



XXpire[®]
INSECTICIDE

Technical Bulletin

 **CORTEVA[™]**
agriscience

Overview

XXpire® insecticide contains two ingredients that control a broad spectrum of insect pests on ornamental plants. XXpire poses minimal phytotoxic risk to plants, is less disruptive to beneficials, and controls seven of the top 10 insect pests on ornamentals. XXpire is composed of two proprietary active ingredients from Corteva Agriscience™, each of which has a unique mode of action. One component, sulfoxaflor, provides outstanding control of sap-feeding insect pests, including whiteflies and aphids, and has been categorized by the Insect Resistance Action Committee (IRAC) as a Sub-group 4C insecticide. The other component is spinetoram, which provides control of chewing pests and has been categorized by IRAC as a Group 5 insecticide. XXpire controls most pests and suppresses spider mites on ornamental plants in nurseries and greenhouses.

Noteworthy features of XXpire include:

- Two active ingredients: sulfoxaflor and spinetoram
- Two modes of action
- Effective on more than 39 insect and mite pests
- Controls seven of the top 10 insect pests on ornamentals, and suppresses spider mites
- Up to one month of residual control, depending on the pest
- Less disruptive to beneficial insects
- Minimal phytotoxic risk to plants: No plant injury observed on more than 300 plants tested
- No visible spray residue on flowers and leaves after application
- Can be applied in both greenhouse and outdoor production facilities
- Low odor



Active Ingredients

XXpire® insecticide is composed of two proprietary active ingredients discovered and registered by Corteva Agriscience. Sulfoxaflor has a unique mode of action (IRAC Sub-group 4C) and is not neonicotinoid chemistry. Sulfoxaflor controls many important and difficult-to-control sap-feeding insects, including thrips, aphids, whiteflies, and mealybugs. Sulfoxaflor provides excellent knockdown and residual control and has translaminar and xylem-mobile activity. It has minimal activity against beneficial insects and also has a favorable mammalian toxicological profile.

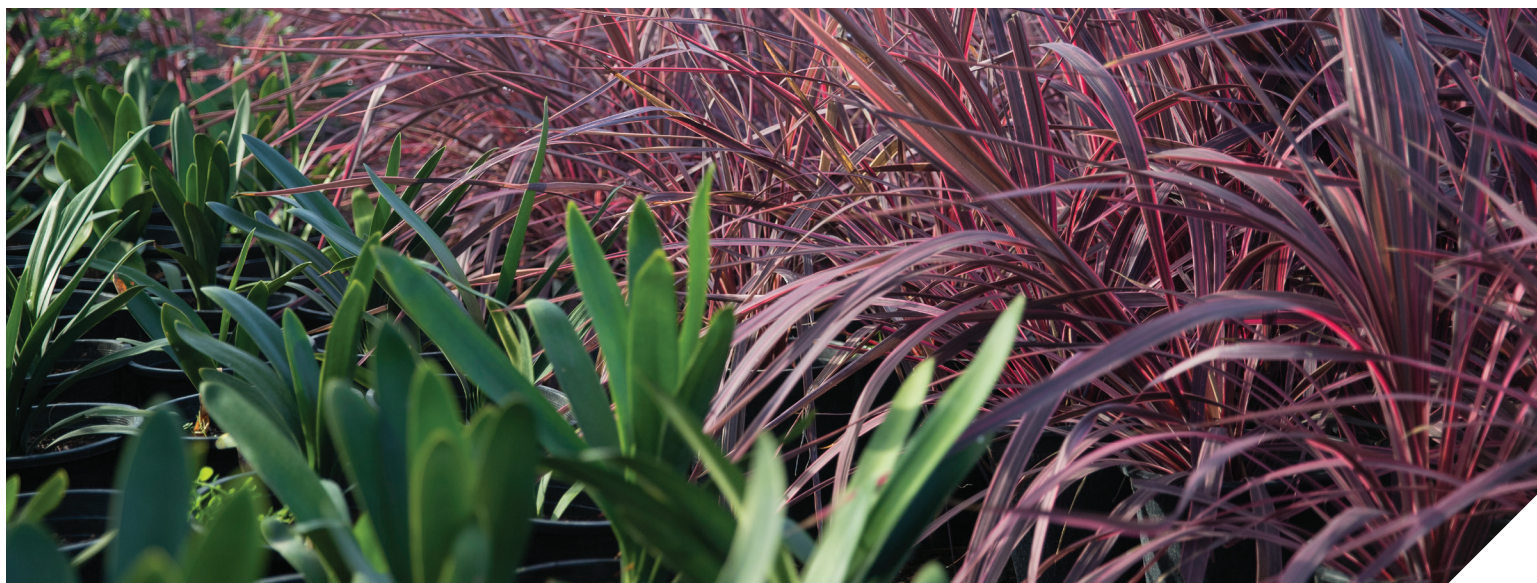
Spinetoram is a spinosyn insecticide and is categorized in IRAC Group 5 insecticides (spinosyns). Spinosyns are derived initially from fermentation of *Saccharopolyspora spinosa*, a naturally occurring bacterium. Spinetoram then undergoes synthetic modifications that confer improved insecticidal activity and longer residual control. Spinetoram controls most lepidopteran insect pests, as well as thrips. It also suppresses mites on ornamental plants.

