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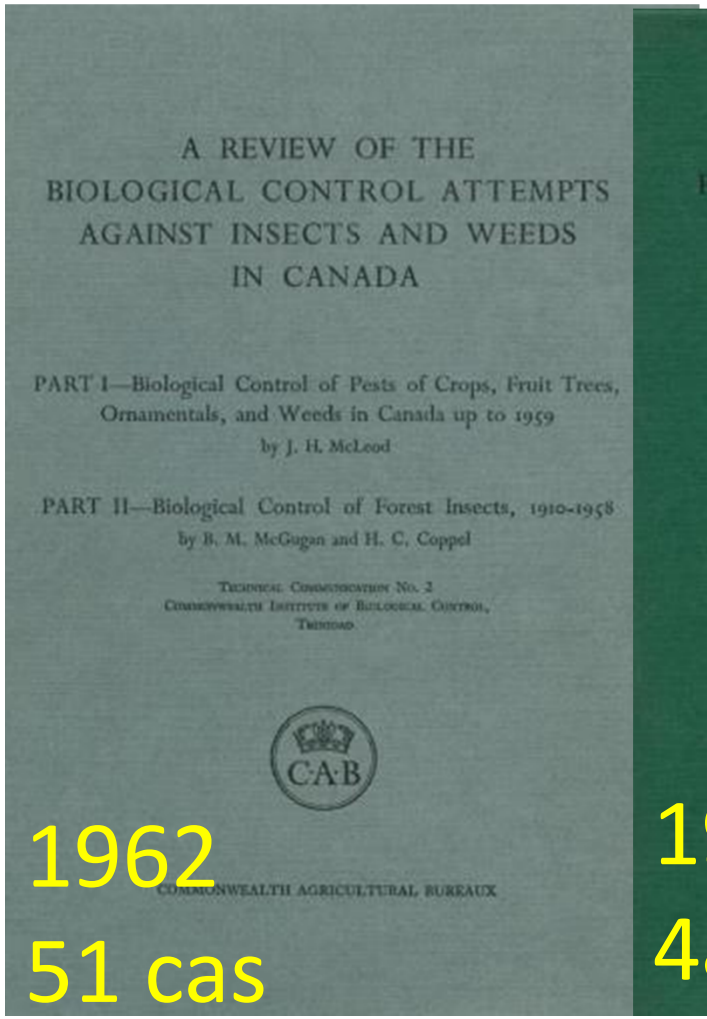
Portrait de la lutte biologique au Canada (2)

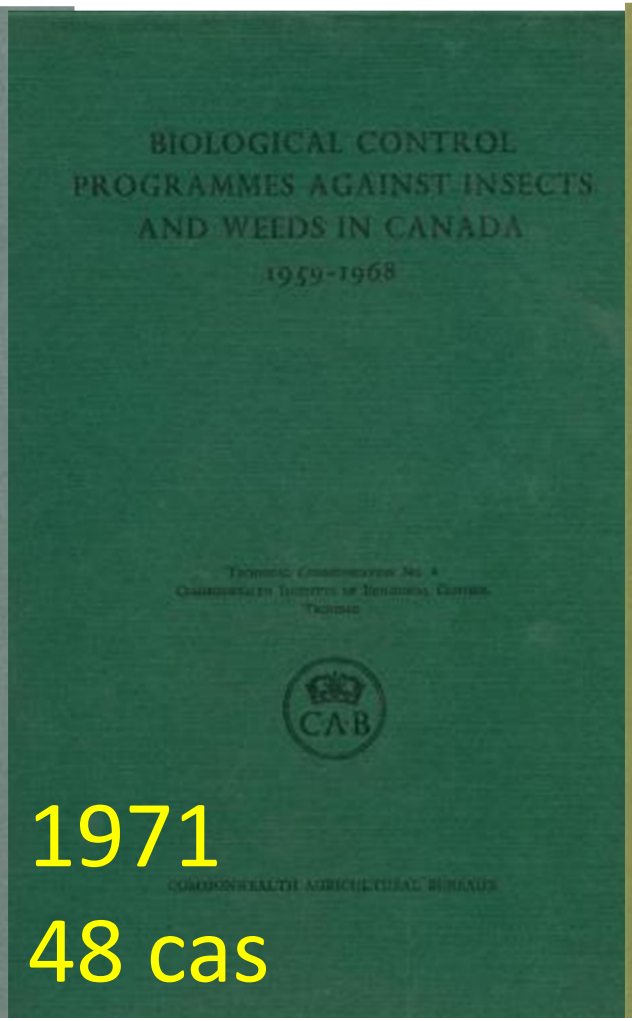
Charles VINCENT, AAC, Saint-Jean-sur-Richelieu, Qc
Peter G. MASON, AAC, Ottawa, Ont.
David R. GILLESPIE, AAC, Agassiz, C.B.

Canada

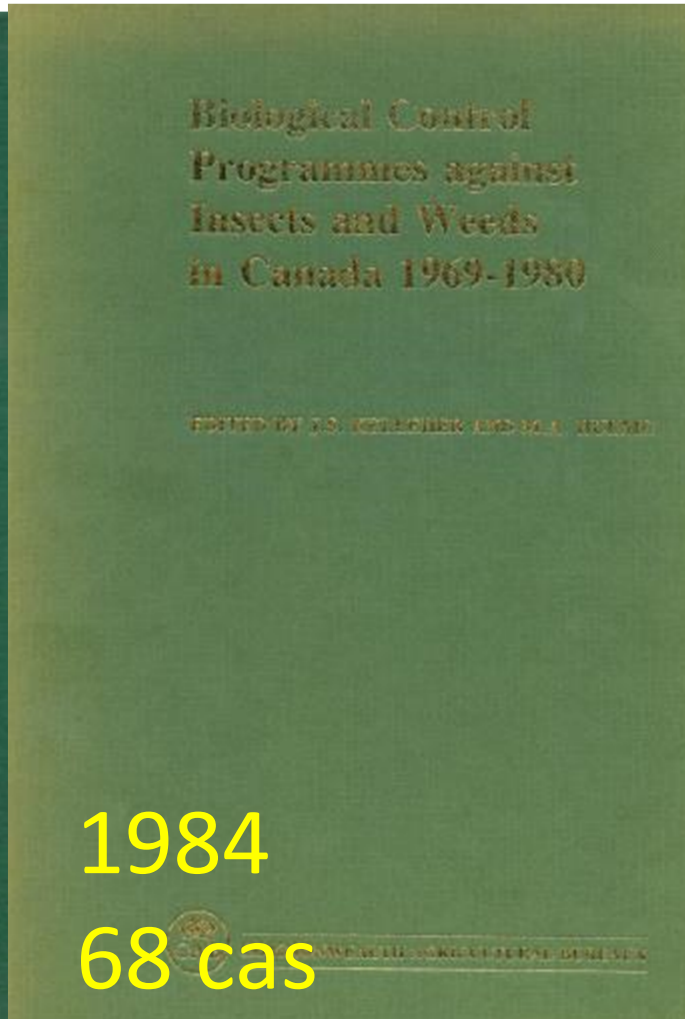
Informations relatives aux programmes de lutte biologique au Canada



