Useful Pest Management Products that Should be Considered by Colorado Nurseries

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What are the insect management products I like to see when visiting the aisles in a retail nursery/hardware store?

A periodic survey that lists active ingredients of OTC insecticides, arranged by active ingredient

Over-the-Counter Insecticides for Home, Yard and Garden Use
2018 Survey, Fort Collins, Colorado

The following is a list of all insecticides found in a survey conducted June 4-11, 2018 in Fort Collins. These are arranged by common name of the active ingredient(s).

The survey included 3 nurseries, 3 hardware stores and 3 box stores. Following each product are indicated the type of store(s) in which it was found (**n** = nursery; **h** = hardware store; **b** = box store).

ACEPHATE (Orthene)

Bonide Systemic Insect Control (h)
Bayer Advanced 2 in 1 Systemic Rose & Flower Care (b)

ACETAMIPRID

Ortho Flower, Fruit & Vegetable Ready-to-Spray (n)
Ortho Rose and Flower Insect Killer Ready-to-Use (h,h,n)
Ortho Rose & Flower Insect & Disease Control Concentrate (with triticonazole) (n)

ALLETHRIN/TRANS-ALLETHRIN

This is available at the Insect Information Web Site

#1 on the A-List

A broadly labeled horticultural oil

Petroleum Derived Horticultural Oils **(Mineral oils, paraffinic oils)**

Sesame oil, fish oil

Canola oil

Neem seed oil

Some natural source horticultural oils

Horticultural Oil

Primary Target Pests- Foliar Spray

- Scale insects in all stages
- Whitefly nymphs on the underside of leaves
- Spider mites
- Aphids that curl leaves on trees in spring

Soft brown scale (on houseplants in CO)

European elm scale

Soft Scales

Families Coccidae, Eriococcidae and others

Striped pine scale

Cottony maple scale

Armored Scales

Family Diaspididae

Example: Oystershell scale

Oil sprays can smother some of the eggs underneath the cover of the mother scale

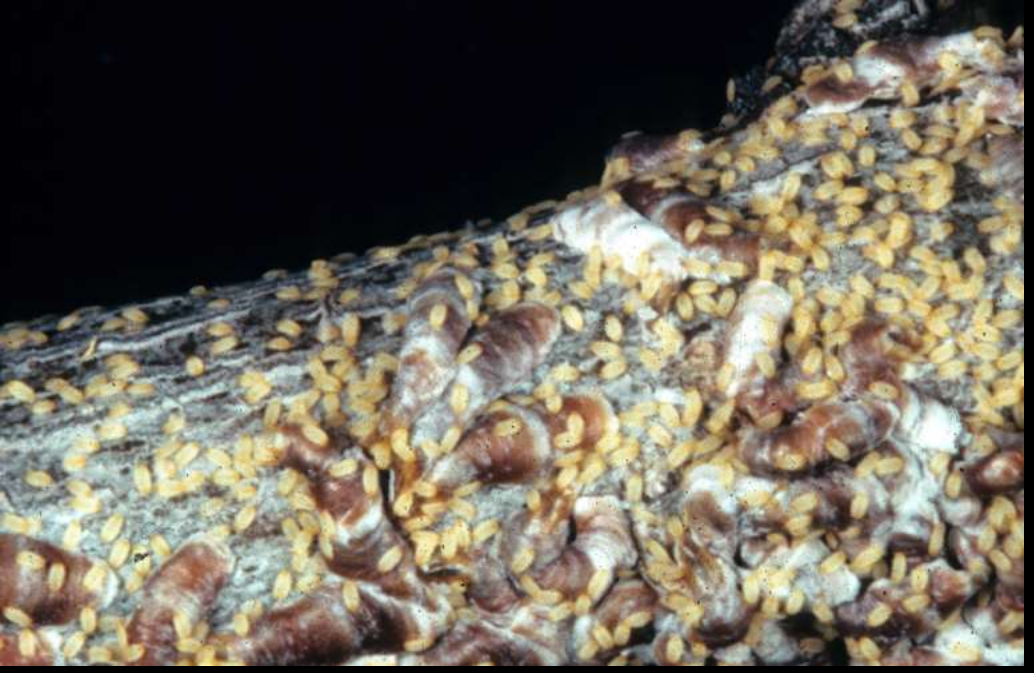
Eggs exposed from under the cover of the mother scale

Crawler stage: The 1st stage of a scale insect that occurs after eggs hatch

Oils – and almost anything else – can kill a scale crawler

Within about a week the crawlers have either ‘settled’ or died. They remain in place where they settled for the rest of their life.

