



Zylam[®] Liquid

SYSTEMIC INSECTICIDE

Technical Bulletin

Introduction

Zylam® Liquid Systemic Insecticide controls many of the toughest insects on trees and shrubs. It contains the active ingredient dinotefuran, a third generation neonicotinoid insecticide belonging to the IRAC Group 4A. It is the first and only liquid dinotefuran formulation available for the professional landscape market. Use on ornamental plants such as trees, shrubs, vines and flowering plants.

Application Options

High water solubility allows for rapid plant uptake and translocation with movement through root and plant tissue. This results in fast control of troublesome insects. Various application methods allow for flexibility based on target insects, plant species, and application timing.

1 Soil drench or injection: Due to its solubility in soil water, it's able to be absorbed quickly into the vascular plant tissue (xylem) working its way to the plant's extremities. Compared to many other systemic insecticides, the product's movement results in control of tough insects such as armored scales.

2 Bark banding: When applied on the trunk, **Zylam Liquid** is absorbed through the bark and into the vascular system. It is then transported throughout the tree. Control of target insects will be dependent on tree size, tree health and environmental conditions. All applications must include the addition of an organosilicone surfactant.

3 Foliar spray: For certain insects, applications can be made to the leaf surfaces. Thorough coverage is required. The product's solubility also lends itself to **translaminar movement:** it moves within the leaf to protect the upper and lower leaf surfaces, where typical spray applications may not reach. Insects are affected both on contact and through ingestion.

Quick Facts:

- Controls listed chewing and sucking insects
- Curative and preventative applications
- Translaminar movement protects all leaf surfaces
- Rapid uptake and translocation
- Extended systemic control

Zylam Liquid
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General Information

Zylam Liquid works by targeting the acetylcholine receptors in the nervous system of attacking insects. It has been suggested that dinotefuran acts on a different binding site¹ than other neonicotinoids, accounting for its ability to control tough tree and shrub insects.

The soluble properties of dinotefuran promote the movement from the vascular system into the intracellular tissue of the plant. This accounts for the control of armored scales which feed between the cell walls of the plant.

SPEED OF ACTIVITY

For applications involving systemic root absorption, insect death can occur in as little as 30 minutes (see chart B). For drench and bark banding applications, insect control may be observed faster than traditional neonicotinoid insecticides (see chart C).

EXTENDED RESIDUAL ACTIVITY

Zylam Liquid provides extended residual activity. The duration of residual activity is determined by many factors including plant and pest species. Application methods, stage of insect growth and level of population also determine the length of control. Soil drench and bark banding applications can provide season-long residual activity on select insects. In studies, pine needle scale (see chart A) control was observed for up to 57 days.

USE SITES

Use on landscape ornamental sites such as residential, commercial and industrial areas, golf course landscape areas, parks, athletic fields and schools. Ornamental plants include but are not limited to: bedding plants, shrubs, flowering plants, foliage plants, groundcovers, evergreens, ornamental trees, non-bearing fruit trees, non-bearing nut trees, and non-bearing vines.

FORMULATION ADVANTAGES AND STABILITY

Being a soluble liquid, **Zylam Liquid** becomes a true solution after mixing with water and doesn't need continuous agitation. It offers ease of measuring and mixing with other pesticide and liquid nutrient products², as well as being non-abrasive to spray equipment.

Zylam Liquid has no chemical stability issues when used in a typical spray tank at pH ranges of 5.0 – 8.0.

Plants exhibit no phytotoxicity (discoloration) following soil drench, bark banding or foliar applications.

PLANT UPTAKE

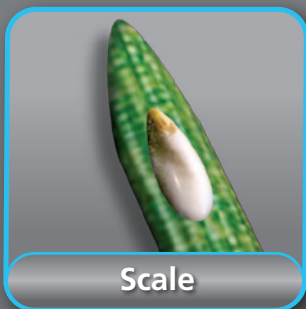
Highly systemic, it moves from the soil to the plant. It translocates within the vascular tissue (xylem) of the plant providing rapid insect control. The product is also translaminar and locally systemic. This means it can be sprayed on the upper surface of a leaf and the active ingredient will move to the underside of the leaf, leaving it fully protected.

USE SEASON

Zylam Liquid can be used curatively whenever insect populations have reached a threshold level. Use it preventatively for control of target insects before damage occurs. **Please contact your state or county extension agent or certified advisor for specific timing.**

IPM TOOL

Zylam Liquid Systemic Insecticide is a unique Integrated Pest Management (IPM) tool for applicators to use when developing a pest control strategy. With rapid plant uptake, translaminar movement, wide range of pest control and favorable toxilogical profile, it is suited to provide true solutions.



