Status of Integrated Pest Management (IPM) practices in outdoor nursery production in Canada

Lanthier Mario, Peter Isaacson
CropHealth Advising & Research, P.O. Box 28098, Kelowna, British Columbia, Canada
Canadian Nursery Landscape Association, 7856 Fifth Line South, Milton, Ontario, Canada

Abstract: Surveys were conducted in 2002 in British Columbia and in 2004 across Canada to assess use of IPM practices by commercial nursery growers. Results indicated widespread knowledge of IPM concepts and regular use of crop monitoring and biologically-based pesticides. A second survey conducted at the same time measured the use of pesticides in outdoor nurseries. Results indicated common use of broad-spectrum insecticides such as organo-phosphates and organo-chlorines. These products are detrimental to naturally-occurring insect predators and parasites. Increased use of IPM practices may result from nursery certification programs being implemented to ensure plants are shipped relatively free of pest problems.

Key words: Canada, IPM, grower survey, monitoring, pesticide use, nursery certification

Introduction

Integrated Pest Management (IPM) has been practiced in outdoor nurseries for many years.

In the United States, a report published in 1988 described IPM practices in nurseries in the state of Maryland (Raupp 1988). The comments triggered a 1992 training manual by the Bio-Integral Resource Center (Darr 1992). More recently, a 422-page book on IPM for nurseries was published by the University of California (Dreistadt 2001).

Use of IPM in Canadian nurseries also has a long history. In a 1995 directory of IPM practitioners, 491 persons were listed, of which 57 indicated working in nursery IPM, either as government extension agent, university researcher or crop consultant (Lanthier 1995).

Current use of IPM

Government publications

Government agencies encourage the use of IPM practices in commercial nursery production.

In Ontario, a 136-page publication for nursery growers contains 4 pages specifically on IPM, including qualifications for crop scouts and suggested monitoring tools (Ontario Ministry of Agriculture and Food 2007).

In Quebec, personnal interviews were conducted in 2005 with 12 nursery growers to verify the adoption of specific IPM practices. Growers scored highest on recognition of early damage by aphids and spider mites, adequate pruning for fire blight and juniper Phomopsis blight, but scored lowest for use of nematodes against root weevil, spray timing based on trap catches for peach tree borer and use of mulches for weed control in container production (pest species not specified) (Martineau 2006).

In British Columbia, a 307-page publication for nursery growers contains 27 pages specifically on IPM. One section offers a step-by-step approach to build a nursery IPM program (Lanthier 2002). Crop monitoring must be done by a person dedicated to the task and not expected to perform other duties suh as shipping or pruning during the inspection.

A nursery crop monitor must recognize normal from abnormal plant growth, as many problems first appear on the newest foliage; must use a variety of methods such as sticky traps and indicator plants for insect pests and seasonal weather conditions for diseases; and should seek the observations of department supervisors.

Time allocation varies with the season and the number of crops. Monitoring can be done over one day every second week for some nurseries, but requires two days per week for other nurseries. During spring and summer, when pest problems are more numerous, each production area should be inspected at least once per month.

Research in IPM practices

In 2003, the Canadian Nursery Landscape Association hired a "National IPM / Minor Use Coordinator" to coordinate national IPM projects and manage registrations of new pesticides (Canadian Nursery Landscape Association 2007).

Fourteen projects were funded from 2003 to 2007. Examples include biological control of root weevil (various species), management of cottony psyllid (*Psyllopsis discrepans*), and development of an IPM program for rose midge (*Dasynerua rhodophaga*).

One project examined the use of mulches and disks for weed control in container production. Results indicated a 95 to 98% weed reduction over one year with woven coco-fiber disk, moulded plastic lid disk and crumb rubber mulch. The mulches and disks are now used in commercial container production, especially in regions receiving extensive rainfall where weed growth is rapid at the base of slow-growing plants such as boxwood (*Buxus*), oak (*Quercus*) and spruce (*Picea*) (Lanthier 2006).

Surveys of IPM use

Survey in British Columbia

In 2002, the provincial nursery association arranged the distribution of two surveys to wholesale nurseries. The overall objective was to establish baseline data.

The first survey determined the use of IPM practices. Results were based on voluntary answers from 51 growers producing on 1447 hectares, representing 34.4% of total nursery land production (Zbeetnoff 2003a).

Thirty-seven growers (74% of the total) answered they practice IPM, defined as "a dynamic decision-making process that emphasizes the use of non-chemical management techniques to prevent or manage pest problems".

Results indicated a high proportion of growers (over 80%) used "a formal process" to detect weeds, insects and diseases in the production areas (see Table 1). Fewer growers (30 to 35%) monitored insects and diseases in perimeter areas. Monitoring for insect pests was done in field production mostly by the operator or a family member (16 of 29 respondants), whereas in container production it was done mostly by an employee (20 of 45 respondants).

Table 1. Percent of total respondents (51) using "a formal process" to detect pests at their commercial outdoor nursery in British Columbia

Pest type	Field production	Container production	Propagation	Yard, perimeters
Weeds	93.3	89.4	82.3	85.0
Insects, mites	90.0	87.3	91.2	35.0
Diseases	80.0	85.1	88.2	30.0
Wildlife	56.7	57.4	35.3	32.5

The second survey measured the use of pesticides for the 2002 calendar year. Results were based on voluntary answers from 53 growers producing on 1863 hectares, representing 61.2% of total land production (Zbeetnoff 2003b).

Growers reported using 159 pesticide products representing 99 active ingredients (a.i.). The most common insecticide / miticide was dormant oil, accounting for 78.3% of total active ingredient amount (see Table 2).