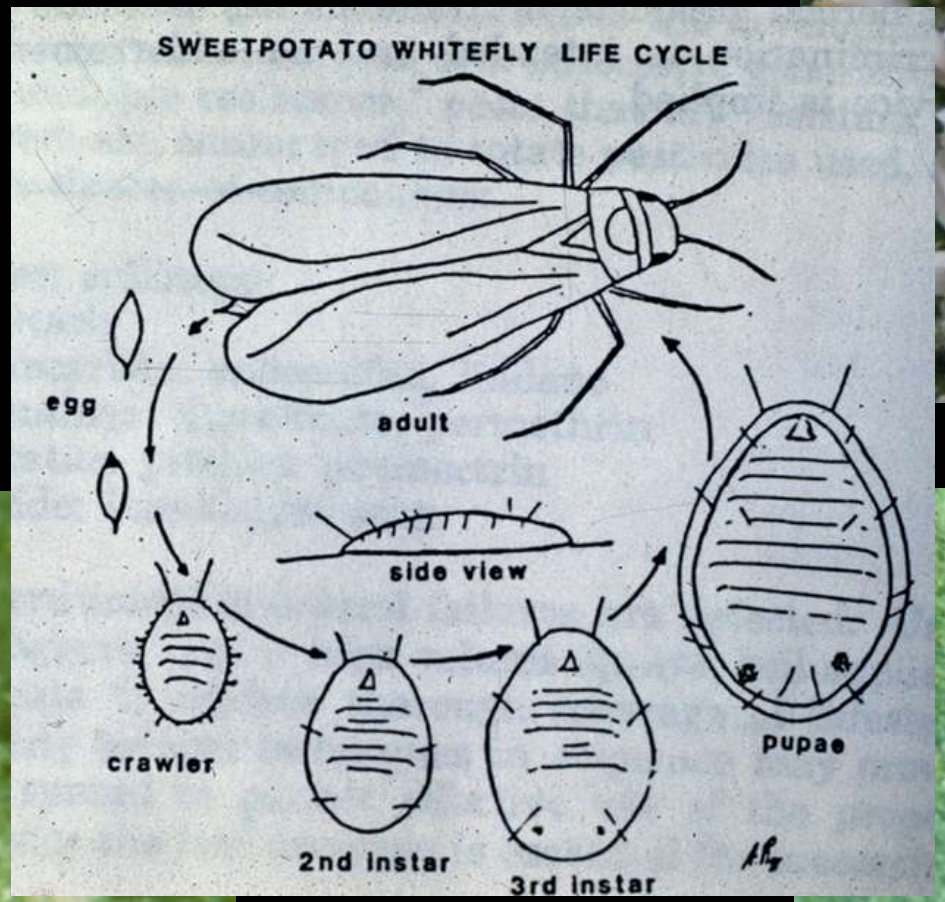
Recently settled crawlers are good targets of oils



Most current horticultural oils can be used on trees with foliage. Crawlers and young settled scales are targets.

Whiteflies


Adults


SWEETPOTATO WHITEFLY LIFE CYCLE
egg
adult
side view
crawler
2nd instar
3rd instar
pupae


Eggs


Adult


Nymphs

Target stages for oils

Oils presently are probably the best OTC product for spider mite control

Spider Mites

Preventive management of aphids that curl leaves in spring

Most aphids on trees and shrubs overwinter as eggs laid near buds or on needles


Stem mother that hatched
from the overwintered egg

Subsequent generations develop and curl leaves in mid-late spring

Overwintered egg near the bud – target for dormant season oil application


If eggs are killed, there is no stem mother

No hatching eggs, no stem mother, now spring populations – **No Spring Leaf Curl**

#1 on the A-List

A broadly labeled horticultural oil

Numerous **Neem Oil (clarified hydrophobic extracts of neem oil)** products are very commonly sold at retail

Neem oil plus pyrethrins

OIL, NEEM*

Bonide Bon-Neem (with pyrethrins and piperonyl butoxide) (n)
Bonide Neem Oil Concentrate (n,h,h)
Bonide Neem Oil Ready-to-Spray (h)
Bonide Neem Oil Ready-to-Use (n)
Bonide Rose Rx 3-in-1 (n,h,b)
Espoma Organic Neem Oil 3n 1 (n)
ferti-lome Fruit Tree Spray (with pyrethrins) (n,n)

Neem

- Extracted from seeds of the neem tree, *Azadirachta indica*
- **Active Ingredients:** ***Azadirachtin*** primarily, oil fractions have some uses.
- **Mode of Action:** Various – insect growth regulator, feeding deterrent, repellent

Neem tree outside house on Culebra, Puerto Rico

Street in Niger lined with a planting of the neem tree, *Azadirachta indica*.

Photograph by William Ciesla

Neem has many human pharmaceutical uses

- **Tooth care**
- **Diuretic**
- **Burn ointments**

Azadirachtin indica (Neem)

Neem seed extracts contain the active ingredient azadirachtin

Commercially available azadirachtin products

Neem

- Extracted from seeds of the neem tree, *Azadirachta indica*
- Active Ingredients: ***Azadirachtin*** **primarily, oil fractions have some uses.**

Contains azadirachtin

Neem oil - Oil fraction only

Uses of Extracts from Neem Seeds

Azadirachtin

- Disrupts insect growth
  - Interferes with ecdysone, the molting hormone
- Repellent to some chewing insects

Neem oil

- Can smother insects by plugging spiracles
  - Horticultural oil feature
- Can aid in suppression of powdery mildew fungi
  - Horticultural oil feature

Active Ingredient: **azadirachtin (0.09%)**

BioNeem was the only retail product ever found on a retail shelf that had some azadirachtin in it.