Formulation and Use Rates

XXpire is formulated as a WG (water dispersible granule). XXpire contains 40% active ingredient by weight, with sulfoxaflor and spinetoram included in equal amounts.

The WG formulation is unique and has important advantages over most liquid formulations, including:

- Uniform-sized, free-flowing granules
- Easy to pour and measure, with “flowable” characteristics
- Low dust
- Good dispersion/solution in water
- Reduced dermal hazard compared with liquids
- Long-term stability at high and low temperatures
- Spills can be cleaned up easily



Mixing order of tank mixes

Fill the spray tank with water to 1/4 to 1/3 of the required spray volume, start agitation, add different formulation types in the order indicated below, allowing time for complete dispersion and mixing after addition of each product. Allow extra dispersion and mixing time for dry flowable products.

Add different formulation types in the following order:

1. XXpire® insecticide and other water dispersible granules
2. Wettable powders

Maintain agitation and fill spray tank to 3/4 of total spray volume. Then add:

3. Emulsifiable concentrates and water-based solutions
4. Spray adjuvants, surfactants and oils
5. Foliar fertilizers

Finish filling the spray tank, maintain continuous agitation during mixing, final filling and throughout application. If spraying and agitation must be stopped before the spray tank is empty, the materials may settle to the bottom. Settled materials must be re-suspended before spraying is resumed. A sparger agitator is particularly useful for this purpose.



User requirements and application

Signal Word: Caution

Personal Protective Equipment (PPE)

Requirements for applicators and other handlers:

- Long-sleeved shirt and long pants
- Shoes plus socks

The restricted entry interval (REI) for XXpire® insecticide is 12 hours.

XXpire can be applied by ground or aerially (commercially grown ornamentals only) and with airblast sprayers. Refer to label directions for specific uses and applications.

Restrictions for using XXpire in greenhouses¹

XXpire cannot be applied more than six times in a 12-month period inside a greenhouse or a non-porous structure that can be altered to be closed or open. XXpire cannot be applied to seedlings of edible crops for transplanting or to any other stage of edible crops growing in greenhouses.

Restrictions for using XXpire in nurseries

Do not apply XXpire more than one time during bloom and no more than four times per year. The single application during bloom must not exceed a rate of 5.5 oz/acre.

¹A greenhouse is defined as a structure or space enclosed with a nonporous covering inside of which plants are produced.

²A nursery is defined as a facility engaged in the outdoor production of plants.



