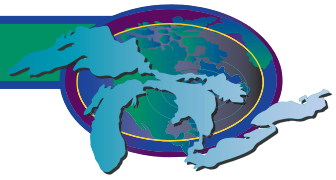

Integrated Pest Management

Indicator # 7062

This indicator report was last updated in 2005.

Overall Assessment

Status:	**Not Assessed**
Trend:	**Not Assessed**

Lake-by-Lake Assessment

Separate lake assessments were not included in the last update of this report.

Purpose

- To assess the adoption of Integrated Pest Management (IPM) practices and the effects IPM has had toward preventing surface and groundwater contamination in the Great Lakes basin by measuring the acres of agricultural pest management applied to agricultural crops to reduce adverse impacts on plant growth, crop production and environmental resources

Ecosystem Objective

A goal for agriculture is to become more sustainable through the adoption of more non-polluting, energy efficient technologies and best management practices for efficient and high quality food production. The sound use and management of soil, water, air, plant, and animal resources is needed to prevent degradation of agricultural resources. The process integrates natural resource, economic, and social considerations to meet private and public needs. This indicator supports Article V1 (e) - Pollution from Agriculture, as well as Annex 1, 2, 3, 11, 12 and 13 of the Great Lakes Water Quality Agreement.

State of the Ecosystem

Background

Pest Management is controlling organisms that cause damage or annoyance. Integrated pest management is utilizing environmentally sensitive prevention, avoidance, monitoring and suppression strategies to manage weeds, insects, diseases, animals and other organisms (including invasive and non-invasive species) that directly or indirectly cause damage or annoyance. Environmental risks of pest management must be evaluated for all resource concerns identified in the conservation planning process, including the negative impacts of pesticides in ground and surface water, on humans, and non-target plants and animals. The pest management component of an environmental conservation farm plan must be designed to minimize negative impacts of pest control on all identified resource concerns.

Agriculture accounts for approximately 35% of the land area of the Great Lakes basin and dominates the southern portion of the basin. Although field crops such as corn and soybeans comprise the most crop acreage, the basin also supports a wide diversity of specialty crops. The mild climate created by the Great Lakes allows for production of a variety of vegetable and fruit crops. These include tomatoes (for both the fresh and canning markets), cucumbers, onions and pumpkins. Orchard and tender fruit crops such as cherries, peaches and apples are economically important commodities in the region, along with grape production for juice or wine. The farmers growing these agricultural commodities are major users of pesticides.

Research has found that reliance on pesticides in agriculture is significant and that it would be impossible to abandon their use in the short term. Most consumers want to be able to purchase inexpensive yet wholesome food. Currently, other than organic production, there is no replacement system readily available at a reasonable price for consumers, and at a lesser cost to farmers, that can be brought to market without pesticides. Other research has shown that pesticide use continues to decline as measured by total active ingredient, with broad-spectrum pest control products being replaced by more target specific technology, and with lowered amounts of active ingredient used per acre. Reasons for these declines are cited as changing acreages of crops, adoption of integrated pest management (IPM) and alternative pest control strategies such as border sprays for migratory pests, mating disruption, alternative row spraying and pest monitoring.

With continued application of pesticides in the Great Lakes basin, non-point source pollution of nearshore wetlands and the effects on fish and wildlife still remains a concern. Unlike point sources of contamination, such as at the outlet of an effluent pipe,

nonpoint sources are more difficult to define. An estimated 21 million kg of pesticides are used annually on agricultural crops in the Canadian and American Great Lakes watershed (GAO 1993). Herbicides account for about 75% of this usage. These pesticides are frequently transported via sediment, ground or surface water flow from agricultural land into the aquatic ecosystem. With mounting concerns and evidence of the effects of certain pesticides on wildlife and human health, it is crucial that we determine the occurrence and fate of agricultural pesticides in sediments, and in aquatic and terrestrial life found in the Great Lakes basin. Atrazine and metolachlor were measured in precipitation at nine sites in the Canadian Great Lakes basin in 1995 (OMOE 1995). Both were detected regularly at all nine sites monitored. The detection of some pesticides at sites where they were not used provides evidence of atmospheric transport of pesticides.

Cultural controls (such as crop rotation and sanitation of infested crop residues), biological controls, and plant selection and breeding for resistant crop cultivars have always been an integral part of agricultural IPM. Such practices were very important and widely used prior to the advent of synthetic organic pesticides. Indeed, many of these practices are still used today as components of pest management programs. However, the great success of modern pesticides has resulted in their use as the dominant pest control practice for the past several decades, especially since the 1950s. Newer pesticides are generally more water soluble, less strongly adsorbed to particulate matter, and less persistent in both the terrestrial and aquatic environments than the older contaminants, but they have still been found in precipitation at many sites.