¹Wakita Takeo, et al "Development Of a Novel Insecticide, Dinotefuran" J Pestic. Sci, 30(2) 122-123 (2005)

²Before applying any tank mixtures, the safety to the target plant should be confirmed.

Insects Controlled

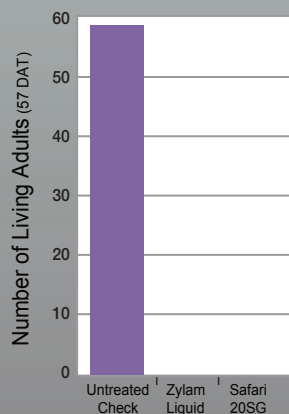
Insect	Drench	Banding	Foliar	Comments
Adelgids*				
Woolly Hemlock	X	X	X	
Woolly Balsam	X		X	
Aphids*				
Balsam	X	X	X	Foliar - Suppression
Crepe Myrtle	X	X	X	Foliar - Suppression
Green Peach	X	X	X	Foliar - Suppression
Melon	X	X	X	Foliar - Suppression
Bagworms	X			
Flatheaded Borers*				
Alder	X	X		
Bronze Birch	X	X		
Emerald Ash	X	X		
Flatheaded Appletree	X	X		
Two-lined Chestnut	X	X		
Froghoppers	X			
Fungus Gnat	X			Drench - Larvae only
Horned Oak Gall	X			
Japanese Beetles			X	Adults
Lacebugs*				
Azalea	X	X	X	
Cotoneaster	X	X	X	
Hawthorne	X	X	X	
Rhododendron	X	X	X	
Leaf Beetles*				
Elm	X	X		
Viburnum	X	X	X	
Leafhoppers*				
Glassy Winged Sharpshooter	X	X	X	
Potato	X	X	X	
Leafminers*				
Birch	X	X		
Boxwood	X	X		
Holly	X	X		
Serpentine	X	X	X	
Mealybugs*				
Citrus	X	X	X	
Long-tailed	X	X	X	
Madeira	X	X	X	
Obscure	X	X	X	
Phormium	X	X	X	
Pink Hibiscus	X	X	X	
Root	X	X		
Pine Tip Moth	X	X		Drench - Larvae only
Psyllids*				
Asian Citrus	X	X	X	
Boxwood	X	X		

Insect	Drench	Banding	Foliar	Comments
Root Weevils*				
Black Vine	X		X	Drench - Larvae and Adults
Diaprepes	X		X	Foliar - Adults
Roundheaded Borers*				
Eucalyptus Longhorned	X	X		
Linden	X	X		
Locust	X	X		Excluding Asian Longhorned
Royal Palm Bug	X			
Sawfly	X		X	Larvae only
Scale*				
Azalea Bark	X	X		
Brown Soft	X	X		
Calico	X	X		
Cottony Cushion	X	X		
Cyad Aulacaspis	X	X	X	
Cyrtomeria	X	X	X	
Duplacionapis	X	X		
Elongate Hemlock	X	X	X	
Euonymus	X	X	X	
False Oleander	X	X		
Fig Wax	X	X		
Fletcher	X	X		
Florida Red	X	X	X	
Florida Wax	X	X	X	
Lecanium	X	X		
Oystershell	X	X		
Poplar (Aspen)	X	X		
Pine Needle	X	X		
Tea	X	X	X	
Tulip Tree	X	X		
Spittlebugs	X			
Thrips*				
Chili	X	X	X	Drench/Bark Banding - Suppression Only
Cuban Laurel	X	X		Bark Banding - Suppression Only
Gladiolus	X	X		Bark Banding - Suppression Only
Gynaikothrips uzeli	X	X	X	Drench/Bark Banding - Suppression Only
Western Flower	X	X	X	Drench/Bark Banding/Foliar - Suppression Only
Treehoppers	X			
Whiteflies*				
Ficus	X	X		
Giant	X	X	X	
Greenhouse	X	X	X	
Sliverleaf/Sweet Potato	X	X	X	
White Grubs				
Oriental Beetle	X			
White Pine Weevil	X			

