Pesticide Efficacy Trials for Seed Orchards and Seedling Nurseries



Mario Lanthier CropHealth Advising & Research Kelowna, B.C. www.crophealth.com

One part of our duties - Testing new pesticides



For us: Help growers reduce the pest damage



For us: Replace the older, more toxic pesticides

CYGON[™] 480 -18 SYSTEMIC INSECTICIDE - AGRICUI ш Σ KEEP OUT OF REACH OF CHILD NET CONTENTS: 10 L READ THE LABEL AND ATTACHED PAMPHLET IN CASE OF RE BETWEEN 4'C and 30'C INCAL EMERGENCY HAVE NO. 25651 PEST CONTROL PRODUCTS ACT CALL TOLL FREE, DAY OR 4 the Drive, Line 201 ULL TVB CHEMI

RESTRICTED ENTRY INTERVALS:

Crops	Activity	REI (days)
Filberts (hazelnuts)	Thinning	34
	Hand harvesting, hand-line irrigation	21
	All other activities	5
Peaches	Thinning	32
	Hand harvesting, hand-line irrigation	20
	All other activities	3
Pears	Thinning	28
	Hand harvesting, hand-line irrigation	17
	All other activities	1
Cherries	Thinning	20
	Hand harvesting, hand-line irrigation	9
	All other activities	12 hrs
	Hand harvesting (high bush)	12
Blueberries	Hand harvesting (low bush) and all other	12 hrs
	activities	
Boxwood	Thinning	7
	All other activities	12 hrs
Hemlock, spruce, Balsam fir	Thinning	13
224	All other activities	12 hrs
Christmas trees (Balsam fir, spruce, hemlock, pine),	Thinning	18
pine, oak, cedar	Hand-line Irrigation	3
	All other activities	12 hrs
Douglas fir (seed tree)	Seed cone harvesting	48
	Scouting	5
	Grading, animal control, baiting	1
Sitka spruce (seed tree), spruce (seed tree and	Seed cone harvesting	49
woodland)	Scouting	5
	Hand pruning, staking, tying	27
	Grading, animal control, baiting	2
Lilac	All activities	15
Holly	All activities	12

Year of first Canadian registration for "older" pesticides

Active ingredient	Trade names	First
		registration
carbaryl	Sevin	1958
dimethoate	Cygon, Lagon	1962
mancozeb	Dithane, Manzate	1963
chlorothanonil	Daconil, Bravo	1967
chlorpyrifos	Dursban, Lorsban, Pyrate	1970
thiophanate-methyl	Senator	1973

Pesticide Efficacy Trials Work done by our company

Production	Pest	Years	Results
Seed orchard	Dioryctria	2009 to 2014	New registration
Seed orchard	Leptoglossus	2009 to 2012	New registration
Seed orchard	Contarinia	2009 to 2013	New registration
Seed orchard	White pine weevil	2010, 2013, 2014	New registration
Seed orchard	Pine shoot moth	2017 and 2018	New registration
Seed orchard	Pine needle cast	2017 and 2018	Change of program
Seed orchard	Sequoia pitch moth	2017 to 2023	In progress
Seedling nursery	Botrytis	2018	Screening trial
Seedling nursery	Fusarium	2021	Screening trial
Seedling nursery	Herbicides	2021 and 2022	Screening trial

The trials follow guidelines from PMRA



Regulatory Directive

DIR2003-04

Efficacy Guidelines for Plant Protection Products

The aim of the regulation of pest control products is to ensure that pest control products offered for sale and use in Canada are safe to use, effective, and provide a demonstrated benefit or value. Value assessment is an important element of the pre-market evaluation of pest control products. Value assessments, as conducted by the Pest Management Regulatory Agency (PMRA), consist of three components: assessments of efficacy, of economic benefits and competitiveness, and of a pest control product's contribution to sustainability.

The principles of efficacy evaluation described in this document are consistent with those established by major regulatory and scientific organizations internationally (e.g., the United Kingdom Department for Environment, Food and Rural Affairs, the United States Environmental Protection Agency, the European and Mediterranean Plant Protection Organization and the Australian Pesticides and Veterinary Medicines Authority).

The intent of these guidelines is to:

- outline the general requirements for conducting efficacy trials;
- describe procedures and criteria for efficacy data evaluation; and
- provide guidance in developing rationales for reduced data requirements.