No stores in the 2018 survey carried this product

Some commercially available azadirachtin products (typically about 3% concentration

“B List” Product

Insecticidal Soap (potassium salts of fatty acids)

Soap plus pyrethrins combination

Environmental Limitations to Effective Use of Insecticidal Soaps

- Soaps are strictly contact insecticides
  - No residual activity
- Efficacy degrades in ‘hard water’
  - Minerals combine to make insoluble soaps
- Rapid drying may decrease uptake and efficacy

Primary Target Pests- Insecticidal Soaps Sprays

- **Scale insects**
  - Fair for crawlers, Fair for newly settled *soft scales*, poorer for armored scales
- **Aphids**
  - Fair (better than oils)
- **Spider mites**
  - Fair to poor

“B List” Product

Pyrethrins (pyrethrum extracts)

An extremely common active ingredient in retail products (ca. 3 dozen products found on retail shelves)

Soap plus pyrethrins combination

Pyrethrum

Tancetum (= *Chrysanthemum*)
cineriariifolium

Pyrethrum (Dalmatian) Daisy

The insecticides known as **pyrethrins** are extracted from the flowers of pyrethrum daisy

Pyrethrum

- **Active Ingredient:** Pyrethrins
- **Attributes:** Very fast acting/ 'knockdown' activity. Very rapidly degrades in light (hours). Short persistence.
- **Current Uses:** Labeled for use on essentially all crops. Has indoor uses including some around food handling areas.
  - Products that do not contain piperonyl butoxide are often allowable in Certified Organic Production.

Primary Target Pests- Pyrethrins Sprays

- **Chewing insects (beetles, caterpillars, grasshoppers, earwigs)**
  - Fair-good for insects that do not move much. Control is often poor for mobile species.
- **Aphids most other sucking insects**
  - Fair
- **Spider mites**
  - Often worse than poor

Pyrethrins-containing products

plus sulfur

plus neem oil

plus insecticidal soap

“A List” Need

A broadly labeled product that reliably controls most chewing insects

- Historically a role of various organophosphate insecticides (malathion, diazinon, Dursban, Orthene)
- Historically a role of carbaryl/Sevin
- Presently largely filled by pyrethroid insecticides that have persistent effects
- Spinosad an option
- Acetamiprid an option

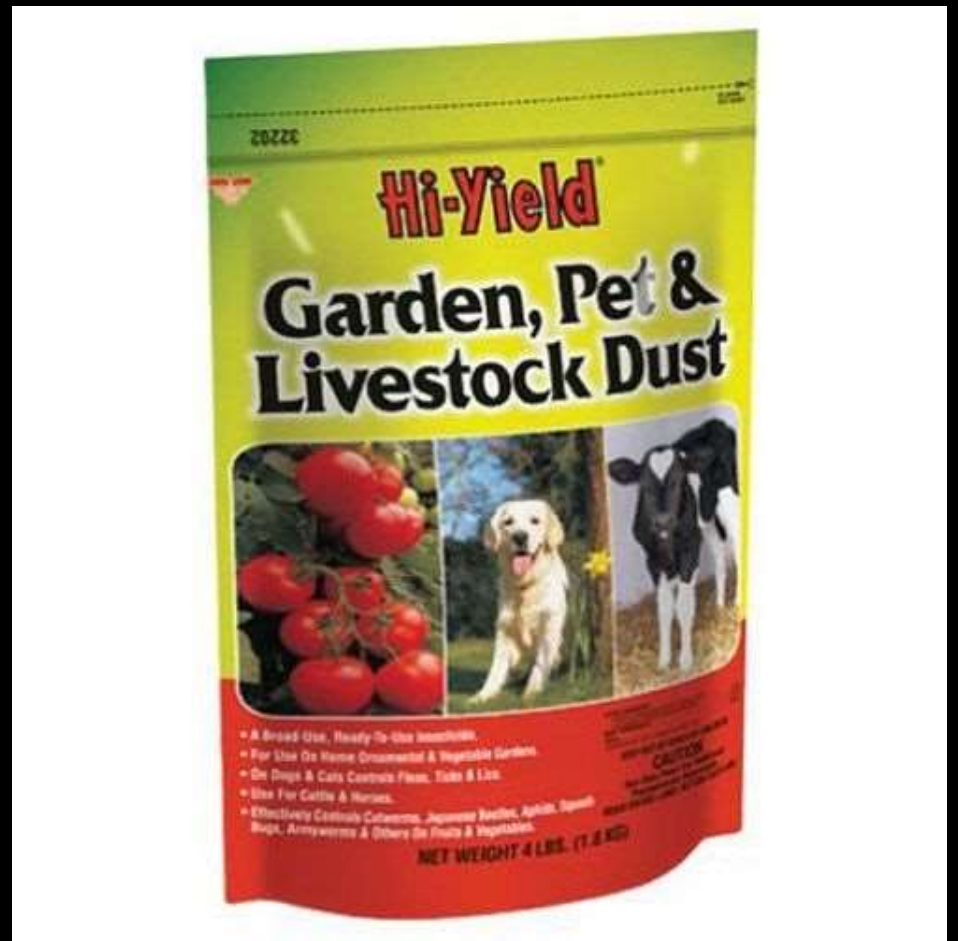
Pyrethroid Insecticides
(a.k.a., synthetic pyrethrins)

