



We create chemistry

Sefina™

Insecticide Powered by **Inscalix™**

Technical Information Brochure



contents

- 1 Introduction
- 2 Insects controlled by Sefina™ insecticide
- 5 Physical and chemical properties
- 6 Biological profile
- 9 Formulation and use
- 10 Resistance management
- 11 Environmental profile
- 12 Safety, stewardship and first aid instructions

Introduction

Sefina insecticide powered by Inscalix™ is a pioneer solution that has been classified by the Insecticide Resistance Action Committee (IRAC) as the only member in the new mode of action subgroup 9D. It provides effective control of harmful piercing and sucking insect pests, such as aphids, including those that have developed resistance to other insecticides.

Sefina boasts a favorable environmental profile with low acute toxicity to mammals, fish, birds and predatory insects. Derived from a fungal metabolite that occurs in nature, it provides an alternative mode of action in many segments with no known cross-resistance to commercial insecticides.



Sefina is registered in Canada for use on soybeans and potatoes.

Key attributes



Exceptional activity

Sefina delivers high efficacy with long-lasting control of problematic insect pests, such as aphids.



Fast acting

Sefina provides rapid feeding cessation of insect pests, which can in turn reduce virus transmission.



New resistance management tool

Sefina offers a unique mode of action and control of labeled piercing and sucking insect pests that have developed resistance to other insecticides, providing a valuable new tool for resistance management.




Integrated pest management compatible

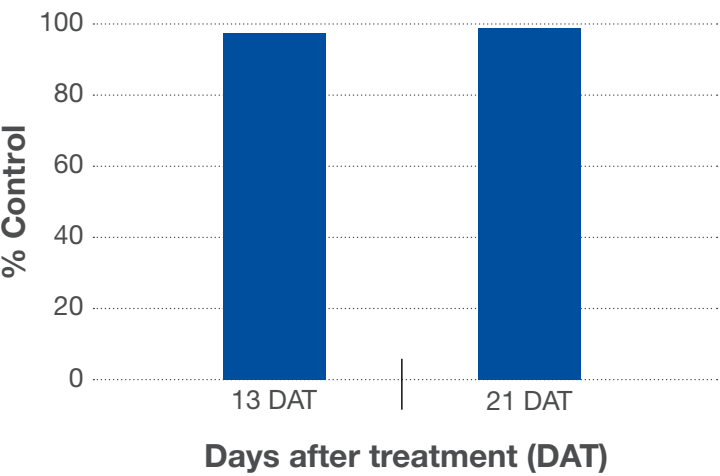


Insects controlled by Sefina insecticide

Many piercing and sucking insect pests contained within the order Hemiptera contribute to significant economic loss to crop production systems worldwide. Crop loss can be attributed to direct pest feeding damage or through the transmission of vector-borne plant diseases. The following table, not intended to be all-inclusive, illustrates the specific activity of Sefina on key target pests.

Aphid		
		
Common name	Scientific name	EPPO code
Soybean aphid	<i>Aphis glycines</i>	APHIGY
Potato aphid	<i>Macrosiphum euphoribae</i>	MACSEU
Green peach aphid	<i>Myzus persicae</i>	MYZUPE

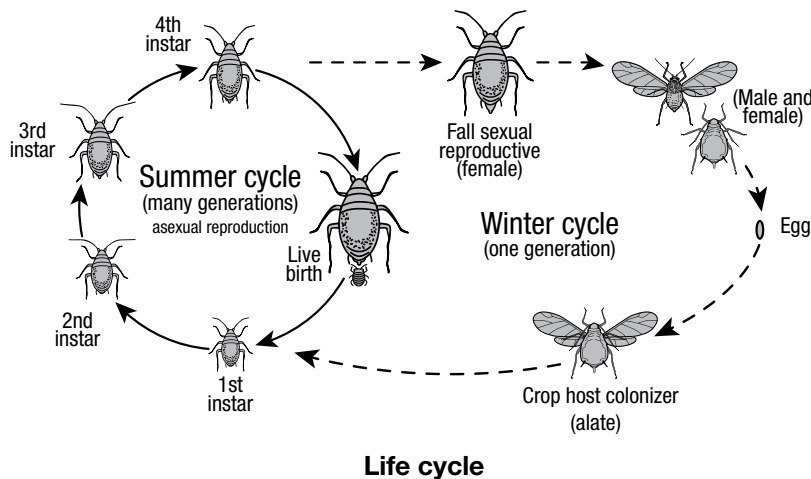
Extended duration of insect control with Sefina





Key insects controlled by Sefina insecticide

APHID



Distribution: Cosmopolitan throughout the world.