(publié aussi en français)

December 5, 2003

This document is published by the Alternative Strategies and Regulatory Affairs Division, Pest Management Regulatory Agency. For further information, please contact:

Publications Coordinator Pest Management Regulatory Agency Health Canada 2720 Riverside Drive A.L. 6605C Ottawa, Ontario Internet: pmra_publications@hc-sc.gc.ca www.hc-sc.gc.ca/pmra-arla/ Information Service: 1-800-267-6315 or (613) 736-3799 Facsimile: (613) 736-3798



Applicants for registration of pest control products must provide scientific information to support the efficacy of each control product for its intended purposes. This avoids the use of ineffective products or the use of excessive dosages, which may increase pesticide residues in food and unnecessary exposure to applicators, bystanders and the environment. Efficacious use of pest control products directly contributes to sustainable pest management and risk reduction. Efficacy evaluation (i.e., a determination of acceptable uses, rates and practices) also provides a necessary baseline for future risk assessments and risk management decision-making.

Efficacy is defined as the ability of a pest control product to fulfil the claims made on the product label. It includes the extent of control of the pest problem and considers any adverse effects on the treated site. The purpose of the assessment of efficacy is to evaluate product performance in order to establish appropriate label claims and to demonstrate benefits to users at the lowest effective application rate. Pest control products must provide consistent results without unacceptable damage or injury to the crop or subsequent crops under normal use conditions. Data are required regarding: (a) performance of the treatment on the target pest, (b) host tolerance to the treatment, and (c) effect on rotational crops.

Pesticide Efficacy Trials - Where we stand

Pest	Results	Still to do
Fir coneworm	New registration	Need to test Intrepid (IGR)
Leptoglossus	New registration	
Contarinia	New registration	No option except Movento
White pine weevil	New registration	
Pine shoot moth	New registration	Need to test Intrepid (IGR)
Pine needle cast	Change of program	
Sequoia pitch moth	In progress	2023 - Continue mating disruption
Botrytis	Screening trial	Need to retest "new" fungicides
Fusarium	Screening trial	Need to retest "new" fungicides
Herbicides	Screening trial	2022 was "field testing"

Trials in seedling nurseries



Survey in 2017 of nurseries across Canada Sponsored by Forest Nursery Association of BC

CropHealth Advising & Research

Survey of pest problems and pesticide needs in BC Forest Seedling Nurseries

We need your help. Which pest problems are a big concern in forest seedling nurseries?

What are we doing?

The Forest Nursery Association of BC is looking to expand the list of pesticides available for use in forest seedling nurseries. Our company was asked to prepare a review of the current situation. The pest problems reported by the growers will form the basis of the next steps to seek new pesticide registrations.

About the survey

We would appreciate if you complete this survey. There are 30 questions, with check boxes or space to type your answer. It should take 15 to 20 minutes. Please answer the questions that relate to your place of work. This survey allows you to go back and forth between the pages. However, using your web browser navigation buttons will close the survey, use only the navigation buttons at the bottom of the page. The answers will be sent only when you press the "Submit" button at the very end.

Your identity

We ask that you identify yourself at the end of the survey, so we know the answers are legitimate. All responses will be kept confidential by our company. Only the compiled results will be made available to the FNABC and the industry at large.

Questions or comments?

Do not hesitate to contact us with questions or comments.

Mario Lanthier CropHealth Advising & Research

Replies from 72% of nurseries contacted

REGISTRATION OF NEW PESTICIDES FOR BC FOREST SEEDLING NURSERIES

Part A: SURVEY OF MEMBERSHIP ON PESTS AND PESTICIDE USE

July 5, 2017

Province	Contacted	Replies
British Columbia	25	22
Alberta	5	5
Saskatchewan	2	1
Manitoba	1	0
Ontario	9	2
Québec	9	7
New-Brunswick	2	1
Newfoundland	0	0
Total across Canada	53	38

Survey results for diseases and fungicides



Survey results for insects and insecticides



Published in "Tree Planters' Notes" (on the web)

Tree Planters' Notes United States Department of Agriculture USDA Fall 2020 Forest Service Volume 63, No.2

Survey of Pest Problems and Pesticide Use in Canadian Forest Seedling Nurseries

Mario Lanthier and Cora Watts CropHealth Advising & Research, Kelowna, BC, Canada

Abstract

A survey regarding pest problems and pesticide use was distributed to forest seedling nurseries across Canada in the spring of 2017. Growers were asked to volunteer information relevant to their site for the pests found and the pesticides applied over the previous 5 years. Botrytis gray mold was identified as the main disease of concern, requiring at least one pesticide application over the previous 5 years at 89 percent of nurseries. Fusarium root rot is also a disease of concern. The survey identified Lygus bug as the main insect problem and liverwort as the main weed problem. The results highlight the need for new pesticide registrations for forest seedling nurseries in Canada. A full summary of the survey methodology and findings are reported. This paper was presented at the 2019 Joint Annual Meeting of the Forest Nursery Association of British Columbia and the Western Forest and Conservation Nursery Associations (Sydney, British Columbia, September 30-October 2).