Biological activity

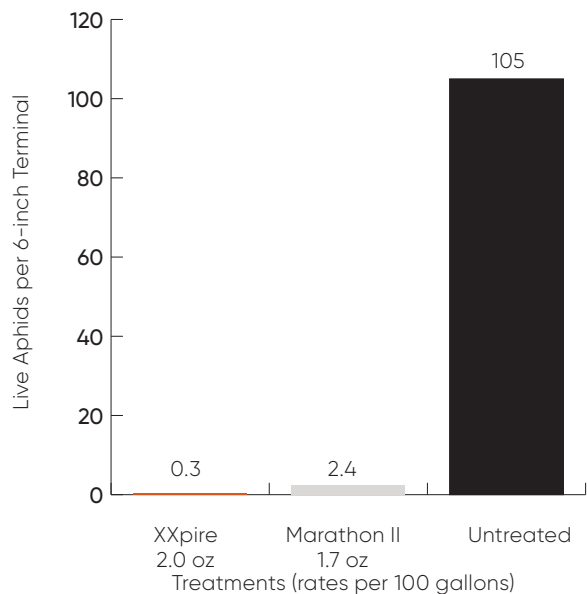
Pest	Pest Spectrum
Aphids	Green peach aphid (<i>Myzus persicae</i>); cotton aphid (<i>Aphis gossypii</i>); oleander aphid (<i>Aphis nerii</i>)
Beetles	Elm leaf beetle (<i>Xanthogaleruca (=Pyrrhalta) luteola</i>); viburnum leaf beetle (larvae) (<i>Pyrrhalta viburni</i>); willow leaf beetle (<i>Plagiodera versicolora</i>)
Lepidoteran larvae	European grapevine moth (<i>Lobesia botrana</i>); azalea caterpillar (<i>Datana major</i>); bagworm (<i>Thyridopteryx ephemeraeformis</i>); beet armyworm (<i>Spodoptera exigua</i>); cabbage looper (<i>Trichoplusia ni</i>); California oakworm (<i>Phryganidia californica</i>); fall cankerworm (<i>Alsophila pometaria</i>); diamondback moth (<i>Plutella xylostella</i>); eastern tent caterpillar (<i>Malacosoma americanum</i>); fall webworm (<i>Hyphantria cunea</i>); Florida fern caterpillar (<i>Callopistria floridensis</i>); geranium budworm (<i>Heliothis virescens</i>); gypsy moth (<i>Lymantria dispar</i>); light brown apple moth (<i>Epiphyas postvittana</i>); obliquebanded leafroller (<i>Choristoneura rosaceana</i>); oleander caterpillar (<i>Syntomeida epilais</i>); orangestriped oakworm (<i>Anisota senatoria</i>); spruce budworm (<i>Choristoneura occidentalis</i>); hickory tussock moth (<i>Lophocampa caryae</i>); whitemarked tussock moth (<i>Orgyia leucostigma</i>); western tent caterpillar (<i>Malacosoma californicum</i>); winter moth (<i>Operophtera brumata</i>); yellownecked caterpillar (<i>Datana ministra</i>)
Sawfly larvae	European pine sawfly (<i>Neodiprion sertifer</i>); pear sawfly (<i>Caliroa cerasi</i>); redheaded pine sawfly (<i>Neodiprion lecontei</i>)



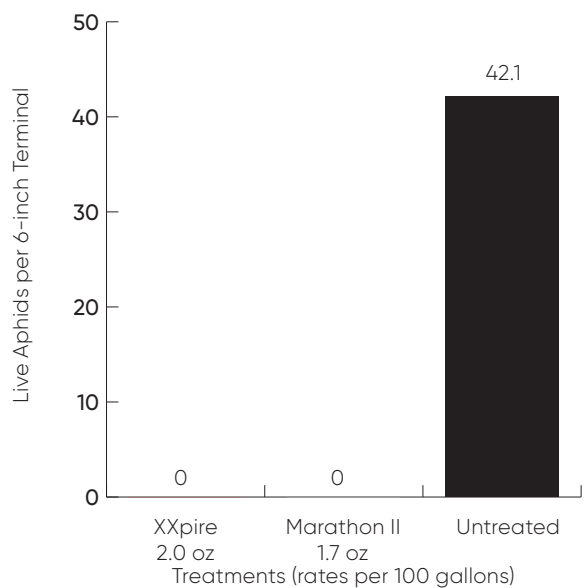
Pest	Pest Spectrum
Diptera	Dipteran gall midges: pinyon spindlegall midge (<i>Pinyonia edulicola</i>); Chrysanthemum gall midge (<i>Diarthronomya chrysanthemi</i>); shore fly (<i>Scatella stagnalis</i>)
Thrips	Western flower thrips (<i>Frankliniella occidentalis</i>); chili thrips (<i>Scirtothrips dorsalis</i>)
Whiteflies	Silverleaf whitefly (<i>Bemisia tabaci</i>); ficus whitefly (<i>Singhiella simplex</i>)
Scale	Pine needle scale (<i>Chionaspis pinifoliae</i>); cottony cushion scale (<i>Icerya purchasi</i>); false oleander scale (<i>Pseudaulacospis cockerelli</i>) (suppression)
Mealybugs	Citrus mealybug (<i>Planococcus citri</i>)
Spider mites (suppression only)	Two-spotted spider mite (<i>Tetranychus urticae</i>); spruce spider mite (<i>Oligonychus ununguis</i>)
Lace bug	Azalea lace bug (<i>Corythucha cydoniae</i>); Hawthorne lace bug (<i>Singhiella simplex</i>)