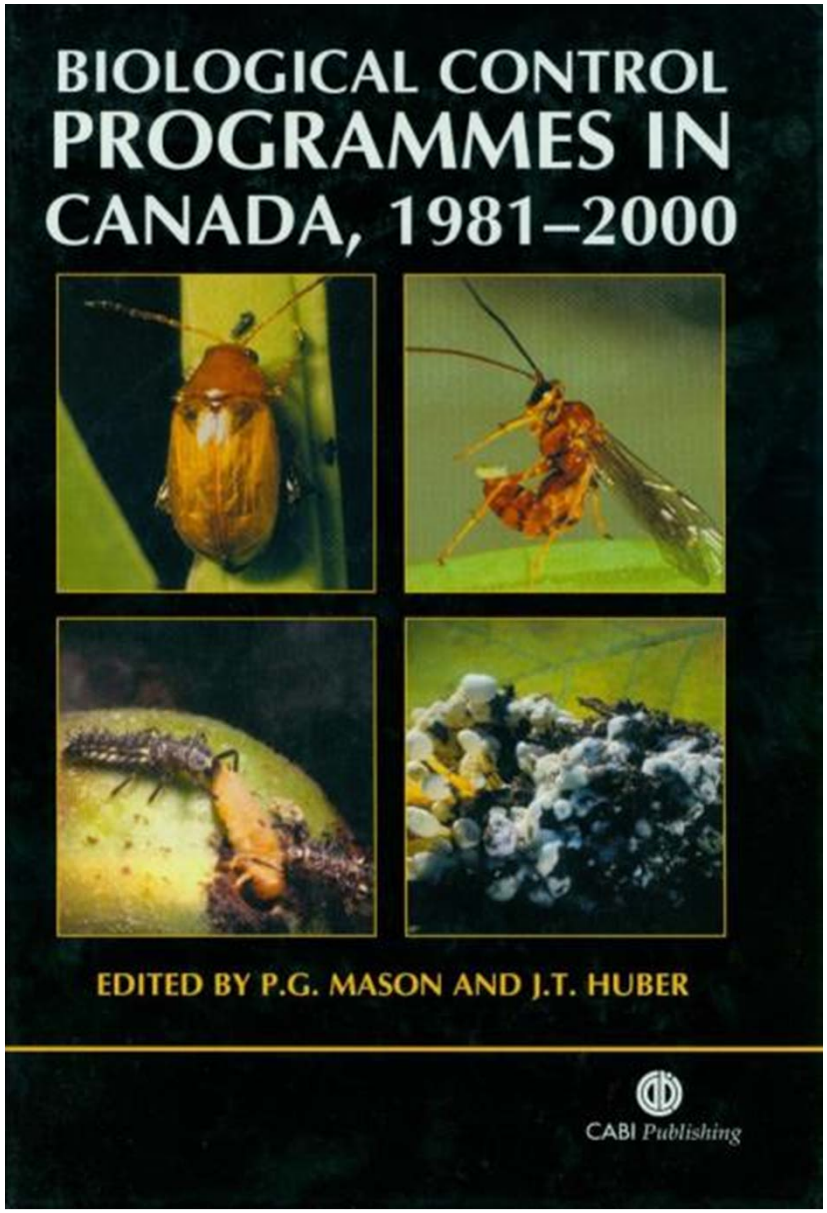
1962
51 cas



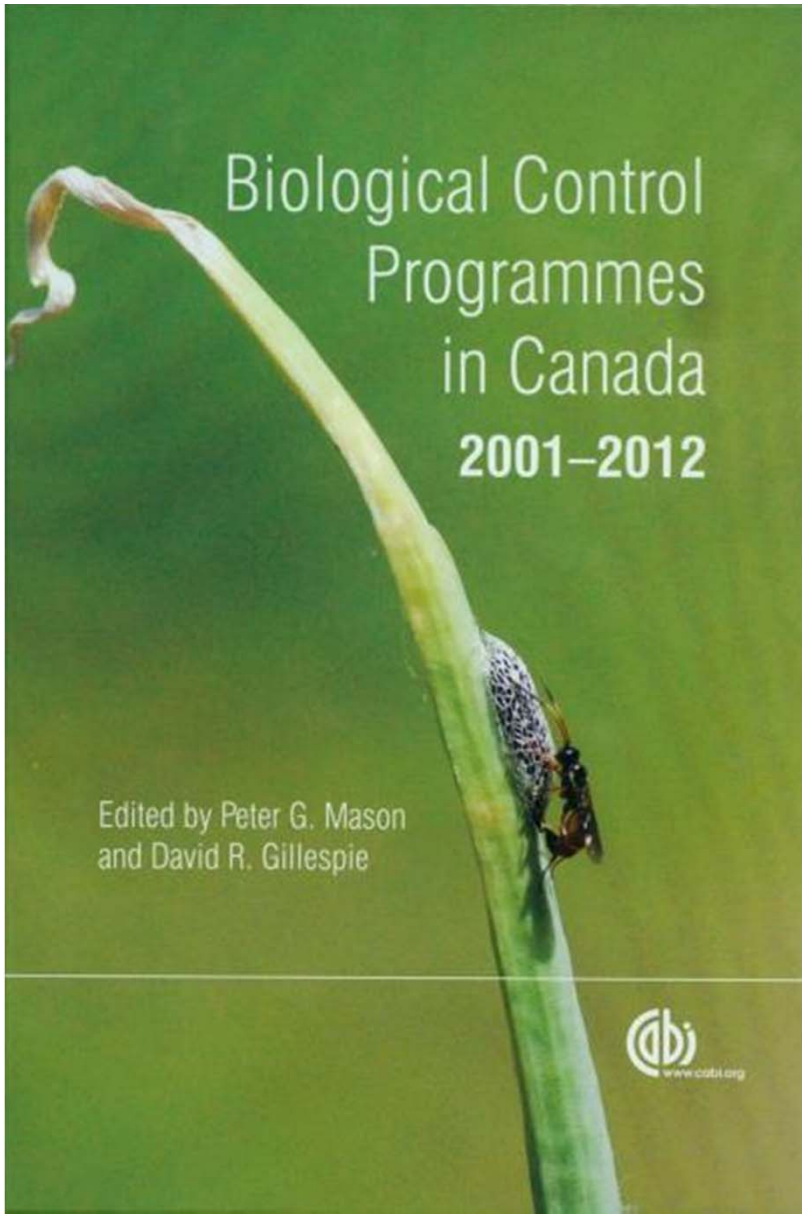
1971
48 cas



1984
68 cas



2002
102 cas



2013
71 cas

Au Canada (Mason et Gillespie 2013)

- 400 espèces d'invertébrés lâchées, dont 74 espèces commerciales
- 78% entomophages, 22% phytophages
- 85 biopesticides homologués

Biopesticides

Biological Control 52 (2010) 221–229

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journal homepage: www.elsevier.com/locate/ybcon

Social and economic drivers shaping the future of biological control: A Canadian perspective on the factors affecting the development and use of microbial biopesticides

K.L. Bailey [a,*], S.M. Boyetchko [a], T. Längle [b]

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Table 1
Global biopesticide and synthetic pesticide market. *Source:* BCC Research (2006).