Host range: Many agricultural and non-crop hosts.

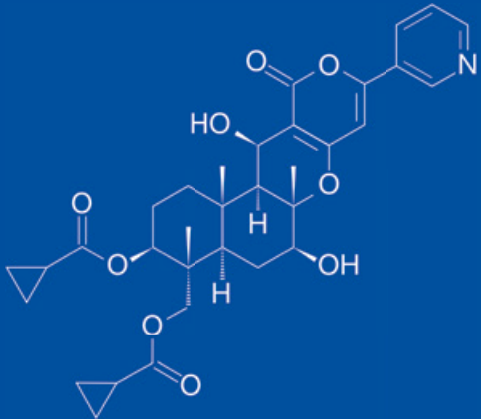
- Alternate between perennial winter host and secondary summer host.

Life history: Varied.

- Parthenogenetic throughout year.
- Sexual reproduction in fall (overwinter as egg) and asexual on summer host.
- Extremely high reproductive rate.
- Winged aphids can disperse great distances.

physical and chemical properties

Active Ingredient	Inscaldis (afidopyropen)
Trade Name	Sefina
Chemical Family	Pyropenes
Chemical Name (IUPAC)	[(3S,4R,4aR,6S,6aS,12R,12aS,12bS)-3-(cyclopropanecarbonyloxy)-6,12-dihydroxy-4,6a,12b-trimethyl-11-oxo-9-(pyridin-3-yl)-1,2,3,4,4a,5,6,6a,12a,12b-decahydro-11H,12H-benzo[f]pyrano[4,3-b]chromen-4-yl] methyl cyclopropanecarboxylate
Chemical Name (CAS)	[(3S,4R,4aR,6S,6aS,12R,12aS,12bS)-3-[(cyclopropylcarbonyl)oxy]-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-6,12-dihydroxy-4,6a,12b-trimethyl-11-oxo-9-(3-pyridinyl)-2H,11H-naphtho[2,1-b]pyrano[3,4-e]pyran-4-yl] methyl cyclopropanecarboxylate
CAS Number	915972-17-7
CIPAC Number	
Molecular Formula	C ₃₃ H ₃₉ NO ₉
Molecular Weight	593.7 g/mol
Melting Point	>150 °C (302 °F)
Appearance	Odourless, solid powder at 21 °C
Relative Density	Approx. 1.07 g/cm ³ (20 °C / 68 °F)
Log Pow	3.45 at 25 °C
Vapour Pressure	<9.9x10 ⁻⁶ Pa at 25 °C (77 °F)
Henry's Law Constant	2.31E-09 Atm·m ³ /mol
Solubility in Water	25.1 mg/L at 20 °C (68 °F)
Solubility in Solvents	n-hexane 0.0076 g/L at 20 °C toluene 5.54 g/L at 20 °C methanol >500 g/L at 20 °C dichloromethane >500 g/L at 20 °C acetone >500 g/L at 20 °C ethyl acetate >500 g/L at 20 °C
Chemical Structure	



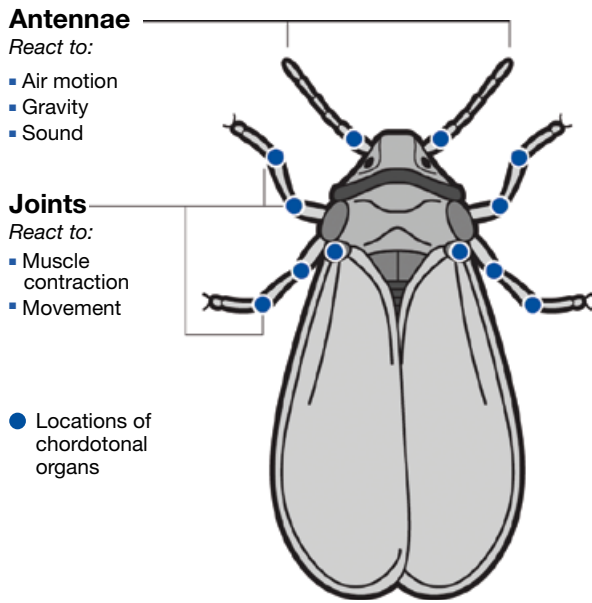
Biological profile

Mode of action

Sefina insecticide is a novel member of a group of insecticides known as chordotonal organ TRPV channel modulators and has been classified by the Insecticide Resistance Action Committee (IRAC) as the only member of the new mode of action subgroup 9D.