Background

Forest nurseries produce tree seedlings to meet reforestation needs after logging. In Canada, tree seedlings are grown from seeds within a greenhouse environment (figure 1) with approximately 95 percent grown in Styrofoam[™] containers, also called Styroblocks[®] (Peterson 1991). Pest management is an important part of the production and frequently requires the use of pesticides.

In British Columbia, annual nursery production is approximately 250 to 300 million trees (BC Ministry of Forests 2017). This accounts for about 50 percent of the total Canadian seedling production (Canadian Council of Forests Ministers 2020). The most commonly produced seedlings are conifers, including lodgepole pine (*Pinus contorta* Douglas ex Loudon var. *latifolia* Engelm. Ex. S. Watson), interior spruce (referring to white spruce: Picea glauca (Moench) Voss; Engelmann spruce: P. engelmannii Parry ex Engelm.; and their hybrids), Douglas-fir (Pseudotsuga menziesii Mirb. Franco), western redcedar (Thuja plicata Donn ex D. Don), and western larch (Larix occidentalis Nutt.).

The federal agency in charge of pesticide registrations is the Pest Management Regulatory Agency (PMRA), a branch of Health Canada. In 2016, the PMRA published preliminary decisions on chlorothalonil and iprodione, two fungicides commonly applied by forest seedling nurseries. Both products were proposed for cancellation on conifer crops (Health Canada 2016b, 2016c). The Forest Nursery Association of British Columbia (FNABC, http://www.fnabc.com/) recognized the major impact on the industry from the proposed changes. A survey was undertaken to assess pest problems and pesticide use by Canadian forest seedling nurseries to clarify the need for new pesticide registrations. The project was funded by FNABC and conducted by CropHealth Advising & Research (Kelowna, BC, http://www.crophealth.com). This article summarizes the results of that survey.



Figure 1. Forest nurseries produce tree seedings to meet reforestation needs after logging. Most trees in Canada are grown from seeds in containers within a greenhouse environment. (Photo by Mario Lanthier 2007)

Ruling by Health Canada in 2017

Based on the use site category definition for ornamentals, forest seedling nurseries would be classified as ornamentals.

> Therefore, all end-use products registered for use on ornamentals may be used in forest seedling nurseries.

However, in order to be used on forest seedlings grown in a greenhouse, the end-use product must be registered for use on greenhouse ornamentals.

"Use Site Category" - There are 33 The information is part of the pesticide label



Use-Site Category (USC) Definitions for Conventional Chemical Pesticides

Table of Contents

- <u>Agriculture/Forestry</u>
- <u>Industry</u>
- <u>Society</u>

Agriculture/Forestry

Use-Site-Category	Definition	Exclusions
1. Aquaculture and Aquatic Food Sites • Insecticides • Herbicides • Insect Growth Regulators (IGRs) • Antifouling products	Plants or animals produced in an aquatic (marine or fresh water) environment for human consumption, as well as the equipment used for the production of these commodities, including antifouling products for nets, pens, ropes and cages/traps. Weed management in aquatic sites where food commodities may be present.	 For hydroponics, see Greenhouse Food Crops (USC #5) and Greenhouse Non-Food Crops (USC #6) For antifouling coatings for structures and materials not used for aquaculture, see Underwater Structures and Materials (USC #22) Treated water that will be subsequently used for irrigation of crops could trigger additional data requirements such as those under Terrestrial Feed Crops (USC #13) and Terrestrial Food Crops (USC #14)
2. Aquatic Non- Food Sites • Insecticides • Herbicides	Outdoor natural and man-made environments (marine or fresh water) such as rivers, lakes, ponds, water gardens, decorative fountains, sewage ponds, irrigation lines, reservoirs, etc. for the control of, including, but not limited to:	 Industrial Process Fluids (USC #17) Underwater Structures and Materials (USC #22) Swimming Pools (USC #29) Other Indoor Surfaces, Water and Air (USC #19)

"Use Site Category" applicable to Seed orchards and Seedling Nurseries

USC 4 - Forests and Woodlots

Forested areas and trees grown for use in forestry industry, including:

- tree plantations
- site preparation
- seed production (seed orchard)
- conifer release
- Christmas tree plantations and nurseries

<u>USC 6 – Greenhouse Non-Food Crops</u>

Non-food crops growing in greenhouses and other protected environments, including:

- non-food crops growing hydroponically, indoors, in soil, or in soilless media
- seedlings for transplants
- ornamentals

<u>USC 27 – Ornamentals outdoor</u>

Non-food plants growing outdoors in the field or in containers, for sale as ornamental plants or when used as ornamentals in residential areas, and public places such as parks. Including:

- flowers
- trees
- shrubs
- seed crops on non-agricultural land
- tree nurseries for silviculture production
- seed production (seed orchard)
- ornamentals grown under high tunnels
- tree seedling production under high tunnels
- tree injection of ornamental trees

Botrytis infection on Lodgepole pine seedling



Fungicides tested in 2018 screening trial



2 trials in BC Interior / Funding by FNABC



Results for impact on Botrytis at Site 1

Area Under Disease Progress Curve. Each point is 1440 data. Treatments Aug 7 + Oct 1.