Category	2003 $ millions USD	2004 $ millions USD	2005 $ millions USD	2010 $ millions USD	% Average annual growth
Biopesticides	468	562	672	1075	9.9
Synthetic	27,144	26,600	26,076	24,205	−1.5
Total	27,612	27,162	26,748	25,280	−1.1
Biopesticides as % of total	1.69	2.01	2.57	4.25	

Table 2
Microbial pest control products released in Canada. *Source:* Brian Belliveau, PMRA and the PMRA website http://www.hc-sc.gc.ca/cps-spc/pest/index-eng.php.

Microbial product category	Active name	Use class	First registered	Pest control product registrations from Jul 1972 to Jan 2008
Bioinsecticides	Various strains of *Bacillus thuringiensis berliner* subsp. *kurstaki*	Commercial	01-Jul-1972	11252, 11302, 24978, 26508, 26854, 27750
		Restricted	30-Jan-1984	17980, 20599, 24976, 24977, 26535, 27099, 27489, 27749
		Technical	30-Jan-1986	19316, 26425, 27337
		Domestic	12-Jun-1996	24536, 27251
	Various strains of *Bacillus thuringiensis* subsp. *israelensis* (or *Bacillus thuringiensis* serotype H-14)	Restricted	01-Mar-1984	18158, 19239, 19241, 21062, 26860, 26863
		Technical	05-Jun-1984	18340, 19238, 26861
		Commercial	08-May-1986	19455,19466, 26862, 27376, 27821
		Domestic	17-Apr-2003	27374
	Bacillus thuringiensis subsp. *tenebrionis*	Commercial	01-May-1995	24068
		Technical	21-Aug-2001	26961
	Bacillus sphaericus strain 2362	Technical	21-Aug-2001	28006
		Restricted	03-May-2005	28007, 28008, 28009
	Cydia pomonella granulovirus	Technical	06-Dec-1996	26532
		Commercial	08-Jun-2000	26533
	Nuclear polyhedrosis virus-gypsy moth	Technical	06-Dec-1996	24778
		Restricted	10-Apr-1997	24869
	Nuclear polyhedrosis virus-red-headed pine sawfly	Technical	29-Jun-1987	20291
	Nuclear polyhedrosis virus- Douglas-fir Tussock moth	Restricted	03-Jun-1983	17786, 19293
		Technical	29-Jun-1987	20290
	Nucleopolyhedrovirus *Neodiprion abietis*	Restricted	21-Apr-2006	28304

Biofungicide/bacteriocide	*Agrobacterium radiobacter*	Commercial	14-Jun-1989	21106
	Bacillus subtilis MBI 600	Technical	11-Jun-2004	27783
		Commercial	10-Oct-2007	28704, 28705, 28706
	Bacillus subtilis QST 713	Commercial	23-Apr-2007	28549, 28626, 28627
		Domestic	21-Aug-2007	28628, 28629
	Gliocladium catenulatum strain J1446	Technical	21-Jan-2008	Pending 45-day consultation period
		Commercial	21-Jan-2008	
	Pantoea agglomerans C9-1	Commercial	07-Sep-2006	28392
	Pantoea agglomerans E325	Commercial	21-Sep-2006	28435, 28436
	Pseudozyma flocculosa strain PF-A22 UL	Technical	03-Jun-2002	27160
		Commercial	03-Jun-2002	27161
	Streptomyces griseoviridis strain K61	Technical	25-Mar-2000	26264
		Commercial	25-Mar-2000	26265
	Streptomyces lydicus strain WYEC 108	Commercial	21-Nov-2007	28672
	Trichoderma harzianum rifai strain KRL-AG2	Technical	31-May-2002	27114
		Commercial	31-May-2002	27115, 27116
Bioherbicides	*Chondrostereum purpureum* strain HQ1	Technical	01-Feb-2002	27091
		Commercial	01-Feb-2002	27020
	Chondrostereum purpureum strain PFC 2139	Technical	26-Oct-2004	27822
		Commercial	26-Oct-2004	27823
	Colletotrichum gloeosporioides f.sp. *malvae*	Commercial	17-Feb-1002	22359
	Sclerotinia minor IMI 3144141	Technical	10-Apr-2007	28544
		Commercial	10-Apr-2007	28545
		Domestic	10-Apr-2007	28546
Wood preservative	*Ophiostoma piliferum* strain D97	Technical	06-May-2004	27561
		Commercial	06-May-2004	27560

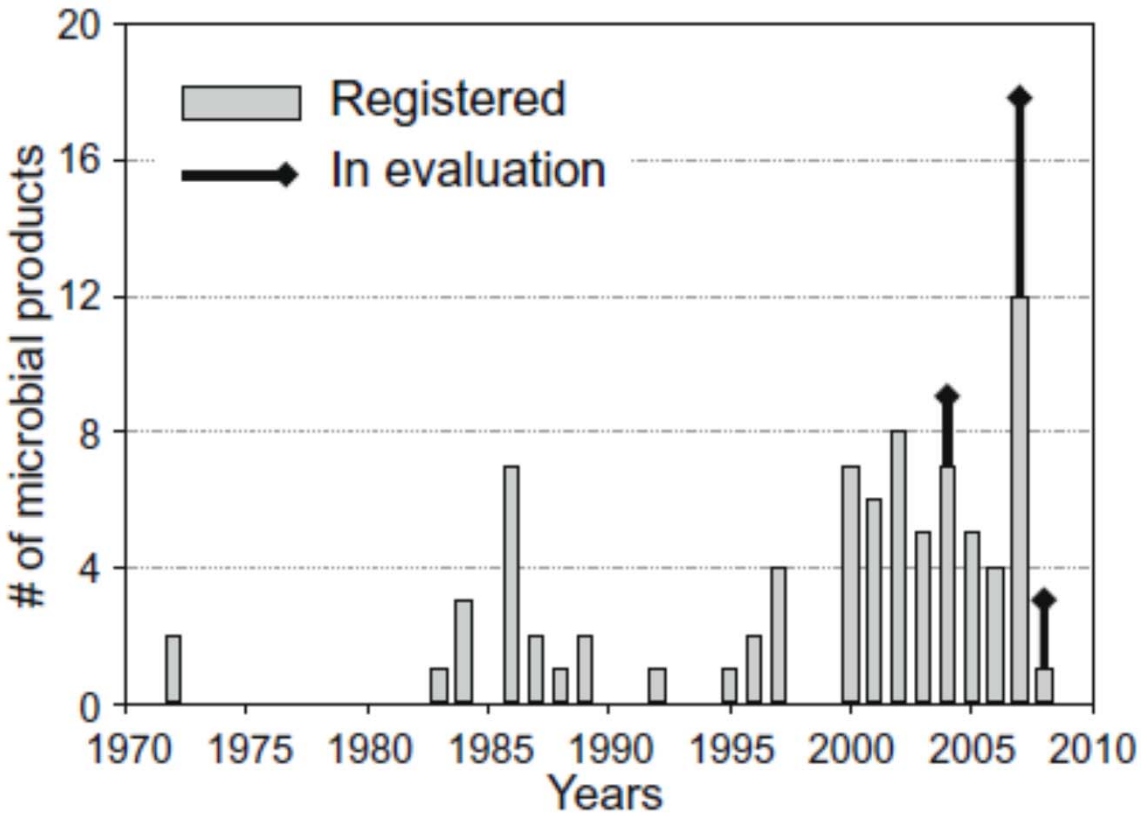


Fig. 2. Microbial products registered and under regulatory evaluation in Canada from 1972 to 2008. *Source:* PMRA website http://www.pmra-arla.gc.ca.