The chordotonal organs, present in insects and crustaceans but not found in any other class of animal, are biological stretch sensors. They may be located in the antennae, mouth, legs, wings or thorax. By sensing position and movement in the antennae under the influence of sound and gravity, these stretch sensors provide insects with their senses of hearing, orientation and balance. In leg joints, the same sensors are critical for coordinated movement. Sefina acts selectively on these stretch sensors.

Chordotonal organs in insects

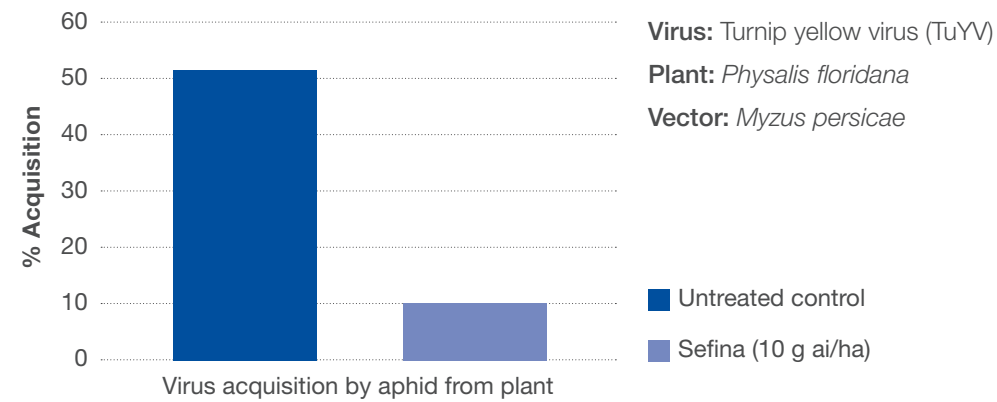


The molecular target of Sefina is the TRPV ion channel, which only occurs in chordotonal organ sensory nerve cells. Sefina selectively binds to the TRPV channels, causing them to open and generate continuous chordotonal nerve signals independently of joint movement. This false stretch signaling makes it impossible for the brain to detect sound, gravity and the movement and position of body parts. Deaf, disoriented and uncoordinated, insects affected by Sefina rapidly cease feeding and die from dehydration and starvation.

Virus transmission

Many important piercing and sucking pests cause significant economic loss in production systems worldwide. Crop damage can be attributed to direct pest feeding injury or to the spread of vector-borne plant diseases, such as potato virus Y. Insecticides powered by Inscalis have been shown to reduce the primary and secondary spread of insect pest-vectorated viruses by causing rapid feeding cessation that leads to impairment and death of the insect pest.