Trials in seed orchards



Fir coneworm (Dioryctria abietivorella)



Trials for Fir coneworm

Year	Funding	Location	Objective
2009	BC Ministry Forests	Kalamalka Research	Screening (2 trials)
2010	BC Ministry Forests	Kalamalka Research	Screening (2 trials)
2011	BC Ministry Forests	Kalamalka Research	Efficacy (2 trials)
2012	Pest Management Centre	Kalamalka Research	Efficacy (2 trials)
2014	Pest Management Centre	Bailey, VSOC	Efficacy (2 trials)

Dioryctria: Results 2014 Trial (Bailey Orchard) Sprays May 24 (8 days after first trap capture) and June 5 (12 days later)

Assessment August 1 on 170 cones per treatment

Treatment	% with damage	Seeds per cone
Untreated	67	24
Dimethoate 2.0 %	19 *	36 *
Delegate low rate	14 *	34 *
Delegate high rate	5 *	33 *
F (5,164)	p = 0.0001	p = 0.0058

Delegate is now registered for fir coneworm



CONIFER SEED ORCHARDS (Douglas-fir, true firs, spruces, pines, larches, hemlocks)

For the control of fir coneworm, apply Delegate Insecticide at the rate of 210 to 420 grams of product per hectare using sufficient water volume to ensure thorough coverage of the foliage and cones. Time the applications for newly hatched larvae for best control. Use the higher rate for high populations and/or large larvae. Reapply if the pest population persists.

Apply a maximum of 3 applications of Delegate Insecticide per year with re-treatment interval of 14 to 21 days.

To reduce the potential for resistance development in target pest species do not make more than 2 consecutive applications of Group 5 insecticides (spinosyns). If additional treatments are required after 2 consecutive applications of Group 5 insecticides, rotate to an insecticide in a different group registered for this use for at least one application.

Summary report of all trials 43 pages

(if interested, ask for a copy)

PESTICIDE EFFICACY TRIALS FOR DIORYCTRIA, 2009 to 2012

By Mario Lanthier

CropHealth Advising & Research, Kelowna BC, office@crophealth.com December 16, 2013

This report is a summary of results for trials conducted from 2009 to 2012 at Kalamalka Forestry Centre, Vernon BC. The trials were designed to generate efficacy and phytotoxicity data of insecticides for control of fir coneworm *Dioryctria abietivorella* (Lepidoptera: Pyralidae). The products reviewed in this report are Delegate and Matador. The data is required for registration as replacements for current use of dimethoate.

SUMMARY OF TRIAL RESULTS

Year / host	Product	# sprays	Rate applied	Spray dates	First trap catch	Efficacy vs untreated ¹
2009 spruce	Delegate	2	4.2 g / 10 L	May 15, May 29	May 27	No insect activity
2009 D fir	Delegate	1	6.3 g / 15 L	May 8	May 27	83 % *
2009 D fir	Delegate	2	6.3 g / 15 L	May 8, May 22	May 27	92 % *
2010 spruce	Delegate	3	6.3 g / 15 L	May 10, 31, June 8	May 4 (visual)	No insect activity
2010 D fir	Delegate	3	6.3 g / 15 L	Apr 22, May 7, May 31	May 4 (visual)	100 % *
2011 D fir	Delegate	3	8.4 g / 20 L	Jun 4, Jun 20, July 1	May 20	89 % *
2011 D fir	Matador	3	8 ml / 20 L	Jun 4, Jun 20, July 1	May 20	90 % *
2011 D fir	Matador	3	8 ml / 20 L	May 6, May 13, May 20	May 20	93 % *
2012 D fir	Delegate	2	8.4 g / 20 L	Jun 11, Jun 25, Jul 9	May 15	10 %
2012 D fir	Delegate	3	8.4 g / 20 L	Jun 11, Jun 25, Jul 9	May 15	40 %
2012 D fir	Matador	3	8 ml / 20 L	Jun 11, Jun 25, Jul 9	May 15	60 %
2012 spruce	Delegate	2	8.4 g / 20 L	Jun 11, Jun 25, Jul 9	May 15	0 %
2012 spruce	Delegate	3	8.4 g / 20 L	Jun 11, Jun 25, Jul 9	May 15	0 %
2012 spruce	Matador	3	8 ml / 20 L	Jun 11, Jun 25, Jul 9	May 15	100 %
2012 D fir	Delegate	3	4.2 g / 10 L	Apr 27, May 11, May 25	May 15	100 % *
2012 D fir	Matador	3	10 ml / 10 L	Apr 27, May 11, May 25	May 15	100 % *

European pine shoot moth (Rhyacionia buoliana)



Trials in 2017 and 2018 at Vernon Seed Orchards Spraying in late April for overwintering larva



2017: Mean number of flagging shoots per tree

Treatment application late April. Visual rating June 15.