Pyrethroid Insecticides Found on Nursery Shelves (for plant use)

- permethrin
- bifenthrin
- beta-cyfluthrin
- cypermethrin
- deltamethrin
- lambda/gamma cyhalothrin

Primary Pyrethroid Insecticide Found on Nursery Shelves – *That can be used on Fruits/Vegetables*

- **Permethrin**



A Pyrethroid Insecticide Found on Nursery Shelves
– That can be used on many fruits/vegetables

Active Ingredient:
Gamma-cyhalothrin

Caterpillars

Flea Beetles

Grasshoppers

European Earwig

On some plants a persistent pyrethroid type of insecticide can give the best control of Japanese beetle (maybe a week of control)

These are not an option for plants that are in bloom and being visited by bees

What is happening with the insecticide known as **Sevin?**

Products sold June 8, 2018

History of Carbaryl as Retail Product

- Sold under trade name Sevin since early 1960s
- Widely used as a garden/landscape plant care product from 1960s until early 2000s
- Increased restrictions on use in past decade (e.g., loss of turfgrass sites)
- Apparent removal from market in 2019 by manufacturer and replaced with zeta-cypermethrin

Products offered for sale February 5, 2019

Status of Carbaryl/Sevin?

- There is a transition in the active ingredient of a Sevin branded product sold at retail
- Carbaryl is apparently leaving the retail market (liquids first, dust later)
- Zeta-cypermethrin is replacing carbaryl as the active ingredient in a Sevin-branded product

For the first time since the Sevin brand was introduced into the market over 50 years ago, some formulations will no longer contain the active ingredient carbaryl

Pyrethroid Uses

- Generally broad spectrum, moderately persistent
- Target pests
  - Standards for borer and bark beetle sprays
  - Very strong on most beetles, caterpillars, sawflies, scale crawlers
  - OK on most Hemiptera (e.g., aphids, whiteflies, leafhoppers, bugs)
- Limitations
  - Marginal to poor on spider mites
  - Generally destroy natural enemies
  - Have high hazard to pollinators

“A List” Product

Spinosad (spinosyns)

Spinosad products also found in retail stores under Earth-tone, ferti-lome, Monterey and Ortho brands

An insecticide derived from microbes (*Saccharopolyspora* spp.)

Spinosad

- Primary target pests:
  - Caterpillars (including tip moths)
  - Sawflies
  - Leafminers
  - Thrips
  - Beetles (fair)
- Can be used on flowering plants if applied at dusk
- Many formulations allow use in Certified Organic production

Spottedwing drosophila (SWD)

Drosophila suzukii

A recently established insect in Colorado that primarily damages small fruits (strawberries, raspberries)

Infestations of the developing larvae rapidly soften the fruit

Management of Spottedwing Drosophila

- Thoroughly and frequently pick ripening fruit
  - Store in refrigerator/rapidly use fruit
  - Destroy culled fruit in manner that kills developing larvae
- Shift to early bearing cultivars
- Insecticides

Management of Spottedwing Drosophila

- Thoroughly and frequently pick ripening fruit
  - Store in refrigerator/rapidly use fruit
  - Destroy culled fruit in manner that kills developing larvae
- Shift to early bearing cultivars
- Insecticide?
  - Spinosad
  - *Only applied at evening after bees cease visiting!*

ENVIRONMENTAL HAZARDS

This product is toxic to bees exposed to treatment for 3 hours following treatment. Do not apply this pesticide to blooming, pollen-shedding or nectar-producing parts of plants if bees may forage on the plants during this time period. This product is toxic to aquatic invertebrates. To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help to ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help avoid run off to water bodies or drainage systems.

Spinosad can be used on flowering plants but ***must only be applied at dusk***, after bees have stopped foraging for the day

#1 Treatment used for most Borers and all Bark Beetles

Preventive Use of Trunk Sprayed Insecticides

Timed for Egg Laying/Egg Hatch Period!