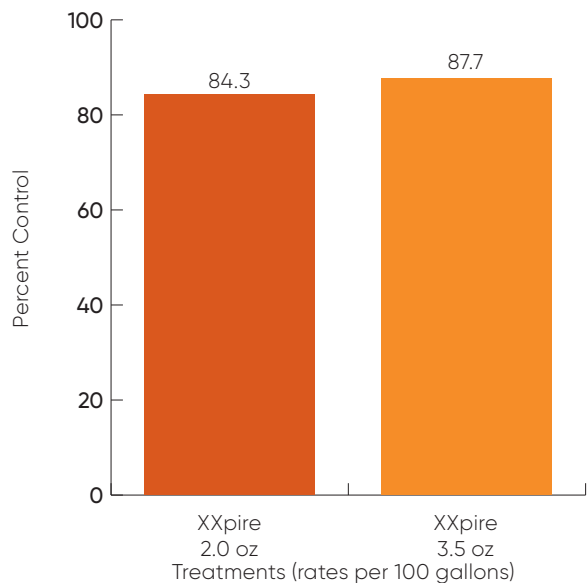
XXpire® insecticide efficacy



Green Peach Aphid on Roses
One Day after Application
Crop Inspection Services, CA

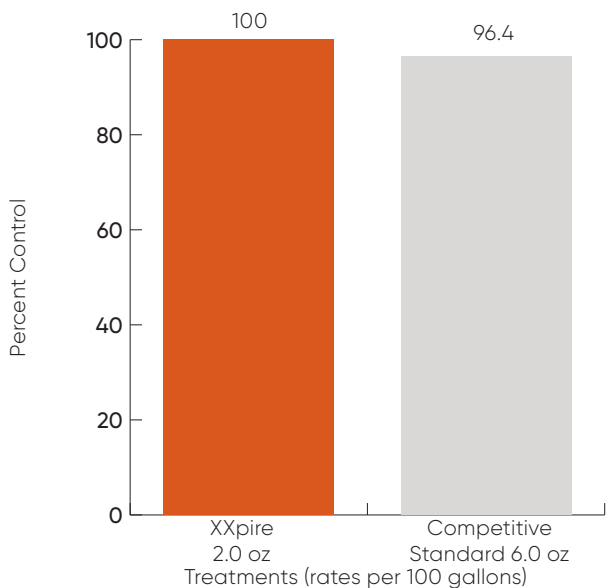


Green Peach Aphid on Roses
28 Days after Application
Crop Inspection Services, CA

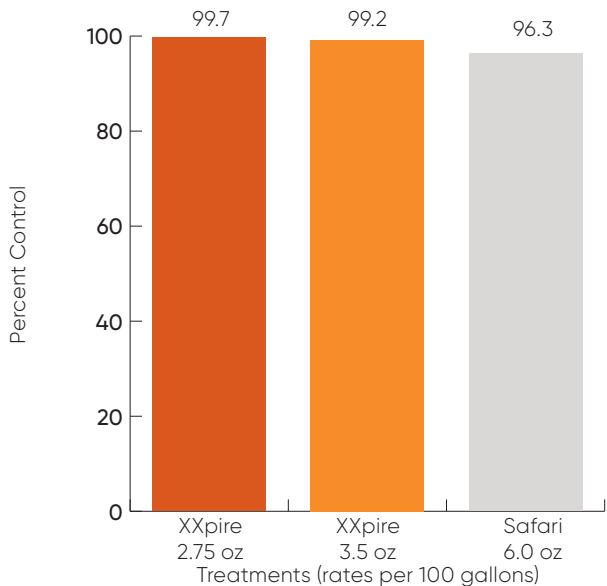


Chili Thrips on Roses
14 Days after Application
Mid-Florida Research Center
University of Florida