*including but not limited to

A

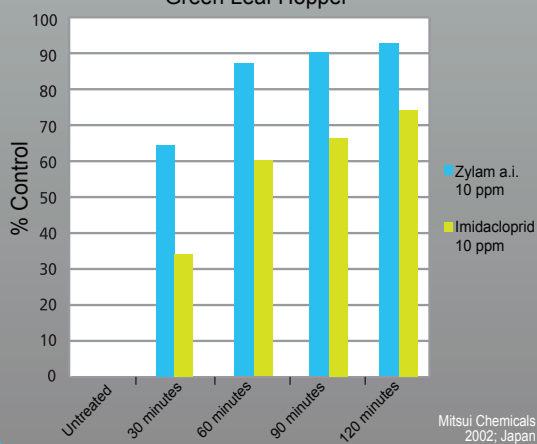
Number of Pine Needle Scale



Applied July 14 Ohio State University, 2010

B

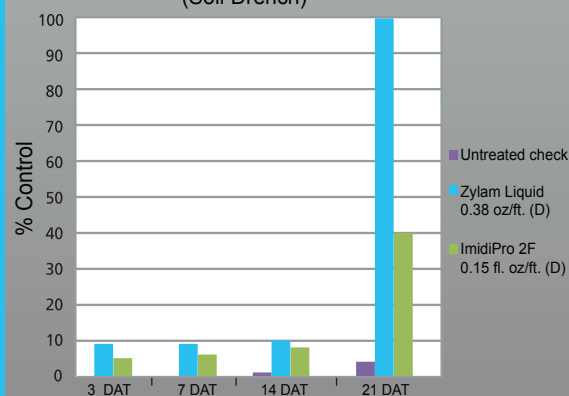
Speed of Control Following Systemic Root Absorption Green Leaf Hopper



Mitsui Chemicals 2002, Japan

C

Bagworm Larvae Percent Mortality (Soil Drench)



Applied May 15

Ohio State University, 2010

Dinotefuran

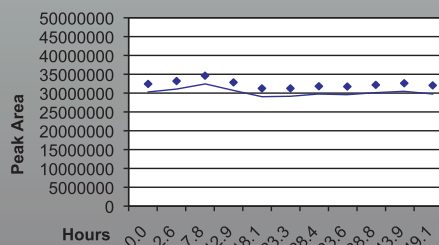
ENVIRONMENTAL FATE/EFFECTS

Dinotefuran is stable in water at a range of pH 4 to 9 and half-life 82-138 days. It is considered to be highly mobile (water solubility (20°C) 39,830) in various soil types (KOC - 6-45 mL/gm).

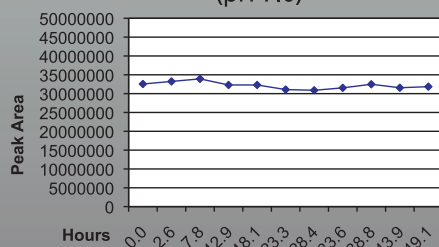
STABILITY

No chemical stability issues when used in a typical spray tank at pH ranges 5.0 - 8.0.

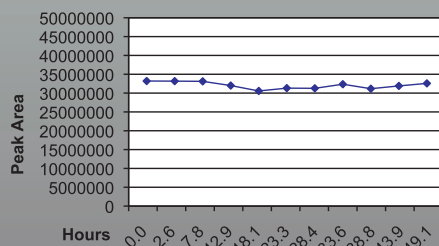
Dinotefuran Spray Tank Stability (pH 5.0)



Dinotefuran Spray Tank Stability (pH 7.0)

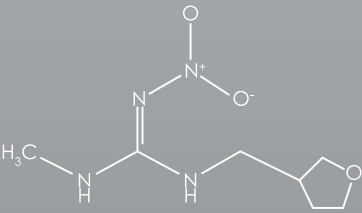


Dinotefuran Spray Tank Stability (pH 8.0)



PHYSICAL AND CHEMICAL PROPERTIES

(Dinotefuran technical)

Common name:	Dinotefuran
Chemical name:	Dinotefuran (RS)-1-methyl-2-nitro-3-(tetrahydro-3-furylmethyl) guanidine
Chemical formula:	
CAS number:	165252-70-0
Molecular weight:	202.21
Melting point/range:	107.5°C
pH:	7.6
Density:	31.2 - 43.7 pounds/cubic foot
Water solubility (20°C):	39,830 ppm
pKa at 20°C:	12.6
Vapor pressure:	1.7x10-6 @ 30°C for Dinotefuran
Soil half life:	82 - 138 days
KOC – organic-carbon sorption constant (ml g ⁻¹):	<46

MAMMALIAN TOXICITY

Hazard Indicator	Zylam Liquid
Acute oral LD ₅₀	>5000 mg/kg
Acute dermal LD ₅₀	>5050 mg/kg
Acute inhalation LC ₅₀	>5.25 mg/L
Eye irritation	Non-irritating
Skin irritation	Non-irritating
Skin sensitization	Not sensitizing

ENVIRONMENTAL SAFETY

Hazard Indicator	Zylam Liquid
Freshwater fish	LC ₅₀ : >1000 ppm/96 hr
Freshwater invertebrate	EC ₅₀ : 1231ppm/48 hr
Marine invertebrate	ErC ₅₀ : >103 ppm/0-72 hr



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SHRUBS**

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