De 1972 à 2008: 83 formulations de biopesticides
De 2000 à 2008: 55 formulations de biopesticides

Le virus de la granulose *Cydia pomonella* (CpGv) en contraste de phase

Premier insecticide viral homologué au Canada pour usage agricole (2001)

Egalement homologué aux USA

Nom commercial: Virosoft CP4 (BioTEPP, Qc, Canada)

37 Madex and Virosoft, Viral Biopesticides for Codling Moth Control

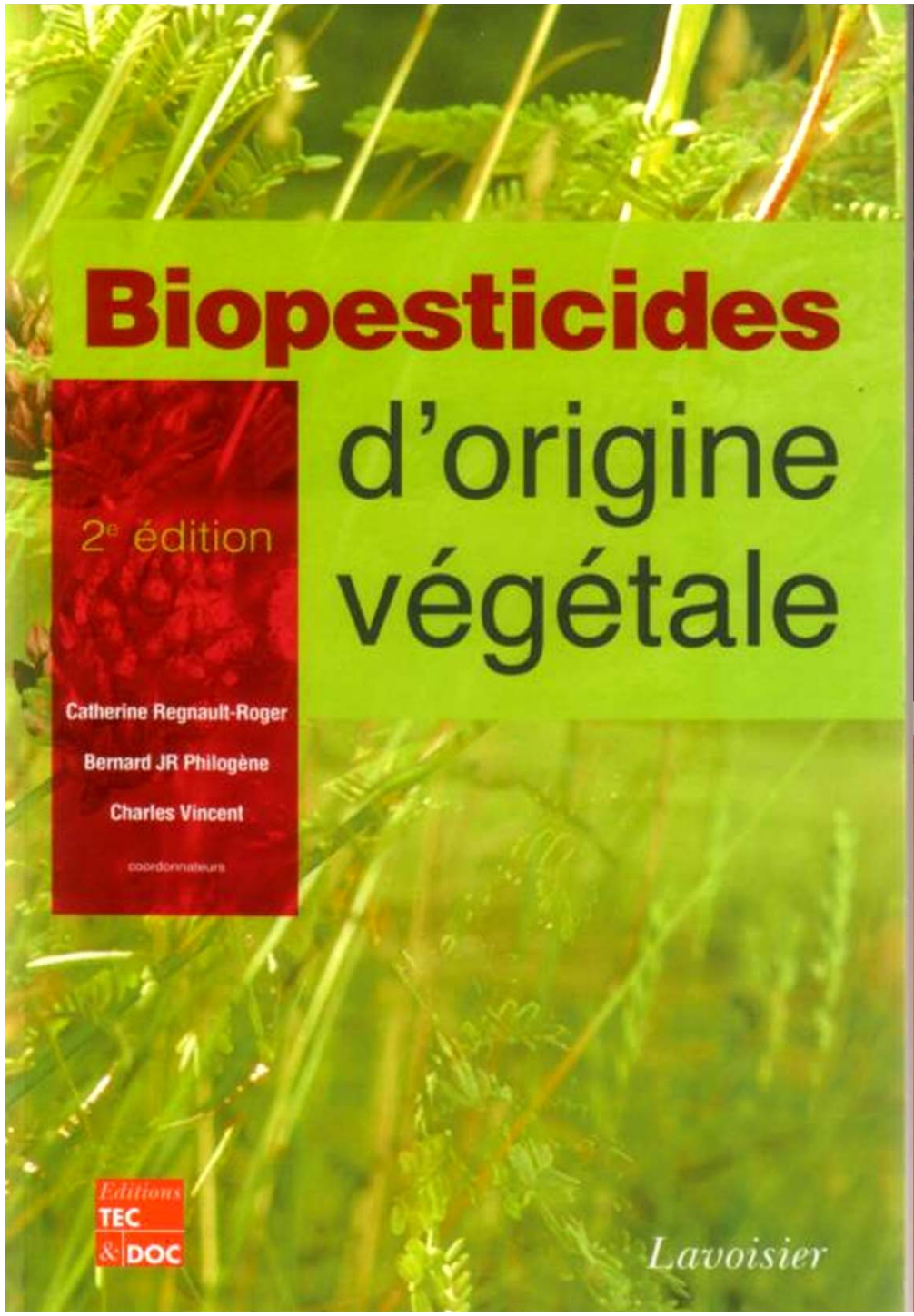
CHARLES VINCENT[1], MARTIN ANDERMATT[2] AND JOSÉ VALÉRO[3]

[1]Horticultural Research and Development Centre, Agriculture and Agri-Food Canada, 430 Gouin Blvd., Saint-Jean-sur-Richelieu, Quebec J3B 3E6, Canada, vincentch@agr.gc.ca; [2]Andermatt BIOCONTROL AG, Stahlermatten 6, CH-6146 Grossdietwil, Switzerland, andermatt@biocontrol.ch; [3]BioTEPP, 895 Chemin Benoit, Mont-St-Hilaire, Quebec J3G 4S6, Canada, josevalero@videotron.ca

Overview: This chapter relates the research and development of two granulovirus-based insecticides to manage the codling moth, *Cydia pomonella*, which is a worldwide pest of a number of fruit crops. Madex® and Virosoft$^{CP4®}$ were registered in Switzerland and Canada, respectively.

The Codling Moth

The codling moth, *Cydia pomonella* (Lepidoptera: Tortricidae), is a worldwide pest of a number of crops, including apples, pears and walnuts. Its literature is considerable, as the Codling Moth Information Support System indexes ca. 6500 references (CMISS-2005). Standard commercial management practices consist of several sprays per season of synthetic pesticides applied against larvae. Among alternatives to insecticides, parasites and predators have been studied but their effects are below expectations in commercial situations. Mating disruption has been successfully implemented in several apple-producing regions. However, this method is relatively costly and needs an environmentally friendly back-up method in case of failure.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Insecticidal Properties of a *Chenopodium*-Based Botanical