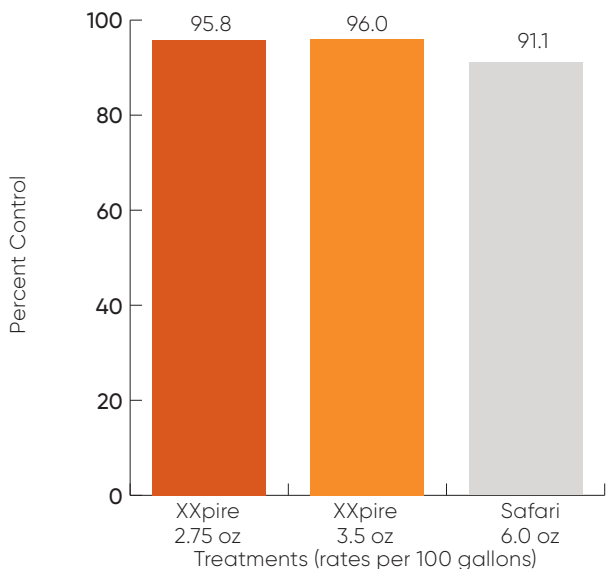




Beet Armyworm on Aster
7 Days after Application
Crop Inspection Services, CA



Silverleaf Whitefly on Rose Mallow Hibiscus
14 Days after Application
University of Florida



Twospotted Spider Mite on Butterfly Bush
14 Days after Application
University of Georgia



Ornamental safety and use of adjuvants

Ornamental safety is a critical issue for all insecticides. XXpire® insecticide has been tested against more than 300 types of plants and has shown an excellent margin of safety in all cases. Contact your Corteva Agriscience sales representative for a current list of ornamentals tested.

Please be aware that ornamentals can respond differently under different application conditions such as temperature, soil moisture, and relative humidity. We recommend that you test XXpire on a small sample of plants to ensure injury will not occur under your specific crop and application conditions.

The addition of agricultural adjuvants to sprays of XXpire may improve initial spray deposits, plant coverage, penetration into waxy leaf surfaces, redistribution and weatherability. Select adjuvants that are recommended and registered for your specific use pattern and follow their use directions. Improved control of whiteflies and spider mites has been observed in research trials when organo-silicone adjuvants have been used with XXpire. We recommend that you test XXpire with any adjuvants on a small sample of plants to ensure injury will not occur under your specific crop and application conditions.

When using adjuvants, always conduct a jar test to determine the compatibility of the various components in the spray mixture. Crop safety should further be evaluated in a small area of the crop whenever there is a significant change in spray mixture ingredients or source of water for the spray mixture.



Non-Target Organisms

Field studies have been conducted to measure the impact of the active ingredients in XXpire® insecticide on green lacewings, lady beetles, minute pirate bugs (including *Orius insidiosus*) and spiders. When applied at field-use rates in these studies, the two active ingredients had no significant impact on population levels of any of the natural enemies measured. Based on the results from these studies and observations from other field trials, use of XXpire is not expected to cause outbreaks of secondary insect pests (often referred to as “flaring”).

The active ingredients in XXpire degrade rapidly and exhibit low toxicity to non-target organisms. Consequently, when XXpire is used according to label directions, exposure of non-target organisms is expected to be minimal. Based on available data, XXpire will not cause unreasonable adverse effects to beneficials or the environment when used according to label directions.

XXpire and Pollinators

The effects of the active ingredients in XXpire on honey bees (*Apis mellifera*) have been studied in laboratory experiments. In these studies, the active ingredients of XXpire exhibit acute toxicity to bees when consumed by or applied directly to bees. The acute toxicity of Xxpire on honey bees was consistent with the acute toxicity of the two active ingredients tested separately, indicating no synergism in the toxicity to bees.

In tests designed to assess the effects of residues of XXpire on foliage, toxicity was low three hours after application. The results indicated that there is no enhancement of toxicity of residues on foliage by the mixture of the two active ingredients. Tunnel studies confirm no long-term effects on colonies when bees were exposed to either active ingredient.

The risk to foraging honey bees is reduced when applications of XXpire are made while foraging bee activity is low (e.g. two hours prior to sunset or when temperature is below 50° F at the site of application) or when bees are allowed to reenter treated areas after spray deposits have dried. Risk to bees and native pollinators can also be reduced by following advisory pollinator recommendations found on the product label.

Resistance and resistance management

XXpire® insecticide controls a wide range of insect pests and is an excellent component of a resistance management program. The individual active ingredients of XXpire each belong to a unique IRAC Group of insecticides and can be rotated with other commonly used insecticides in different IRAC Groups.

Product	Active Ingredient	IRAC Group ¹							
		3A	4A	4C	5	6	12	18	25
XXpire® insecticide	sulfoxaflor and spinetoram			X	X				
Conserve® and Entrust® insect control	spinosad				X				
Intrepid® insecticide	methoxyfenozide							X	
Avid	abamectin					X			
Floramite	bifenazate								X
Marathon, Marathon II, Merit	imidacloprid		X						
Overture	pyridalyl						X		
Safari	dinotefuran		X						
Talstar	bifenthrin	X							

¹Rotation between subgroups is recommended only when no other rotation options are available between groups.