Status of Integrated Pest Management

The Ontario Pesticides Education Program (OPEP) provides farmers with training and certification through a pesticide safety course. Figure 1 shows survey results for 5800 farmers who took pesticide certification courses over a three-year period (2001 to 2004). Three sustainable practices (alter spray practices/manage drift from spray, mix/load equipment in order to protect surface and/or groundwater, and follow label precautions) and the farmers' responses are shown. Results suggest that in 2004 more farmers "do or plan to do now" these three practices after being educated about their respective benefits. These practices have significant value for reducing the likelihood of impairing rural surface and groundwater quality. Figure 2 shows the acres of pest management practice applied to cropland in the U.S. Great Lakes basin for 2003.

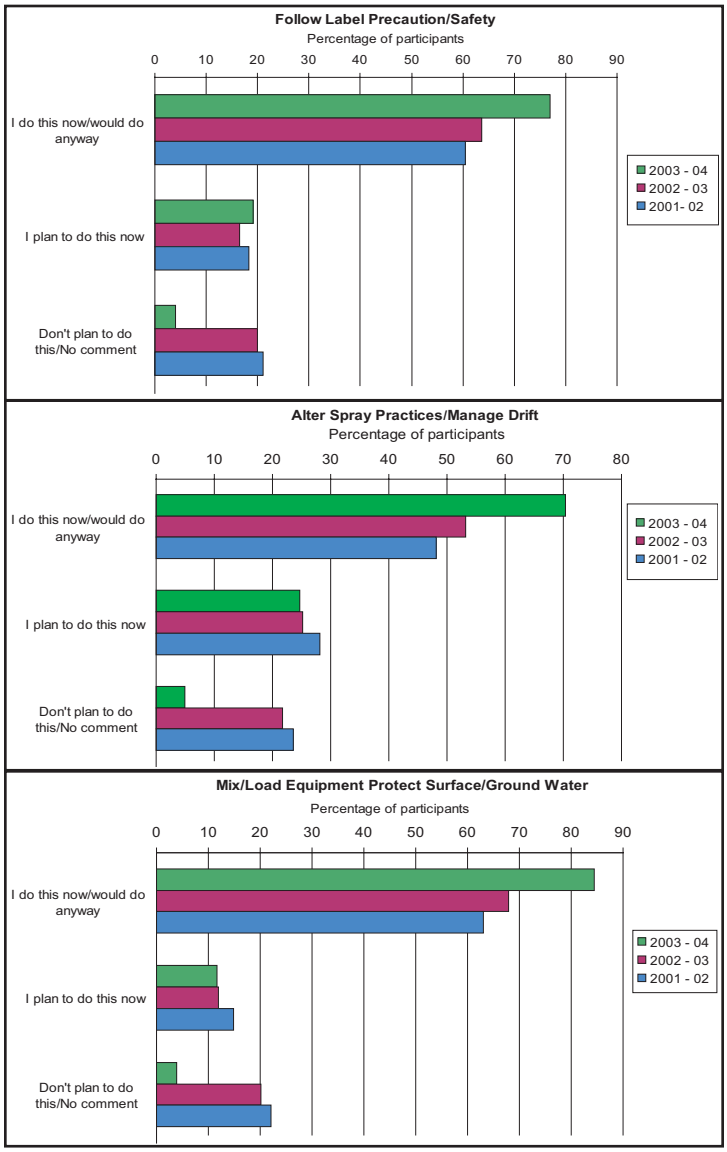

Figure 1. Ontario selected grower pesticide safety training course evaluation results from 2001-2004.