Treatment	Rate	Spray	Damage	%
		date		control
Untreated			36.6	
Lagon 480E	0.2%	April 21	14.8	60
Lagon 480E	0.5%	April 28	5.4	85
Delegate WG	6.3 g / 15 L	April 21	2.3	94
Matador 120EC	1.55 ml / 15 L	April 21	2.9	92
Flagship WG	4.75 g / 15 L	April 21 and May 2	27.0	26

Trial in 2017 to 2018 with air blast sprayer Spraying in June targeting summer egg laying



Trial with Airblast for Pine shoot moth Mean number of flagging shoots per tree

Treatment application June 19 and July 5, 2017. Visual rating June 15, 2018. n=50

Treatment	Rate	Orchard 218	% control	Orchard 219	% control
Untreated		14.4		7.5	
Delegate	420 g / ha	0.72	95	0.78	90
Matador	104 ml / ha	1.22	92	0.73	90

Published in "Tree Planters' Notes" (on the web)



Efficacy of Spinetoram, Methoxyfenozide and Lambda-Cyhalothrin for Control of European Pine Shoot Moth (Rhyacionia bouliana)

> Mario Lanthier and Stefanie Harder CropHealth Advising & Research, Kelowna, BC

Abstract

Four trials were conducted in 2017 and 2018 in British Columbia, Canada, to test newer insecticides for control of European pine shoot moth in a conifer seed orchard. In each of the four trials, the insecticides spinetoram and lambda-cyhalothrin gave over 80-percent reduction in insect damage when compared to untreated. The insecticide methoxyfenozide was tested in one trial and also provided over 80-percent control. In two trials, excellent control of the pest was obtained with one application made in late April, targeting the larvae moving from overwintering sites to new developing shoots. In the other two trials, excellent control was obtained with two consecutive applications made in mid-June and early July, targeting adults and newly hatched larvae on new plant shoots. This work helped generate data for label extension of the products.

Background

Forest seed orchards are managed similarly to tree fruit orchards except cones are harvested, from which seeds are extracted for later sowing in nurseries (figure 1). In British Columbia, more than 250 million trees are produced annually specifically for reforestation efforts after logging of forests (BC Ministry of Forests 2017). Seed orchards grow mostly conifer trees, including a large component of lodgepole pine (*Pinus contorta* Douglas ex Loudon var. *latifolia* Engelm. Ex. S. Watson) (BC Ministry of Forests 2020).

European pine shoot moth (*Rhyacionia bouliana*, Lepidoptera: Tortricidae) is a pest of pine plantations in many areas of Canada. This pest was first reported in North America in 1914 and has since migrated across the continent (Pointing 1967). A night flying moth (figure 2), European pine shoot moth is also found on mugo pines (*Pinus mugo* Turra) in ornamental landscapes and production nurseries. All of the damage from European pine shoot moth is done by the larva (figure 3), which attacks new shoots and reduces conelet production. The European pine shoot moth overwinters as a third instar larva in



Figure 1, Forest seed orchards are managed similarly to fuil tree orchards except cones are harvested, from which seeds are extracted for later sowing in nurseries. (Photo by Stefanie Harder 2019)



Figure 2. The European pine shoot moth adult has orange or bright ochre forewings with irregular, diagonal silvery lines and a wingspread of 16 to 20 mm. This insect files mostly at dusk. (Photo by Cora Watts 2018)

Spruce weevil (Pissodes strobi)



Spruce weevil: 2014 Trial (Armstrong BC) Sprays May 20 (early egg laying), June 3 (14 days later) and June 25 Weekly assessments of wilting shoots until September

Treatment	% of trees with damage
Untreated	40
Delegate	0 *
Matador	0 *
Entrust	0 *
F (9,190)	p = 0.0001

Delegate is now registered for white pine weevil



Delegate[™]

GROUP

A Naturalyte™ insect control produ listed crops.