As with all insecticides, XXpire must be managed to reduce the potential for development of insect resistance. Resistance management practices include rotation of insecticides among different IRAC groups, the use of recommended insecticide rates and treatment intervals, as well as scouting and monitoring for pests and damage. Consult the label for more specific resistance management instructions.

General toxicological characteristics

Sulfoxaflor and spinetoram both exhibit low acute mammalian toxicity. Based on available data, use of XXpire® insecticide in a manner consistent with label directions represents low risk to humans. Mammalian toxicology data for the technical active ingredient of each component of XXpire is listed below.

Study	Animal or Test System	Sulfoxaflor	Spinetoram
Acute oral LD ₅₀	Rat	1,000 mg/kg	5,000 mg/kg
Acute dermal LD ₅₀	Rat	5,000 mg/kg	5,000 mg/kg
Dermal irritation	Rabbit	Minimal	No irritation
Eye irritation	Rabbit	Slight	Mild, transient
Skin sensitization	Mouse	None	Moderate sensitizer
Genotoxicity	Ames Test	Negative	Negative
	Chromosomal aberration	Negative	Negative
	Mouse micronucleus	Negative	Negative
Acute neurotoxicity	Rat	NOAEL = 25 mg/kg	>2,000 mg/kg

Environmental toxicology data for the technical active ingredient of each component of XXpire is listed below.

Study	Sulfoxaflor	Spinetoram
Acute toxicity to birds	LD ₅₀ = 676 mg/kg (bobwhite quail)	LD ₅₀ = 2,250 mg/kg (mallard and bobwhite)
Dietary toxicity to birds	LC ₅₀ >5,620 mg/kg diet (mallard and bobwhite)	LC ₅₀ >5,620 mg/kg diet (mallard and bobwhite)
Reproductive toxicity to birds	NOAEL = 81.2 mg/kg (bobwhite) NOAEL = 25.9 mg/kg (mallard)	NOEC = 1,000 mg/kg (mallard and bobwhite)
Acute toxicity to fish	LC ₅₀ >387 mg/L (rainbow trout) LC ₅₀ >363 mg/L (bluegill sunfish)	LC ₅₀ >3.46 mg/L (rainbow trout) LC ₅₀ >2.69 mg/L (bluegill fish)
Chronic toxicity to fish	NOEC = 5.05 mg/L (fathead minnow)	NOEC = 0182 mg/L (rainbow trout)
Acute invertebrate toxicity	LC ₅₀ >399 mg/L (<i>Daphnia magna</i>) LC ₅₀ = 86.5 mg/L (eastern oyster) LC ₅₀ = 0.885 mg/kg soil (earthworm)	LC ₅₀ >3.17 mg/L (<i>Daphnia magna</i>) LC ₅₀ = 0.393 mg/L (eastern oyster) LC ₅₀ = 1,000 mg/kg soil (earthworm)
Chronic invertebrate toxicity	NOEC = 50 mg/L (<i>Daphnia magna</i>) NOEC = 0.0455 mg/L (<i>Chironomus riparius</i>) NOEC = 0.1 mg/kg soil (earthworm)	NOEC = 0.0624 µg/L (<i>Daphnia magna</i>) NOEC = 0.375 µg/L (<i>Chironomus riparius</i>) NOEC = 18.65 mg/kg soil (earthworm)
Aquatic plant acute toxicity	EC ₅₀ >99 mg/L (<i>Lemna gibba</i> , duckweed)	EC ₅₀ >14.2 mg/L (<i>Lemna gibba</i> , duckweed)

Registration and disclaimer

XXpire® insecticide was registered by the US EPA in November 2019, and registrations are submitted and pending. Please refer to the product label for use restrictions.

The XXpire® insecticide *Technical Bulletin* is provided for reference purposes only and is not a substitute for or an addition to the product label or SDS. Always read and follow label directions. The information and any recommendations in this bulletin ("Information") are presented in good faith; however, Corteva Agriscience™ makes no warranty as to the completeness or accuracy of the information. This information is supplied upon the condition that persons receiving it will make their own determinations as to its suitability for their purposes prior to use and consult with their advisors to ensure compliance with all federal, state and local regulations. In no event will Corteva be responsible for damages of any nature whatsoever resulting from the use of or reliance on this information.

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INSECTICIDE



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