Sefina insecticide effectively limits spread of aphid-vectorated viruses



Potato virus Y



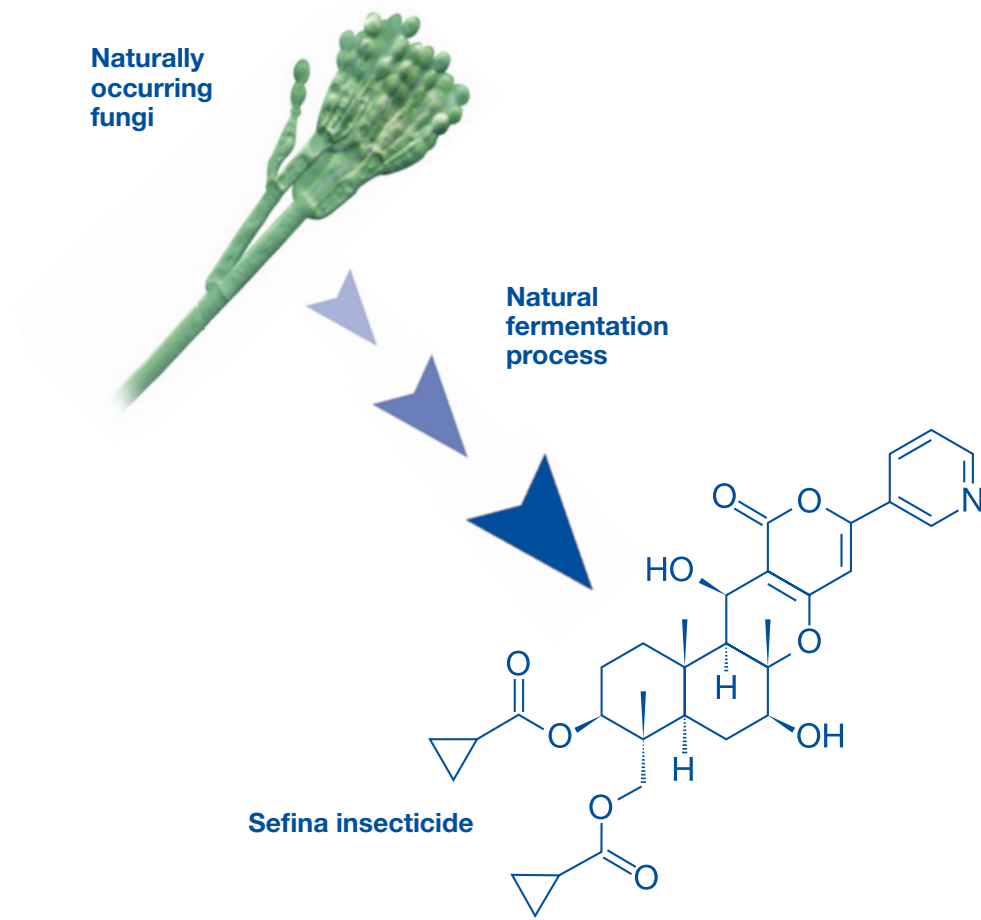
Favourable environmental profile

Sefina insecticide meets the high regulatory standards for modern crop protection compounds featuring low acute toxicity to mammals, fish, birds and important beneficial arthropods.

Sefina has been found to be compatible for use in the presence of many common beneficial arthropods including predatory mites and parasitic wasps.

Derived from nature

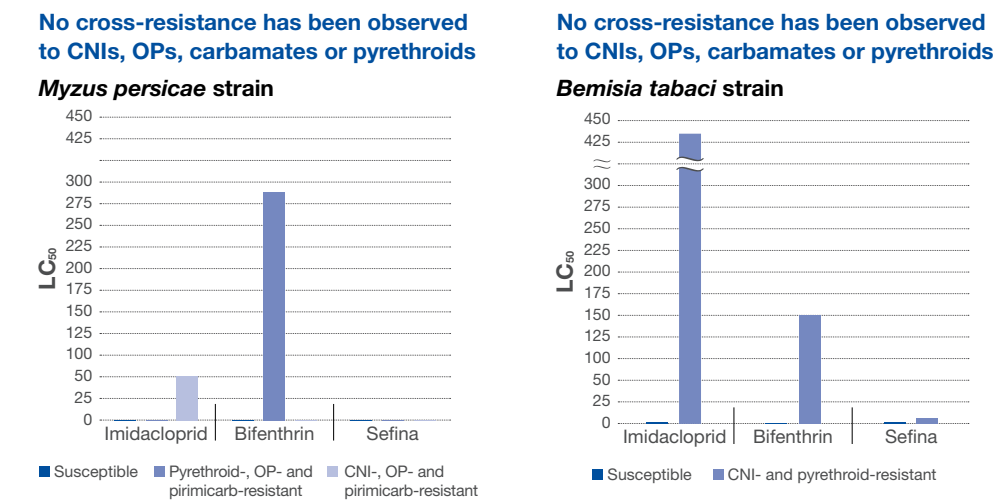
The synthesis of Sefina insecticide is a process whereby a naturally occurring fungus goes through a fermentation process followed by a drying process to extract the natural compound. The final step occurs when nature unites with science to further synthesize and refine the material into the active ingredient, Sefina insecticide.



Resistance management

Sefina is an excellent resistance management tool, controlling labeled insect pests that are resistant to other insecticides, including neonicotinoids, pyrethroids, organophosphates and carbamates. This makes Sefina an ideal candidate for use in insecticide resistance management (IRM) programs where it is necessary to rotate insecticide classes in order to slow or prevent the development of insecticide resistance, or as a replacement product where metabolic resistance exists.

There is no known cross-resistance to other classes of commercial insecticides such as organophosphates, carbamates, neonicotinoid insecticides and pyrethroids.