“A List” Need

A trunk sprayed product to control borers and bark beetles on trees

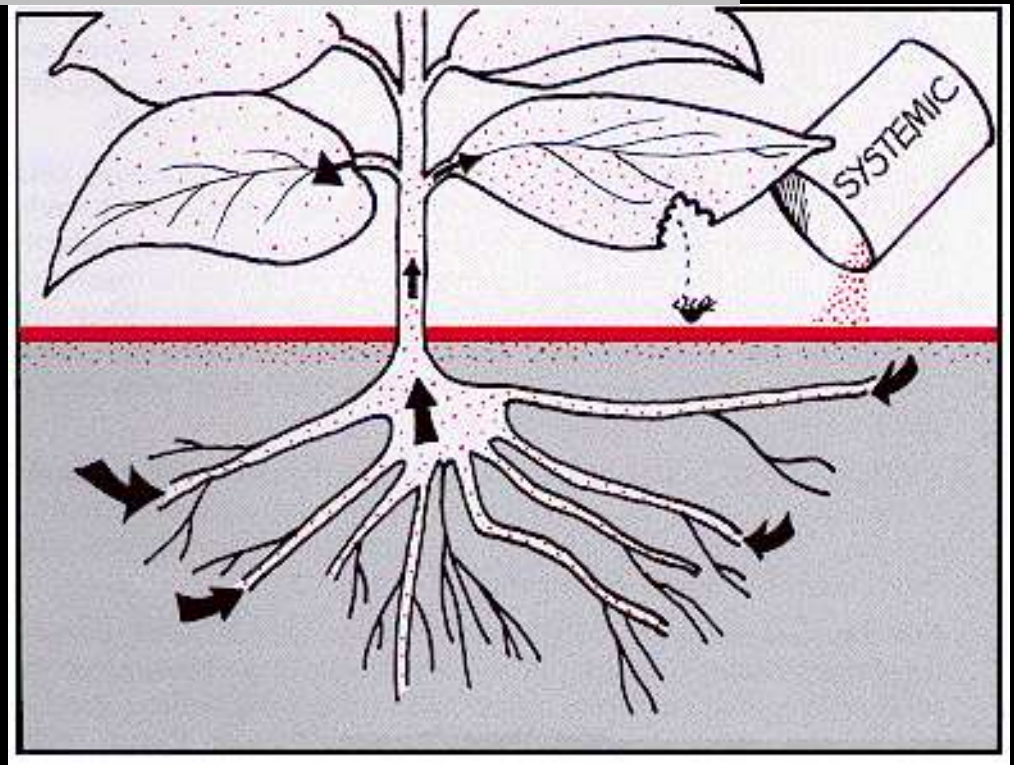
- Historically a role of some organophosphate insecticides, primarily chlorpyrifos/Dursban
- Present alternative
  - Permethrin

Only one permethrin product **sold at retail has a label and use rate that allows effective use against borers and bark beetles!**

Systemic Insecticides - A few insecticides have the ability to move into a plant and move systemically within the plant

Systemic insecticides applied to leaves

Systemic insecticides applied to soil



Neonicotinoids

- Insecticide class originally developed commercially in the late 1980s
- Mode of action - Nicotinic acetylcholine receptor agonist
  - IRAC Mode of Action Group 7A
  - Nicotine mode of action similar
- First new class of insecticide with systemic activity in plants in 30+ years
- Low toxicity to vertebrates accelerated registration as “reduced risk” products

Primary Neonicotinoid Insecticides Used in Tree/Lawn Care

- **Imidacloprid** (Merit, Marathon, Zenith, etc.)
- **Clothianidin** (Arena)
- **Dinotefuran** (Safari, Zylam, Transtect)
- **Acetamiprid** (Tristar)