H. CHIASSON,[1] C. VINCENT,[2] AND N. J. BOSTANIAN[2]

J. Econ. Entomol. 97(4): 1378–1383 (2004)

ABSTRACT The emulsifiable concentrate UDA-245 based on an essential oil extract from *Chenopodium ambrosioides* variety near *ambrosioides*, a North American herbaceous plant, was compared with commercially available pesticides for their effectiveness to control green peach aphid, *Myzus persicae* (Sulzer) (Homoptera: Aphididae), western flower thrips, *Frankliniella occidentalis* (Pergande) (Thysanoptera: Thripidae), and greenhouse whitefly, *Trialeurodes vaporariorium* (Westwood) (Homoptera: Aleyrodidae). Side effects on the whitefly parasitoid *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae) also were determined. With green peach aphid, UDA-245 at 0.5% concentration was significantly more effective than the control (water) treatment in a laboratory bioassay and significantly more effective than neem oil and the control treatment and as effective as insecticidal soap in a greenhouse assay. With the western flower thrips, UDA-245 at 0.5% was significantly more effective than neem oil, insecticidal soap and the control treatment in a laboratory bioassay, whereas in a greenhouse assay, UDA-245 at 1.0% was the only treatment that maintained control of the western flower thrips 2 wk after the last treatment period. UDA-245 at 0.5% (laboratory bioassay) was significantly more effective in managing greenhouse whitefly than neem oil, endosulfan, and the control treatment and as effective as insecticidal soap. Insecticidal soap proved to be toxic to the parasitoid *E. formosa* (71.9% mortality), whereas UDA-245 at 0.5% was not significantly more toxic than the control (11.2 and 4.6% mortality, respectively). Our results suggest that a greenhouse integrated pest management (IPM) program using a botanical such as UDA-245 could effectively control infestations of major pests present while having a negligible effect on biological control agents.

Chapitre 24- Recherche, développement et commercialisation de FACIN™, un biopesticide d'origine végétale. Étude d'un cas de réussite en Amérique du Nord.

Hélène Chiasson, Urgel Delisle, Noubar J. Bostanian, Charles Vincent

In case you were unable to join (in person or on the conference line) the company meeting today, I wanted to share with you the good news. The EPA on April 16th 2008 registered the active ingredient "Extract of Chenopodium ambrosioides var ambrosioides". At the same time, EPA approved QRD400, 25EC formulation for use in ornamentals.

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Accès et bénéfices partagés (Access and Benefit Sharing- ABS)

- Convention sur la biodiversité
- La convention ABS a pris effet en 2010

www.anped.org/media/biodiversity.PNG

No. 30619

MULTILATERAL

Convention on biological diversity (with annexes). Concluded at Rio de Janeiro on 5 June 1992

Authentic texts: Arabic, Chinese, English, French, Russian and Spanish.
Registered ex officio *on 29 December 1993.*

MULTILATÉRAL

Convention sur la diversité biologique (avec annexes). Conclue à Rio de Janeiro le 5 juin 1992

Textes authentiques : arabe, chinois, anglais, français, russe et espagnol.
Enregistrée d'office le 29 décembre 1993.

CBD

Vol. 1760, I-30619

Importance de l'ABS ?

- 193 pays ont signé et ratifié (USA signé, pas ratifié) la convention de Rio en 1992. Andorre a refusé de signer.
- Les signataires ont adopté les Directives de Bonn (BGL) pour faciliter la mise en oeuvre de l'ABS
- En tant que signataire, le Canada est obligé de développer des politiques (et de s'y conformer) garantissant le partage équitable de la biodiversité.
- Dans le monde, on développe souvent des politiques avec peu de considération pour des activités sans but lucratifs comme la recherche en phytoprotection.

Actions concernant la lutte biologique

- OILB (IOBC) a:
  - formé une commission sur l'ABS
  - Reçu du financement de la FAO pour préparer un rapport
  - A formulé des recommandations pour faciliter le travail de ceux qui doivent développer de politiques (qui soient applicables).

Commission de l'OILB sur la lutte biologique et l'ABS (Zurich, 2009)

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Atheta or the Rove Beetle is an amazing predator of almost everything. Once every 3 months, pour 1 liter per acre down your drains.
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Since our beginning in 1980, we have been world leaders in the introduction and implementation of biological pest controls. Applied Bio-nomics was the first company to introduce growers to many now-familiar products including; Stratiolaelaps scimitus (previously called Hypoaspis miles), Stethorus punctillum, and Delphastus catalinae.

Our products are used in banana crops in Costa Rica, arborvitae in Oregon, pepper crops in British Columbia, roses in Holland, hops in Washington State, and butterfly conservatories in Niagara, Ontario. Most of our products are equally suited to outdoor gardens and glasshouses.

In 2005, Applied Bio-nomics decided to eliminate all cold storage of our products. Repeated scientific trials showed consistently that any duration of storage below 8 to 9 degrees Celsius impaired both the searching ability of the flying insects and the sex ratios in the mites – factors critical to efficacy in crops.

Buy from Applied Bio-nomics if you want the freshest, most effective beneficials available. Consult with "Applied" if you want the best advice, strategies and information on how to use these fresh beneficials to give you the highest performance at the lowest cost.

> *"'Best in first': a tip of the hat to one of the original, and still, one of the best*