Laboratory studies were conducted to examine the efficacy of Sefina insecticide against populations of *Bemisia tabaci* (sweet potato whitefly) and of *Myzus persicae* (green peach aphid) with documented resistance against key classes of commercial insecticides such as organophosphates, carbamates, neonicotinoid and pyrethroid insecticides. In all cases, Sefina insecticide provided similar levels of efficacy against these resistant strains and laboratory susceptible populations. Since the results of these studies demonstrate a lack of cross-resistance, Sefina is an ideal candidate for resistance management.

IRAC classification*

* Contact your local university, government experts or the Insecticide Resistance Action Committee (IRAC) for more information about the effective management of insecticide resistance in a particular pest or crop situation.

Environmental profile

Sefina is nonvolatile and readily soluble in water. Stable to hydrolysis at acidic and neutral pH, slow hydrolysis does occur at alkaline pH. The presence of light promotes degradation of the active ingredient in aqueous systems but not on soil surfaces. Due to a favourable combination of moderate sorption and ready degradation in soil, Sefina has a low leaching potential as confirmed in field dissipation trials. Following application to the water phase of natural water/sediment systems, redistribution into the sediment and steady degradation in the overall water/sediment system is observed.

Environment	Study	Endpoint
Air	Vapour pressure	<9.9x10 ⁻⁶ Pa at 25 °C
	Degradation in air	DT ₅₀ : 0.055 days (Atkinson calculation)
Soil	Degradation in soils (aerobic)	DT ₅₀ : 2.7–18.6, mean = 8.8 days
	Degradation in soils (anaerobic)	DT ₅₀ : 26.3–65.8, mean = 44.0 days
	Soil adsorption	K _{OC} : 516–2439, median = 1151 mL/g
	Soil photolysis (sterile soil)	DT ₅₀ : light = 43.8 days, dark = 40.7 days
Water	Terrestrial field dissipation	DT ₅₀ : 1.5–7.9 days, mean = 4.7 days
	Hydrolysis	pH 4 = stable at 50 °C pH 7 = stable at 50 °C pH 9 = 133 days at 25 °C
	Aqueous photolysis	DT ₅₀ pH 7 buffer: 17–28, mean = 22 days at 40 °N DT ₅₀ natural water: 10–12, mean = 11 days at 40 °N
	Degradation in water-sediment (aerobic aquatic)	DT ₅₀ total system: 76–86, mean = 81 days at 20 °C
	Degradation in water-sediment (anaerobic aquatic)	DT ₅₀ total system: 35–45, mean = 40 days at 20 °C

Safety, stewardship and first aid instructions

Safety instructions

- Handle in accordance with good industrial hygiene and safety practice. No special measures are necessary if stored and handled correctly.
- Avoid contact of the product with eyes and skin. Protective overalls (heavy-duty cotton fabric with linen reinforcements), gloves (impermeable to water, mineral oil and organic solvents) and protective safety goggles with safety shields should be worn when applying the product.
- Do not breathe the vapours or spray mist of the product.
- Do not eat, drink or smoke while working with the product.
- Immediately change work clothing contaminated by the product.
- Take off protective clothing immediately after use; wash face and hands with soap and water.
- Keep product out of surface water.
- When handling the concentrated product, use a fume hood or adequate ventilation.
- Use additional protective equipment or handling precautions as required by local conditions, ordinances or laws.
- Use suitable chemical-resistant safety gloves (EN 374).
- Use suitable fire-fighting measures, including water spray, carbon dioxide, foam and dry powder. For safety reasons, do not use a water jet to extinguish fire containing this product.

Cleaning of spray equipment

- Before application, start with clean, well-maintained application equipment.
- Following spray application, thoroughly clean all application equipment.
- Drain application equipment of any excess product. Thoroughly rinse application equipment and flush hoses, boom and nozzles with clean water.
- Clean all other associated application equipment.
- Take all necessary safety precautions when cleaning equipment.
- DO NOT clean equipment near wells, water sources or desirable vegetation.

Storage notes

- Keep product above -10 °C.
- Store in a cool, dry place away from children, animals, food, feed and/or fertilizers.
- Keep container tightly closed in a dry and well-ventilated place.
- Keep unused product in resealed original container(s).
- Protect from direct sunlight.
- Avoid formation of dust and aerosols.
- Keep packages dry at all times.
- Keep packages out of rain.
- Keep packages away from heat.



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