Neonicotinoid Insecticides Sold at Retail

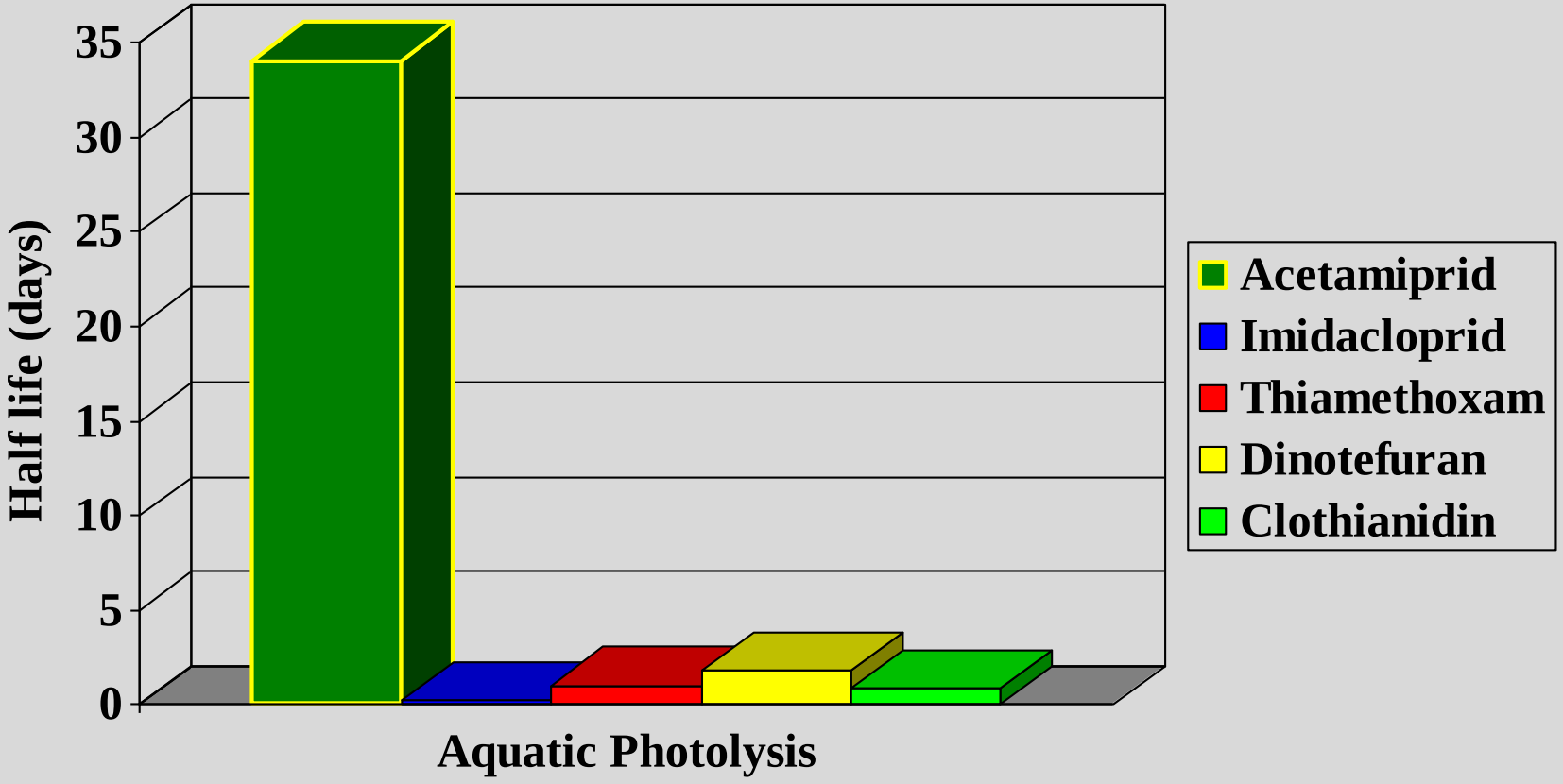
acetamiprid

imidacloprid

Not all Neonicotinoids are alike:

- UV stability
- Water solubility
- Rate of uptake by plants
- Mobilization within plants
- Host range of susceptible insects

Comparison of UV Stability Among Neonicotinoid Insecticides



Bottom line: Acetamiprid is the only neonicotinoid – and only presently available systemic insecticide – the is useful for a spray application

“A List” Need

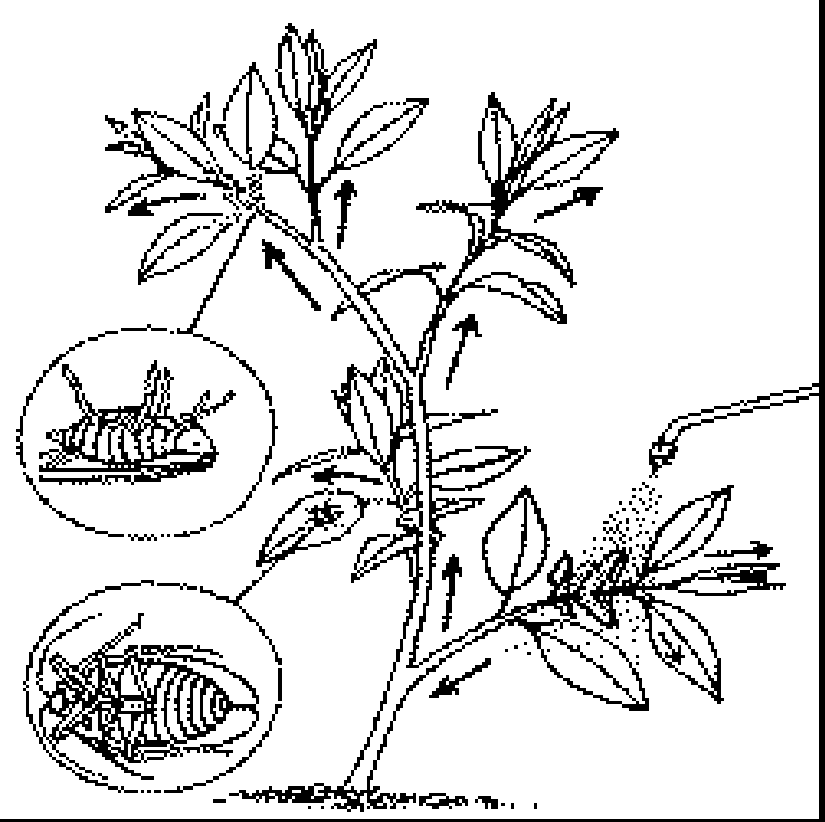
Systemic Insecticide Spray

Leafminers within a leaf

Aphids within a leaf curl

Insects in shoots

Systemic Insecticides – Foliar Applications



Acetamiprid **has replaced acephate (Orthene) and other organophosphates as a systemic insecticide to be sprayed**

Retail formulation

Commercial formulation for ornamentals

Acetamiprid formulations

Commercial formulation for fruits and vegetables

Acute Toxicity of Neonicotinoid Insecticides to Adult Honey Bees

(Oral LD50* – micrograms/bee)

• Acetamiprid	14.53
• Imidacloprid	0.005
• Dinotefuran	0.056
• Thiamethoxam	0.005
• Chlothianidin	0.0003

*The lower the LD50, the more acutely toxic is the insecticide

Characteristics of Acetamiprid

- **Has systemic activity; applied as a spray**
- **Low hazard to bees**
- **Broadly labeled for use on fruit crops, many vegetables and ornamental plants.**
- **Target pests**
  - Aphids, scale insects (sucking insects) – Excellent
  - Caterpillars – Good to Excellent
  - Beetles - Fair

Status of Acetamiprid?