COMMERCIAL

SEP 2020

READ THE LABEL AND BOOKLE KEEP OUT OF REACH OF CHILD

ACTIVE INGREDIENT: Spinetorar Wettable granules

REGISTRATION NO. 28778 PEST

NET CONTENTS: 840 g

Dow AgroSciences Canada Inc. 2400, 215 – 2nd Street S.W. Calgary, Alberta T2P 1M4 1-800-667-3852 To reduce the potential for resistance development in target pest species, do not make more than 2 consecutive applications of Group 5 insecticides (spinosyns). If additional treatments are required after 2 consecutive applications of Group 5 insecticides, rotate to an insecticide in a different group registered for this use for at least one application

Refer to the main Delegate Insecticide product label for Buffer Zone information, additional details and instructions.

CHRISTMAS TREES, OUTDOOR NURSERY STOCK AND ORNAMENTALS (for pines, spruces and Douglas-fir only)

For the control of white pine weevil (*Pissodes strobi*) apply Delegate Insecticide at the rate of 420 grams of product per hectare in 1000 L of water as a dilute spray. Ensure thorough coverage of the terminal buds and leaders. Maximum of three applications per year with a re-treatment interval of 7 - 10 days.

Applications should be applied in the spring when adults first emerge or in the fall after new adults emerge.

Refer to the main Delegate Insecticide product label for additional details and instructions.

MINT

For suppression of Thrips, apply Delegate at the rate of 200 to 280 grams of product per hectare.

For control of Cabbage Looper, apply Delegate at the rate of 140 to 200 grams of product per hectare.
Phytotoxicity of EC product in 2014 trial



Pine shoot moth and Spruce weevil How can we reach the larva inside the plant?



For pesticides, 2 main "modes of action"

Contact
Products applied to cover the plant or pest

Systemic
Products absorbed into the plant or pest

Contact activity





Systemic activity





L AL MANA MA ANALY MINA ANALY MINA

To be rigorous, "systemic" is not the proper word

Contact

• Products applied to cover the plant or pest

Penetrant pesticides (or systemic)
Products absorbed into the plant or pest

• They include:

Localized penetrants (translaminar) Move up only (acropetal penetrant) Move up and down (true systemic)

Translaminar activity

Drawing from Fungicides for Field Crops. American Phytopathological Society. 2013.



Delegate has "Translaminar" activity



What is the biological activity of Delegate?

- Delegate has demonstrated excellent efficacy across a broad spectrum of insects pests on a variety of crops
- Active by ingestion (primary) and contact (secondary)
- Active across multiple insect growth stages
- Delegate penetrates leaves (has translaminar activity) to provide control of dipterous and lepidopterous leafminers larvae
- Sap-feeding insects are not generally controlled with foliar applications of Delegate; there are some exceptions, such as Psylla sp. (pear psylla) which Delegate controls

How fast does Delegate work?

- Paralysis and feeding cessation occurs within minutes to hours depending on pest
- Insect death occurs within hours
- Symptoms are visual, providing rapid and tangible assurance that the product is performing
- Rapid speed of kill and feeding cessation enhance plant and fruit protective qualities of Delegate insecticide

Insecticides with translaminar activity



Fungicide Compass has translaminar activity

COMPASS[™] 50WG Fungicide

COMMERCIAL FUNGICIDE Wettable Granules

For control of certain foliar, stem, and root diseases of turfgrass and ornamentals

50%

READ THE LABEL AND BOOKLET BEFORE USING



REGISTRATION NO.: 27527 PEST CONTROL PRODUCTS ACT

GENERAL INFORMATION:

COMPASS 50WG Fungicide is a fungicide with primarily preventative activity for use on turfgrass and ornamentals. COMPASS 50WG Fungicide <u>penetrates the plant and provides translaminar activity</u> via a high affinity for the waxy layer of the plant surface, localized vapor movement and re-deposition on the plant.

"Acropetal penetrants" move up inside the plant



Drawing from Iowa State University Extension

Most systemic insecticides are "acropetal"



Insecticide Altus is "acropetal" systemic



Section 2: The Product

ALTUS Insecticide is intended for the control of insect pests in a wide variety of greenhouse vegetables, strawberries and ornamental crops, in outdoor nursery and landscape ornamentals, and in Christmas tree plantations. ALTUS Insecticide is a broad-spectrum insecticide that is acropetally systemic, moving from roots to the leaves in the case of soil applications. ALTUS Insecticide moves translaminarly through the leaf tissue in the case of foliar applications, and can provide control of pests on the underside of leaves. ALTUS Insecticide is readily absorbed into leaf tissue and is considered "rainfast" within 1 hour after spray dries.