Growers reported using many broad-spectrum pesticides such as dimethoate, endosulfan and carbaryl. These products can disrupt naturally-occuring insect predators and parasites (British Columbia Ministry of Agriculture 2002). The Canadian government recently announced deregistration of endosulfan (Pest Management Regulatory Agency 2007).

Table 2. Insecticide / miticide use by chemical class for 2002 in British Columbia nurseries

Chemical class	Example of product	kg of a.i.	% of total
Oil	dormant oil	4,112,193	78.3
Organo-phosphate	acephate, dimethoate	660,219	12.6
Organo-chlorine	dicofol, endosulfan	246, 218	4.7
Carbamate	pirimicarb, carbaryl	95,303	1.8
Fatty acid	insecticidal soap	70,056	1.3
Pyrethrin	permethrin, deltamethrin	36,298	0.7
Organotin	fenbutatin-oxide	15,350	0.3
Chlorinated hydrocarbon	pyridaben	7,980	0.15
Other	spinosad, abamectin	2,956	0.06
Chloronicotinyl	imidacloprid	1,449	0.03
Insect growth regulator	kinoprene, cyromazine	1,021	0.00

Survey across Canada

In 2004, a survey of IPM practices was distributed to wholesale nurseries across the country, similar in scope and content to the British Columbia (B.C.) survey of 2002 (Zbeetnoff 2005). Final results of the B.C. and Canada-wide surveys are based on voluntary answers from 107 growers producing on 4856 hectares, representing 21.3% of total nursery land production.

Table 3. Practices rated as “very important” by growers wishing to improve their IPM program

Practice suggested	B.C.	Prairies	Ontario	Québec	Atlantic	Totals
Knowledge of beneficials	17	9	15	3	3	47
Available low risk products	19	7	13	4	3	46
Increased training about IPM	17	9	12	1	3	42
Wider range of chemicals	14	6	14	4	3	41
Knowledge of pest thresholds	12	6	10	2	3	33
Information on banker plants	9	6	9	2	2	28
Established economic benefits	11	8	3	3	2	27
Reasonably priced products	7	2	4	4	1	16
# of growers answering	26	10	22	5	5	68

Future prospects

Nursery certification programs are being introduced across Canada with the general aim to sell plants "relatively free of pest problems". A secondary impact will be the hiring of persons with skills typical of IPM, such as monitoring and diagnosis of pest problems.

These programs include *P. ramorum* certification in British Columbia, the Canadian Nursery Certification Program for export to the United States (Canadian Food Inspection Agency 2006), and the Domestic Phytosanitary Certification Program for domestic plant movement (Canadian Nursery Certification Institute 2007).

References

British Columbia Ministry of Agriculture, Food and Fisheries. 2002. The relative toxicity of pesticides to beneficial organisms. In: Nursery and Landscape Pest Management and Production Guide. Pub. B.C. Landscape and Nursery Association.

Canadian Food Inspection Agency. 2006. Canadian Nursery Certification Program. Policy Directive D-04-01. Website http://www.inspection.gc.ca/english/plaveg/protect/dir/d-04-01e.shtml. Retrieved November 2007.

Canadian Nursery Certification Institute. 2007. Website http://www.cleanplants.ca/.

Canadian Nursery Landscape Association. Website http://www.canadanursery.com/. Page "Integrated Pest Management". Retrieved November 2007.

Daar, S., H. Olkowski & W. Olkowski. 1992. IPM Training Manual for Wholesale Nursery Growers. Bio-Integral Resource Center. Berkeley CA.

Dreistadt, S.H. 2001. Integrated Pest Management for Floriculture and Nurseries. University of California Statewide Integrated Pest Management Project. Publication 3402. Oakland CA.

Lanthier, M. et al. 2006. Non-chemical weed control with mulches and disks for nursery container production. Poster presentation. Canadian Weed Science Society. Victoria BC.

Lanthier, M. & T. Jensen. 2002. Building a Nursery IPM Program. In: Nursery and Landscape Pest Management and Production Guide. Op. cit.

Lanthier, M., R. Powlowski & D. Thomas. 1995. Integrated Pest Management in Canada: A Directory of Expertise. Pest Management Alternatives Office. Ottawa ON.

Martineau C. & M.É. Tousignant. 2006. La lutte intégrée dans les pépinières de production du Québec. In: Québec Vert. Website http://www.agrireseau.qc.ca/horticulture-pepiniere/documents/13%20QVS%20lutte%20_03_.pdf. Retrieved November 2007.

Ontario Ministry of Agriculture, Food and Rural Affairs. 2007. Nursery & Landscape Plant Production and IPM. Publication 383. Queen's Printer. Toronto ON.

Pest Management Regulatory Agency. 2007. Preliminary Risk and Value Assessments of Endosulfan. Re-evaluation document REV2007-13. Website http://www.pmra-arla.gc.ca/english/pdf/rev/rev2007-13-e.pdf. Retrieved November 2007.

Raupp, M.J. & C.F. Cornell. 1988. Pest prevention: Treating pests to the IPM treatment. Amer. Nurs. 167(3):59-62, 65-67.

Zbeetnoff Agro-Environmental Consulting. 2005. Wholesale Nurseries Integrated Pest Management (IPM) Practices Survey 2004. Canadian Nursery Landscape Association.

Zbeetnoff Agro-Environmental Consulting. 2003a. BC Wholesale Nurseries Integrated Pest Management (IPM) Practices Survey 2002 – Executive Summary. Prepared for BC Landscape Nursery Association.

Zbeetnoff Agro-Environmental Consulting. 2003b. BC Wholesale Nurseries Pesticide Use Survey 2002. Prepared for BC Landscape Nursery Association.