Source: Ontario Ministry of Agriculture and Food, Ontario Ministry of the Environment (OMOE) and the University of Guelph

Pressures

Pest management practices may be compromised by changing land use and development pressures (including higher taxes); flooding or seasonal drought; and lack of long-term financial incentives for adoption of environmentally friendly practices. In order for integrated pest management to be successful, pest managers must shift from practices focusing on purchased inputs (using commercial sources of soil nutrients (i.e. fertilizers) rather than manure) and broad-spectrum pesticides to those using targeted pesticides and knowledge about ecological processes. Future pest management will be more knowledge intensive and focus on more than the use of pesticides. Federal, provincial and state agencies, university Cooperative Extension programs, and grower organizations are important sources for pest management information and dissemination. Although governmental agencies are more likely

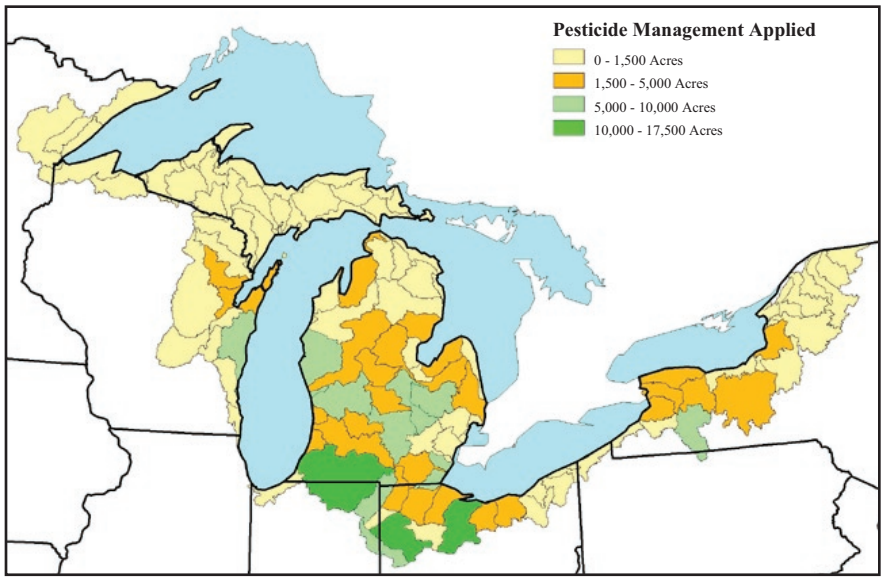

Figure 2. Annual U.S. Pesticide Management Systems Planned for 2003.
Source: U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), Performance and Results Measurement System

to conduct the underlying research, there is significant need for private independent pest management consultants to provide technical assistance to the farmer.

Management Implications

All phases of agricultural pest management, from research to field implementation, are evolving from their current product based orientation to one that is based on ecological principles and processes. Such pest management practices will rely more on an understanding of the biological interactions that occur within every crop environment and the knowledge of how to manage the cropping systems to the detriment of pests. The optimum results would include fewer purchased inputs (and therefore a more sustainable agriculture), as well as fewer of the human and environmental hazards posed by the broad-spectrum pesticides so widely used today. Although pesticides will continue to be a component of pest management, the following are significant obstacles to the continued use of broad-spectrum pesticides: pest resistance to pesticides; fewer new pesticides; pesticide- induced pest problems; lack of effective pesticides; and human and environmental health concerns.

Based upon these issues facing pesticide use, it is necessary to start planning now in order to be less reliant on broad-spectrum pesticides in the future. Society is requiring that agriculture become more environmentally responsible through such things as the adoption of Integrated Pest Management. This will require effective evaluations of existing policies and implementing programs for areas such as Integrated Pest Management. To reflect these demands there is a need to further develop this indicator. The following types of future activities could assist with this process:

- Indicate and track future adoption trends of IPM best management practices;
- Analyze rural water quality data for levels of pesticide residues;
- Evaluate the success of the Ontario Pesticide Training Course, such as adding and evaluating survey questions regarding IPM principles and practices to course evaluation materials; and
- Evaluate the number of farmers and vendors who attended, were certified, or who failed the Ontario Pesticides Education Program.

Note: Grower pesticide certification is mandatory in Ontario and in all Great Lakes States, and it applies to individual farmers as well as custom applicators.

Acknowledgments

Authors:

Peter Roberts, Water Quality Management Specialist, Resources Management, Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), Guelph, Ontario Canada, peter.roberts@ontario.ca;

Ruth Shaffer United States Department of Agriculture, Natural Resources Conservation Service, ruth.shaffer@mi.usda.gov; and Roger Nanney, Resource Conservationist, United States Department of Agriculture, Natural Resources Conservation Service.

Sources

U.S. General Accounting Office. 1993. *Pesticides – Issues concerning pesticides used in the Great Lakes watershed*. GAO/RCED-93-128. Washington, DC. 44pp.

Ontario Ministry of the Environment (OMOE). 1995. *Water monitoring 1995*. Environmental Monitoring and Reporting Branch.

Last Updated

State of the Great Lakes 2005