Fungicides that are "acropetal" penetrants



True systemics move up (xylem) & down (phloem)



Follows the transport of sugars that move from leaves to roots and other storage organs

Insecticides: Only 1 active is a "true systemic"



Fungicides: Only 2 products are "true systemics"





Fungicide Aliette is a true systemic

2019-11-04



GENERAL INFORMATION:

CHIPCO ALIETTE[®] SIGNATURE Systemic Fungicide can be used to control *Pythium* and as a preventative control of foliar and basal rot anthracnose in turf. CHIPCO ALIETTE[®] SIGNATURE is completely systemic. Product applied to leaves will move downwards to the roots. CHIPCO ALIETTE [®] SIGNATURE is most effective when used as a preventative treatment. Plants displaying early disease symptoms, or when conditions for disease are favorable, are most likely to benefit from this treatment. Be careful. Most "systemic" pesticides are local penetrant or move up (not down)

ContactProducts applied to cover the plant or pest

Penetrant pesticides (or systemic)
Products absorbed into the plant or pest
They include:

Localized penetrants (translaminar)
Move up only (acropetal penetrant)
Move up and down (true systemic)

Recall the results for European pine shoot moth...

Treatment	Rate	Spray	Flagging shoots	% control
Untreated			27.9	
Lagon 480E	0.2%	April 23	12.4	55
Delegate WG	7.56 g / 18 L	April 23	1.1	96
Matador 120EC	1.8 ml / 18 L	April 23	3.0	89
Intrepid 240DF	18 ml / 18 L	April 23		

Excellent results with Intrepid on pine shoot moth

Treatment	Rate	Spray	Flagging shoots	% control
Untreated			27.9	
Lagon 480E	0.2%	April 23	12.4	55
Delegate WG	7.56 g / 18 L	April 23	1.1	96
Matador 120EC	1.8 ml / 18 L	April 23	3.0	89
Intrepid 240DF	18 ml / 18 L	April 23	0.2	99

2009 trial for Dioryctria at Kalamalka Station...

Treatment	Sprays	% reduction vs untreated
Untreated		
Dimethoate 0.25%	May 8	67 %
Delegate	May 8	83 %
Delegate	May 8, May 22	92 %
Intrepid	May 8, May 22	
Movento	May 8, May 22	75 %

Excellent results with Intrepid on Dioryctria

Treatment	Sprays	% reduction vs untreated
Untreated		
Dimethoate 0.25%	May 8	67 %
Delegate	May 8	83 %
Delegate	May 8, May 22	92 %
Intrepid	May 8, May 22	100 %
Movento	May 8, May 22	75 %

Intrepid - An insect growth regulator



Intrepid[™] Insecticide

INSECTICID

For the control of listed lepidopteran larvae in fruits, vegetables, tree nuts and herbs (subgroup 19-A), except chives

AGRICULTURAL

READ THE LABEL AND BOOKLET BEFORE USING KEEP OUT OF REACH OF CHILDREN

Suspension

REGISTRATION NO. 27786 PEST CONTROL PRODUCTS ACT

NET CONTENTS: 4 L - bulk

GENERAL INFORMATION

Intrepid Insecticide is a suspension concentrate product for the control of listed lepidopteran larvae in fruits, vegetables and tree nuts.

MODE OF ACTION

Intrepid Insecticide belongs to the diacylhydrazine class of insecticides and <u>mimics the action of the</u> molting hormone of larval Lepidoptera. Upon ingestion, larvae undergo an incomplete and developmentally premature molt which is ultimately lethal. This process interrupts and rapidly halts their feeding. Feeding typically ceases within hours of ingestion although complete mortality of the larvae may take several days. Affected larvae often become lethargic and develop discoloured areas or bands between segments.



Sequoia pitch moth (Synanthedon sequoia)



Larvae feed inside the trunk A concern on young trees



Spraying the trunks - 3 Trials in 2018 to 2020



Mean number of trees showing new pitch

3 applications Jun 26, Jul 11, Jul 26. Entrust 4 applications Jun 26, Jul 6, Jul 16, Jul 26 2020 Vernon Seed Orchard Co.

Treatment	Rate	% damage
Untreated control		10
Altacor WG	7.6 g / 12 L	0
Delegate WG	4.2 g / 12 L	0
Entrust 80W	2.0 ml / 12 L	0
Rimon 10EC	16.8 ml / 12 L	20

One problem with trunk spraying: low branches...



Organic apple growers spraying Synanthedon Pictures by Tamara Richardson, Cawston BC



Mating disruption - 5 trials 2017 to 2023





Pheromone Plume





Monitor adult flight - Use the proper lure !



Monitor new pitch - Larvae can live up to 2 years!



Mating disruption - Use the proper product !