- Has been available through retail outlets since 2015
- Rarely found on retail shelves
  - Availability less in 2018 than 2015
- Remains an underutilized product

Another “A List” Need

A soil-applied systemic insecticide that can control insects

- Historically a role of some organophosphate insecticides
  - Acephate (Orthene)
  - Disulfoton (DiSyston)
- Recent alternatives involve *neonicotinoid* insecticides
  - Imidacloprid (only product sold at retail)

Systemic Insecticides – Soil Applications

Some Over-the-Counter imidacloprid formulations

Imidacloprid has replaced the organophosphates as a soil application

Soil applications can substitute for whole plant sprays

Soil application of systemic insecticide

Spraying whole plant

Aphids on trees and shrubs

Some gall producing insects on trees (e.g., hackberry psyllid)

Elm Leaf Beetle

Leafminers

Effectiveness of neonicotinoid insecticides against scale insects varies by type of scale and mobility of the insecticide

Soft Scales

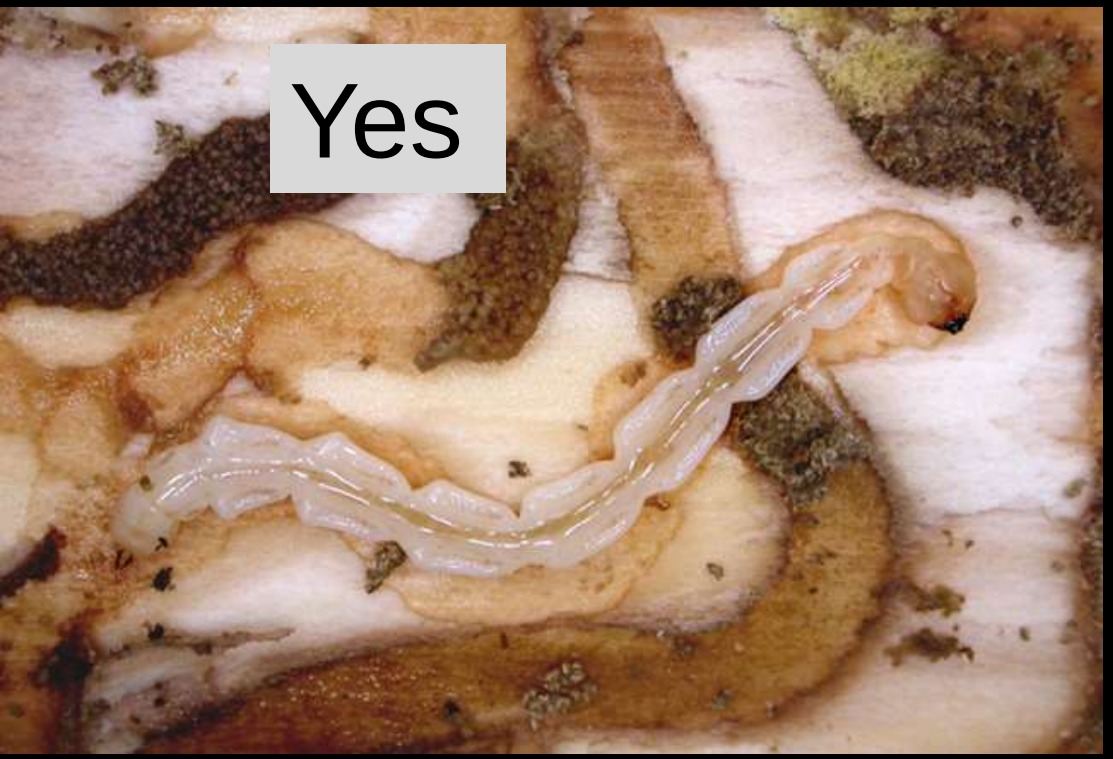
Armored (Hard) Scales

Soft Scales - Imidacloprid can be very effective

Armored Scales – *Imidacloprid is not very effective*

Imidacloprid for Borers?

