system, particularly by revising tests required for biological products such as microbial controls, viral products and pheromones, is needed to enable these controls to be registered in a timely and economical fashion without an increase in risk.

Role of the Entomological Society of Canada

The Entomological Society of Canada represents a range of entomological fields and interests that make important contributions to the development and implementation of IPM. The development of pest management systems requires detailed knowledge in biology, ecology, economics, physiology, sociology, systems science and biotechnology. Basic work in systematics and taxonomy of pest and beneficial species is essential for the expansion of IPM programs, particularly those that involve biological controls. Research on population dynamics and development of population models are essential to the improvement of sampling plans and the determination of treatment thresholds. Knowledge of the biology and ecology of species is the basis for using controls responsibly, for developing survey and monitoring methods, damage assessment, tracking and predicting population dynamics. Research on arthropod physiology is crucial, especially in the development of the new generation of controls such as insect growth regulators, attractants, pheromones or repellents. Economic and applied entomology is, of course, centrally involved in research and implementation of IPM in food, fibre and ornamental crops, for structural and stored products pests and livestock pests. Extension entomology is involved in transferring the technology to the grower and is usually the liaison between the research community and the end users of the research. A good example of this is the comprehensive *Diseases and Insects of Vegetables* published in collaboration with the Canadian Phytopathological Society. Ultimately, the development of rational pest management requires whole systems research, involving many disciplines, as well as studies that examine the sociological and psychological aspects of our attitude towards pests and to different methods of control.

Recommendations for an ESC Policy

It is the position of the Entomological Society of Canada that promoting the implementation of IPM programs is essential to the well being of Canadians and should be encouraged through further research and widespread training and information programs.

1. As a society, ESC should operate from the assumption that IPM is presently the best model for implementing responsible pest control programs. The Society should voice its support for the allocation of research time and money to the development of IPM; it could also initiate studies on the economics of IPM in various sectors. As an independent body, without commercial support, it should be free to call for the rational use of pesticides and reductions in the use of conventional chemical pesticides where possible.

2. The ESC should recommend that scientists be more aware of legislative and regulatory process that influence pest management technologies, and develop ways of influencing this process based on the results of scientific research.

3. The ESC should recommend that researchers work together with the people most likely to apply or benefit from the results of the research to ensure that projects are timely, practical and result in operational programs that fit the requirements of commercial crop or commodity management.

4. The ESC should help lobby in support of the growers, foresters and other pest managers wishing to promote further training and research programs on IPM, especially where there is a lack of conviction at the policy making level in government departments.

5. To foster IPM in Canada, the ESC could coordinate initiatives with other pest management societies in the country (i.e., Canadian Pest Management Society, Professional Pest Management Society of B.C., Quebec Society for Protection of Plants); reviews of IPM related subjects could be solicited for publication in *The Canadian Entomologist.*

The expanded version of the report, which includes a [rather lengthy] review of the advantages and disadvantages of various integrated pest management methods, is available from:

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