Products

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Ask the Doctor

BioControl (2010) 55:445–454
DOI 10.1007/s10526-010-9273-2

FORUM PAPER

A Canadian national survey on the public perception of biological control

J. N. McNeil · P.-A. Cotnoir · T. Leroux ·
R. Laprade · J.-L. Schwartz

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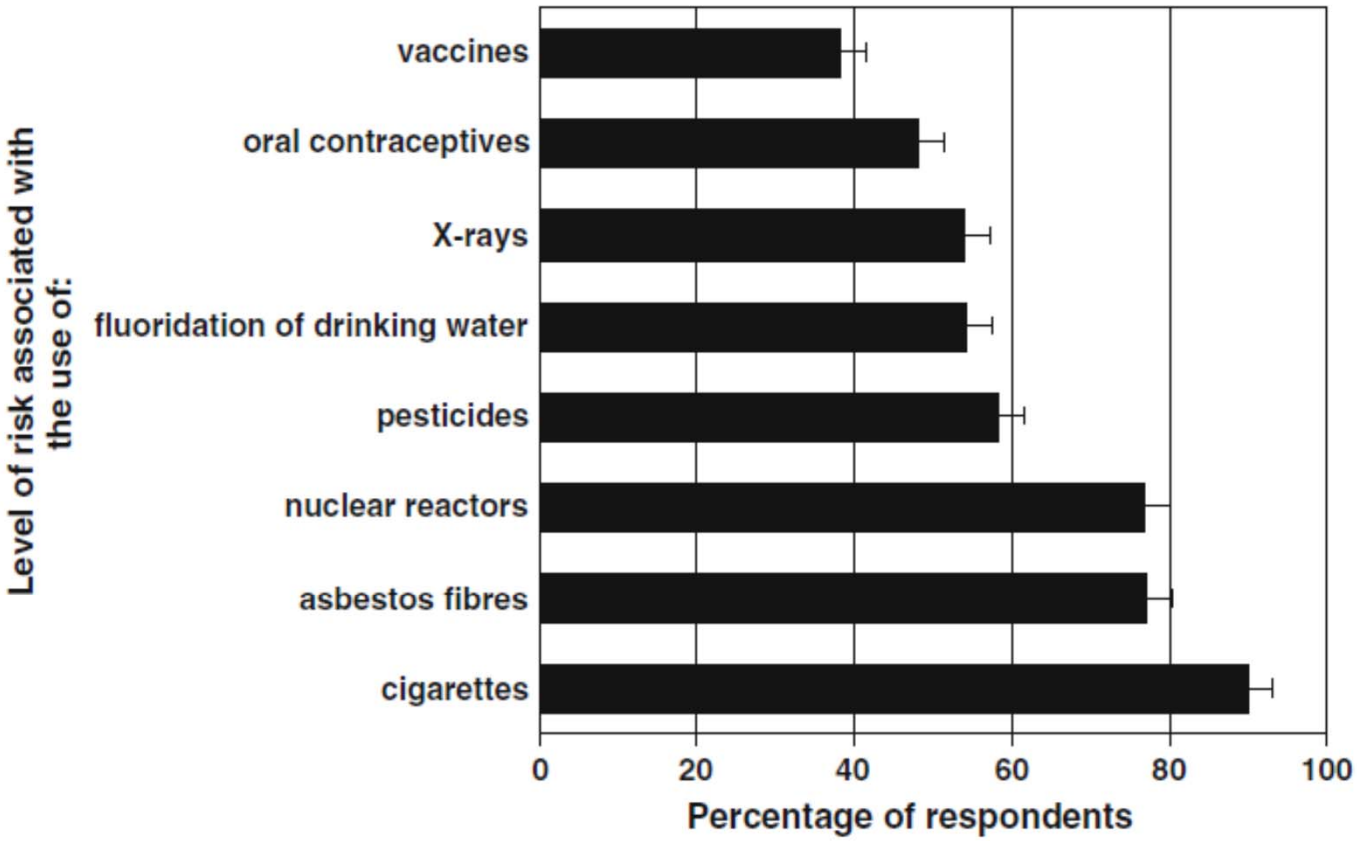
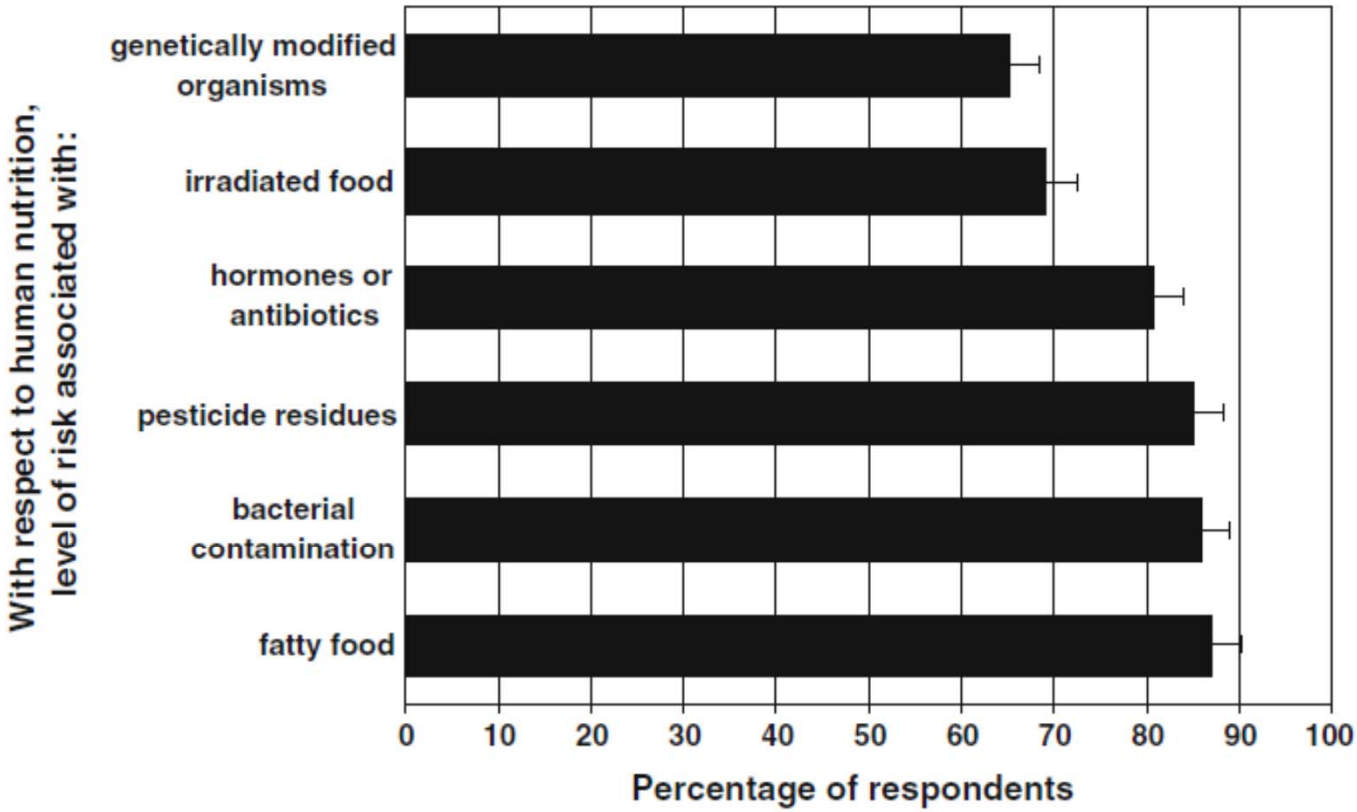
Fig. 6 Level of perceived risk associated with different factors that might be commonly encountered by members of the general public (Questions 4a to 4h of survey questionnaire). N = 967 (vaccines = 911; oral contraceptives = 819; X-rays = 905; fluoridation = 886; pesticides = 941; nuclear reactors = 917; asbestos fibres = 876; cigarettes = 963), error bars are SE



