12. Integrated Pest Management

SUMMARY

Producers are increasingly adopting integrated pest management *systems to reduce the use of chemical pesticides in agriculture while maintaining productivity. An indicator—the Integrated Pest Management Adoption Index—is currently being developed to assess the extent to which the main integrated pest management practices are being adopted. A survey approach will be employed to prepare a profile of crop pest control practices in Canada and to quantify the adoption of alternatives to chemical pesticides, for the main crops grown in Canada. The survey is to be repeated every five years.*

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INDICATOR NAME:

Integrated Pest Management Adoption Index

STATUS:

Currently under development

THE ISSUE

Currently, most crop pests are controlled through the application of chemical pesticides. The use of pesticides for crop protection has been linked to various disadvantages such as environmental pollution (air, soil, water), hazards for handlers and the periodic buildup of *pest resistance*. As part of their efforts to ensure more environmentally sustainable agriculture in Canada, producers are increasingly adopting alternative methods for managing pests. One such approach, called integrated pest management (IPM), is aimed at reducing chemical pesticide use in agriculture while maintaining productivity. IPM is a decision-making process that uses all necessary techniques to suppress pests effectively, economically and in an environmentally sound manner (ECIPM 2003).

THE INDICATOR

The proposed indicator—the Integrated Pest Management Adoption Index—is based on a scale from 1 to 5 (Table 12-1). A producer using only chemical treatments on a fixed schedule or according to crop growth stage is at Level 0 on this scale. As crop practices like pest scouting, economic thresholds (holding off with measures until economically damaging levels of pests are reached) and the use of pesticides that are less harmful to natural pest enemies are adopted, the producer then moves to Level 1. Producers who use alternative methods such as biological or physical control (e.g. mechanical destruction of pests), cultural practices, (e.g. crop rotation, use of resistant cultivars), biopesticides and predictive models are at Level 2 or 3. At Level 2 and higher levels, producers are considered to be employing an integrated pest management program. Producers at Level 4 consider the effects of their crop pest control practices on other

Table 12-1: Scale for the Integrated Pest Management Adoption Index

Level	Description
0	Chemical treatments applied on a regular basis or based on crop stages. Broad-spectrum pesticides used.
1	Chemical pesticide treatments. Use of pest scouting and economic thresholds. Selective pesticides used.
2	Pest control consists primarily of chemical pesticide treatments. Pest and *natural enemy scouting*. Use of action and inaction thresholds. Crop rotation. Selective pesticides used. Crop practices that reduce pest populations.
3	Pest control consists primarily of alternative methods. Use of models (based on accumulated *degree-days*) to predict the arrival of pests and natural enemies. Use of natural enemies (biological control). Use of resistant plants. Use of *biopesticides* (bioinsecticides, hormones, semiochemicals). When chemical pesticides are used, the producer uses selective pesticides that do not interfere with alternative methods.
4	Level 3 plus consideration of interactions among pest species. Habitat management. Use of expert systems. Dynamic pest/crop models.
5	Level 4 plus consideration of interactions among crops. Regional management.

Table 12-2: List of crops for which the Integrated Pest Management Adoption Index may be developed

Alfalfa	Cherry	Greenhouse tomato	Plum
Apple	Chick pea	Hop	Potato
Apricot	Corn	Leek	Radish
Asparagus	Cranberry	Lentil	Raspberry
Bean	Dry beans	Melon	Rye
Beet	Field cucumber	Mushroom	Soy
Blueberry	Field tomato	Mustard	Spinach
Buckwheat	Ginseng	Oat	Strawberry
Canola	Grape	Onion	Sunflower
Carrot	Green pea	Peach	Sweet pepper
Celery	Greenhouse cucumber	Pear	Wheat

crop pests at the field level. Finally, producers at Level 5 manage pests not just within a single crop, but at the farm or regional level, and they base their decisions regarding crop rotations and companion crops on the associated effects on pests, for all crops on their farms.

IPM is a decision-making process that uses all necessary techniques to suppress pests effectively, economically and in an environmentally sound manner (ECIPM 2003).

CALCULATION METHOD

As currently proposed, the Integrated Pest Management Adoption Index will be calculated by using crop-specific questionnaires to survey a representative sample of producers. The surveys will be conducted at regular intervals (e.g. every five years) so as to eventually cover all 48 of Canada's primary grain, vegetable and fruit crops (based on surface area and value) (Table 12-2). The survey questionnaires will comprise all the IPM techniques available to producers, for each individual crop. Points will be awarded for each integrated pest management practice that a producer uses (details of the scoring system are currently being developed). A producer's accumulated points will provide a total, which will be converted into an index using an integrated pest management adoption scale (Table 12-1) similar to those used in other countries (Benbrook et al. 1996, Frantz and Mellinger 1998, Kogan 1998). The value obtained will be adjusted based on crop-specific characteristics. These calculations will yield average adoption rates for integrated pest management practices, by crop and by province.

LIMITATIONS

Various factors may influence the accuracy of the results for the Integrated Pest Management Adoption Index, such as errors in identifying the available integrated pest management practices for each crop, the accuracy and quality of the answers on the questionnaires and the distribution and number of respondents covered across Canada. To ensure that the survey samples are representative, the statistical analyses are sound and confidentiality is maintained, the survey is to be prepared in co-operation with Statistics Canada.

RESULTS

This indicator is currently under development and results are not yet available.

RESPONSE OPTIONS

When fully developed, this indicator will assess changes in the adoption of IPM systems by producers. An increase in the level of adoption of integrated pest management over the years would show that producers are successfully adopting alternatives to chemical pesticides. If the adoption level is considered to be unsatisfactory, the underlying information will aid in determining whether the low adoption level is connected with a lack of viable alternative methods (necessitating research efforts), limited availability (requiring marketing) or insufficient information for producers (necessitating extension). The survey approach may make producers aware of the alternative pest management methods that are available for their crops and may encourage them to adopt such measures.

REFERENCES

Benbrook, C.M., E. Groth III, J.M. Halloren, M.K. Hansen, and S. Marquardt, 1966. *Pest Management at the Crossroads*. Consumers Union, Yonkers (N.Y.).

ECIPM (Expert Committee on Integrated Pest Management), 2003. *Resources on IPM (Web site)*. www.carc-crac.ca/english/ECIPM/ ecipm.htm

Frantz, G. and H.C. Mellinger, 1998. "*Measuring Integrated Pest Management Adoption in South Florida Vegetable Crops*". Paper No. 132, Proceedings of the Annual Meeting of the Florida State Horticultural Society, Vol. 111, pp. 1-15.