Sequoia pitch moth - We need "ol" pheromone



BEHAVIORAL MATING DISRUPTION FOR DOGWOOD BORER (SYNANTHEDON SCITULA)

For use on pome fruit, stone fruit, tree nut, highbush blueberry and woody ornamental nursery crops

AGRICULTURAL SLOW RELEASE GENERATOR INSECT SEX PHEROMONE

READ THE LABEL BEFORE USING

GUARANTEE:

(Z,Z)-3,13-Octadecadien-1-yl Acetate	79.84 %
(E,Z)-2,13-Octadecadien-1-yl Acetate	5.46 %
(Z,Z)-3,13-Octadecadien-1-ol	1.50 %
(E,Z)-2,13-Octadecadien-1-ol	0.27 %

CAUTION SKIN IRRITANT

REGISTRATION NO. 30589 PEST CONTROL PRODUCTS ACT

ISOMATE®-P PHEROMONE

ISOMATE[®]-PTB DUAL

BEHAVIORAL MATING DISRUPTION FOR PEACH TREE BORER APPLE CLEARWING MOTH

FOR USE ON PEACHES, NECTARINES, CHERRIES, PRUNES, PLUMS, APRICOTS, APRICOTS, APRICOTS, HAWTHORNE, MOUNTAIN ASH

AGRICULTURAL

GUARANTEE:(Z,Z)-3,13 Octadecadien-1-yl Acetate80.4 %(E,Z)-3,13 Octadecadien-1-yl Acetate3.3 %

REGISTRATION NUMBER 27141 PEST CONTROL PRODUCTS ACT

BEHAVIORAL MATING DISRUPTION FOR PEACHTREE BORER (SYNANTHEDON EXITIOSA), AND LESSER PEACHTREE BORER (SYNANTHEDON PICTIPES)

For use on stone fruits and almonds

AGRICULTURAL SLOW RELEASE GENERATOR

READ THE LABEL BEFORE USING

GUARANTEE:

(E,Z)-3,13 Octadecadien-1-yl Acetate 44.20 % (Z,Z)-3,13 Octadecadien-1-yl Acetate 43.74 %

REGISTRATION NO. 30042 PEST CONTROL PRODUCTS ACT
Where we stand today

Pesticide Efficacy Trials for Seed orchards and Seedling nurseries

Pest	Results	Still to do	
Dioryctria	New registration	Need to test Intrepid (IGR)	
Leptoglossus	New registration		
Contarinia	New registration	No option except Movento	
White pine weevil	New registration		
Pine shoot moth	New registration	Need to test Intrepid (IGR)	
Pine needle cast	Change of program		
Sequoia pitch moth	In progress	Test DWB mating disruption	
Botrytis	Screening trial	Need to retest "new" fungicides	
Fusarium	Screening trial	Need to retest "new" fungicides	
Herbicides	Screening trial	2022 was "field testing"	

Thank you for your attention !



Mario Lanthier CropHealth Advising & Research Kelowna, B.C. www.crophealth.com

FGC MMA Forest Genetics Council Interior Technical Advisory Committee

ITAC Extension Meeting Tuesday: January 10, 2023

Microsoft Teams

meeting Join on your computer, mobile app or room device <u>Click here to join the meeting</u> Meeting ID: 264 957 315 811 Passcode: EqAtsY Download TeamsJoin on the webOr call in (audio only)+1 778-401-6289,,959551774#VictoriaPhone Conference ID: 959 551 774#Find a local numberReset PINToll-free (audio only): 1-888-600-3289

Time	Min.	Topic	Presenter
8:15	15	Technology trial run and participant login	
8:30	10	Welcome, Introductions and Agenda	ITAC Chair
8:40	20	Whitebark Pine Orchards Update	Stephen Joyce (WBPEF)
9:00	20	Physiological and Transcriptomic Responses to Drought in Ponderosa Pine	Adam Gilewski (SFU)
9:20	40	Genomics to Increase Breeding Efficiency (e.g. Cedar polycross)	Omnia Gamal El-Dien (UBC/CFS)
10:00	20	Health Break	
10:30	40	Landscape Level Genetic diversity	Hayley Tumas (UBC)
11:10	50	Pesticide Efficacy Trials for Seed Orchards and Seedling Nurseries	Mario Lanthier (CropHealth Advising & Research)
12:00	40	Lunch	
12:40	40	Interior Broadleaf Working Group – New Strategies for Managing Broadleaves	Neil Hughes (MoF)
1:20	40	Round Table Updates: Orchardists and Seed Users	ITAC Chair Lead
2:00	20	Health Break:	
2:20	35	SPAR and the Forestry Suite of Applications Modernization Project	Sabina Donnelly (MoF)
2:55	35	Tree Seed Centre Update	Dave Kolotelo (MoF)
3:30	15	Wrap-up	