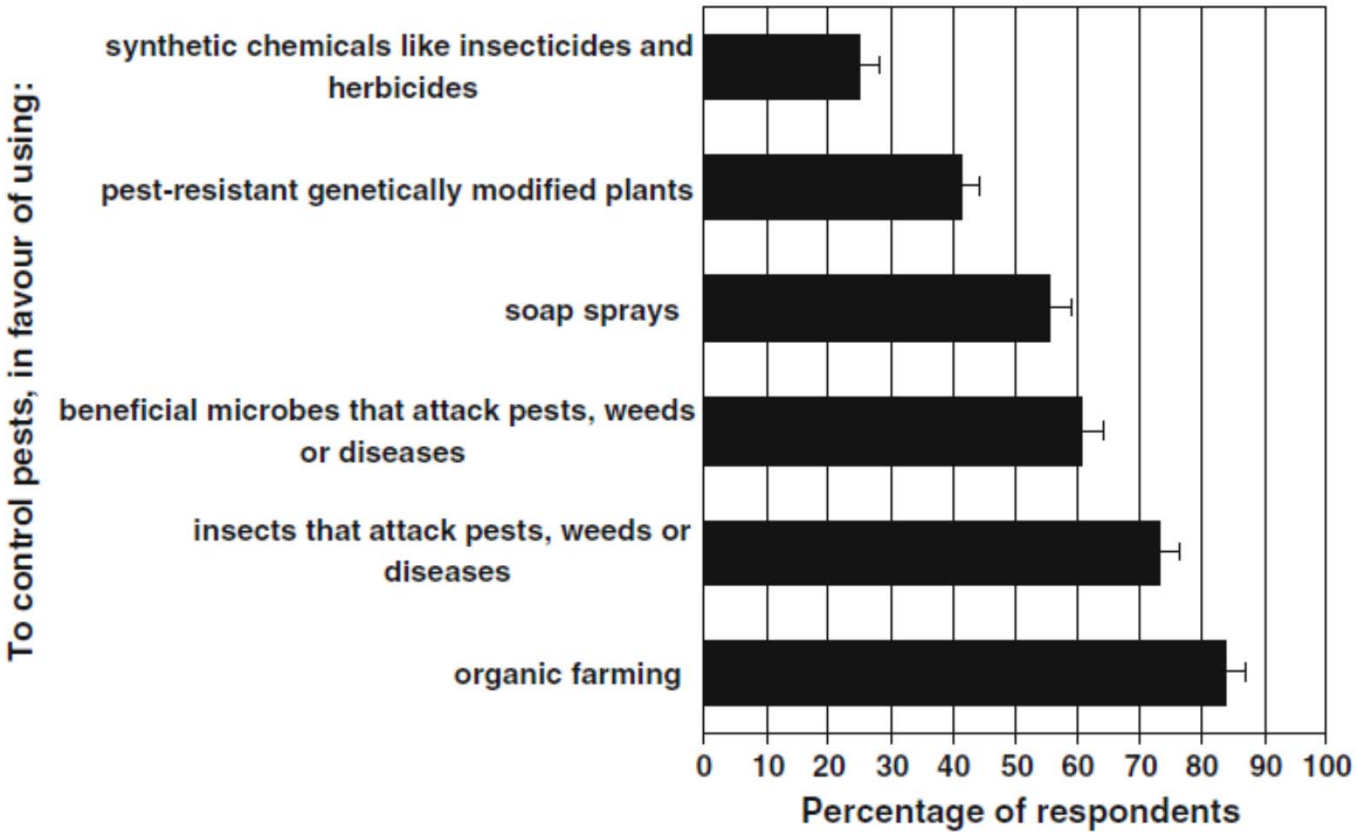
Perception de différents facteurs de risque

Fig. 7 Level of perceived risk associated with different factors that might affect food quality (Questions 8a to 8f of survey questionnaire). N = 967. Number of respondents considering the risks to be important or very important: genetically modified organisms = 631; irradiated food = 670; hormones or antibiotics = 782; pesticide residues = 822; bacterial contamination = 829; fatty food = 842, error bars are SE



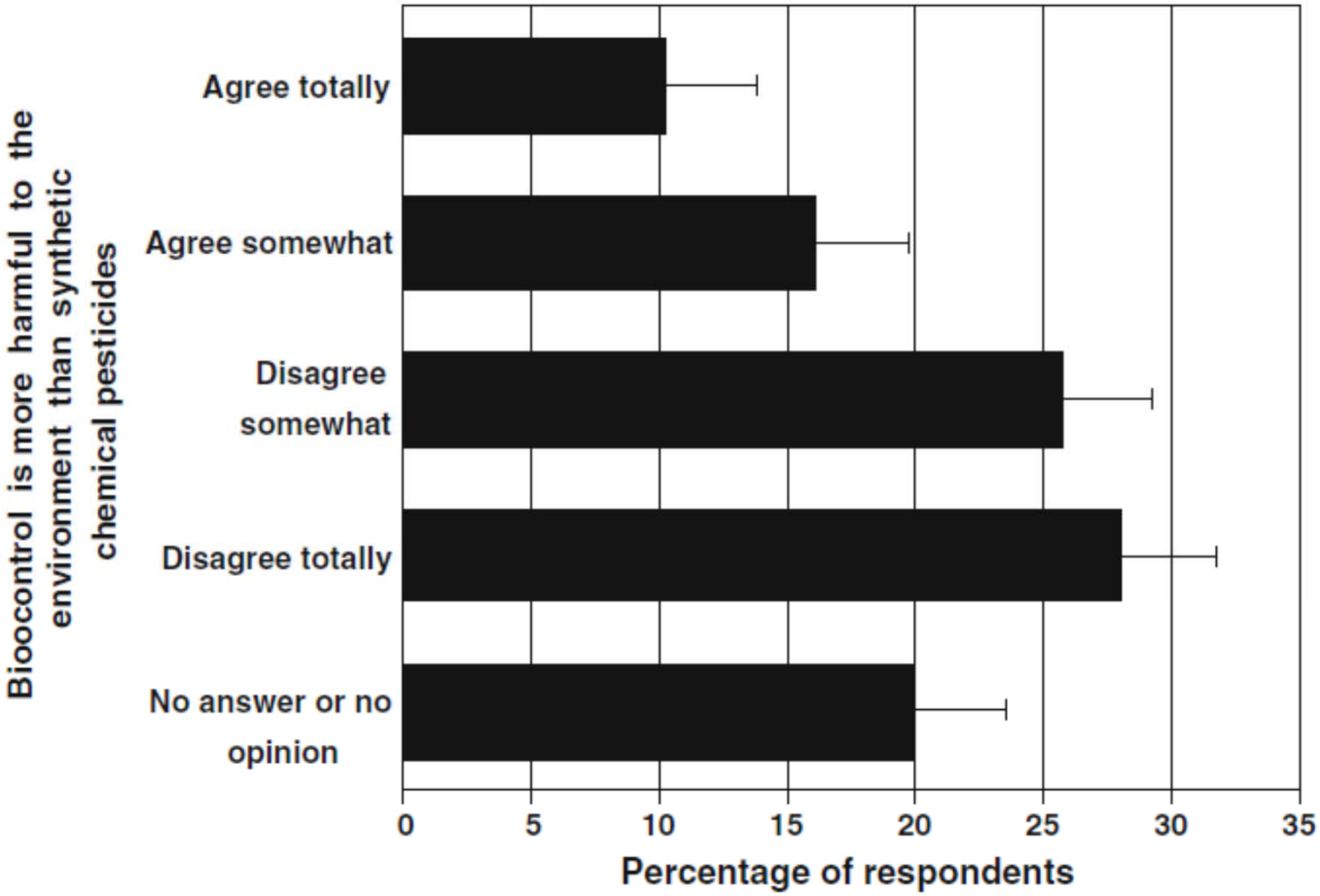
Facteurs de risques affectant la qualité de la nourriture

Fig. 8 Proportion of those interviewed expressing support for different means of managing pest species on consumable crops (Questions 9a to 9f of survey questionnaire). N = 967. Number of respondents being somewhat or totally in favour of: synthetic pesticides = 242; genetically modified plants = 397; soap sprays = 541; beneficial microbes = 589; beneficial insects = 709; organic farming = 813, error bars are SE



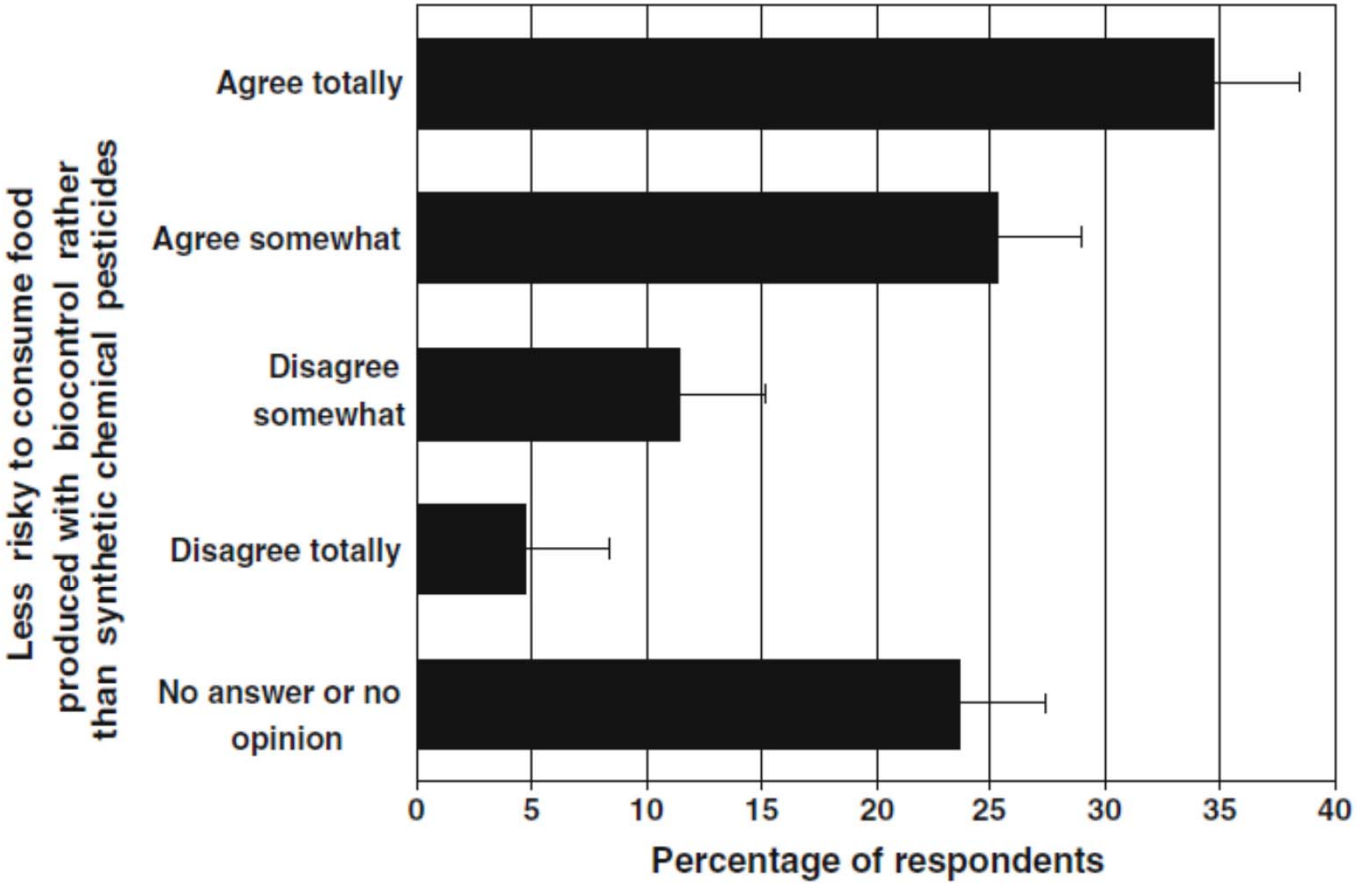
Appui à différentes méthodes de lutte

Fig. 9 Proportion of Canadians interviewed who believed that biological control would be more damaging to the environment than synthetic chemical pesticides (Question 11b of survey questionnaire). N = 967 (agree totally = 98; agree somewhat = 156; disagree somewhat = 249; disagree totally = 272; no answer or no opinion = 192), error bars are SE



La lutte biologique serait plus dommageable pour l'environnement que les pesticides

Fig. 10 Proportion of people interviewed who believed that it would be less harmful to eat produce if biological control had been used for pest management instead of synthetic chemical pesticides (Question 11c of survey questionnaire). N = 967 (agree totally = 336; agree somewhat = 245; disagree somewhat = 112; disagree totally = 46; no answer or no opinion = 229), error bars are SE



Il serait moins dommageable de manger des produits si la lutte biologique avait été utilisée au lieu de pesticides

Les consommateurs sont-ils prêt à payer le prix réel des denrées agricoles produites majoritairement avec des méthodes non-pesticides ?

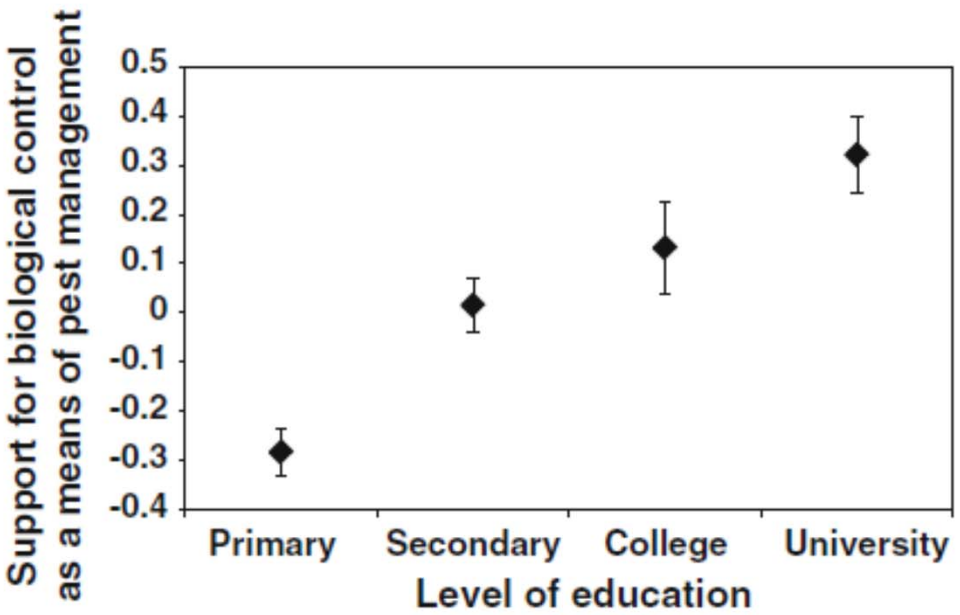


Fig. 5 Effect of the level of education on the support for biological control as a means of pest management. The scores derived from principal component factorial analysis of the responses given to Questions 11a to 11h and 15 of the survey questionnaire were analysed using ANOVA (N = 944 (Primary = 287; Secondary = 333; College = 145; University = 179), $F_{3, 940} = 15.47$, $P < 0.001$). The y axis represents the range of factorial scores and the values presented are the means ± SEM

Appui à la lutte biologique

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2e édition
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March 4-8, 2013
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