Yes…..but



Imidacloprid *will not* work well on borers that are the larval stage of moths (Lepidoptera)

Lilac/ash borer larvae

Peach tree borer larval tunneling in base of plant

Zimmerman pine moth injury

Imidacloprid *will not* work well if the borer spends much of its life in the heartwood of the plant

This would include most roundheaded borers/ longhorned beetles

Larvae within trunk

Adult pair on trunk

Locust Borer

Megacyllene robiniae

Full-grown larvae

Exterior symptoms on trunk

Flatheaded Borers

Imidacloprid soil treatments *can work* against this type of wood borer

Four *Agrilus* sp. borers found in Colorado

Top Row - Rose stem girdler (left), Bronze birch borer (right)

Bottom Row – Honeylocust borer (left), Gambel oak borer (right)

Emerald ash borer is a flatheaded borer

Photograph by Eric Day

Imidacloprid *will not* work well if there has already been extensive damage to the cambium

Primary method of imidacloprid application – soil applications for root uptake

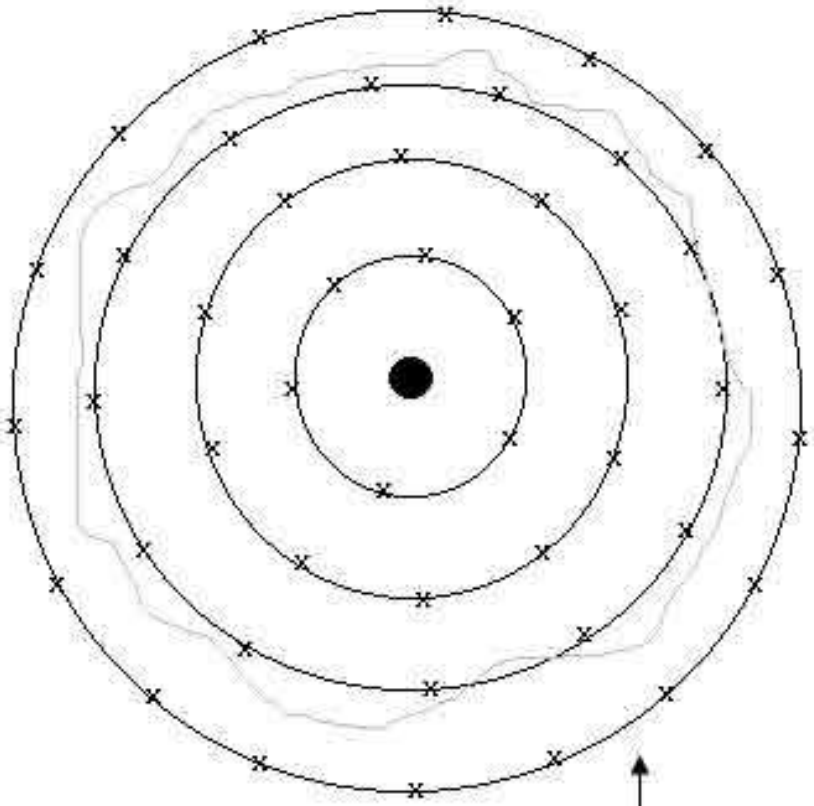
Optimal Application – Soil drench within 18-24 inches of the trunk

Yes

No?

Originally, when soil applied systemic insecticides hit the market the recommended application was as a regularly spaced arrangement of injections under the drip line of the tree.

Soil Injection Patterns



Circular Pattern

Injections are made at each "X" spaced apart every 2.5-feet. Rings are also spaced apart by 2.5-feet.

****

A circle of 40-ft diameter (i.e., 40-ft canopy spread) covers 1250 sq ft.

Bird's eye views from above the tree looking through the canopy to the ground. The dark spot represents the trunk, while the irregular grey line represents the border of the canopy (the drip line).

There are many roots present near the base of the tree that can allow uptake of a soil applied insecticide

07.07.2011

Soil applications of systemic insecticides ***should not be made if there are flowering plants at the application site***

Pollinators and Systemic Treatments

Soil Applied Systemic Insecticides and Honey Bees – Targets for Concern

- Plant is heavily used by honey bees as pollen and/or nectar source
  - Risk related to the amount the plant contributes to the overall intake of a specific hive

Top honey bee-visited plants include: **most Sedums, most thistles, catmint, *Gaillardia*, most *Agastache*, Blue mist spirea, Russian sage, fruit trees, linden, golden raintree ……..**

Heavily used by bees

Often has problems with linden aphids

Susceptible to Japanese beetle

My greatest concern about neonicotinoids and woody plants - Lindens

Soil Applied Systemic Insecticides and Honey Bees – Targets for Concern

- Plant is heavily used by honey bees as pollen and/or nectar source
- The type of application has high potential to cause exposure and harm to the pollinator
  - Risk related to time of application
  - Risk related to inherent hazard of the insecticide to pollinators
  - Risk related to rate applied

2013 Oregon Bumble Bee Kills

Involved use of a highly mobile systemic insecticide (dinotefuran) applied just prior to bloom on plants that are heavily used by bumble bees

Soil Applied Systemic Insecticides and Honey Bees – Highest Risk Scenario

- Plant is heavily used by honey bees as pollen and/or nectar source
  - Treated plants constitute important part of food being brought to hive
- The type of application has high potential to cause exposure and harm to the pollinator
  - Treatments are likely to result in hazardous levels of residues in pollen and/or nectar

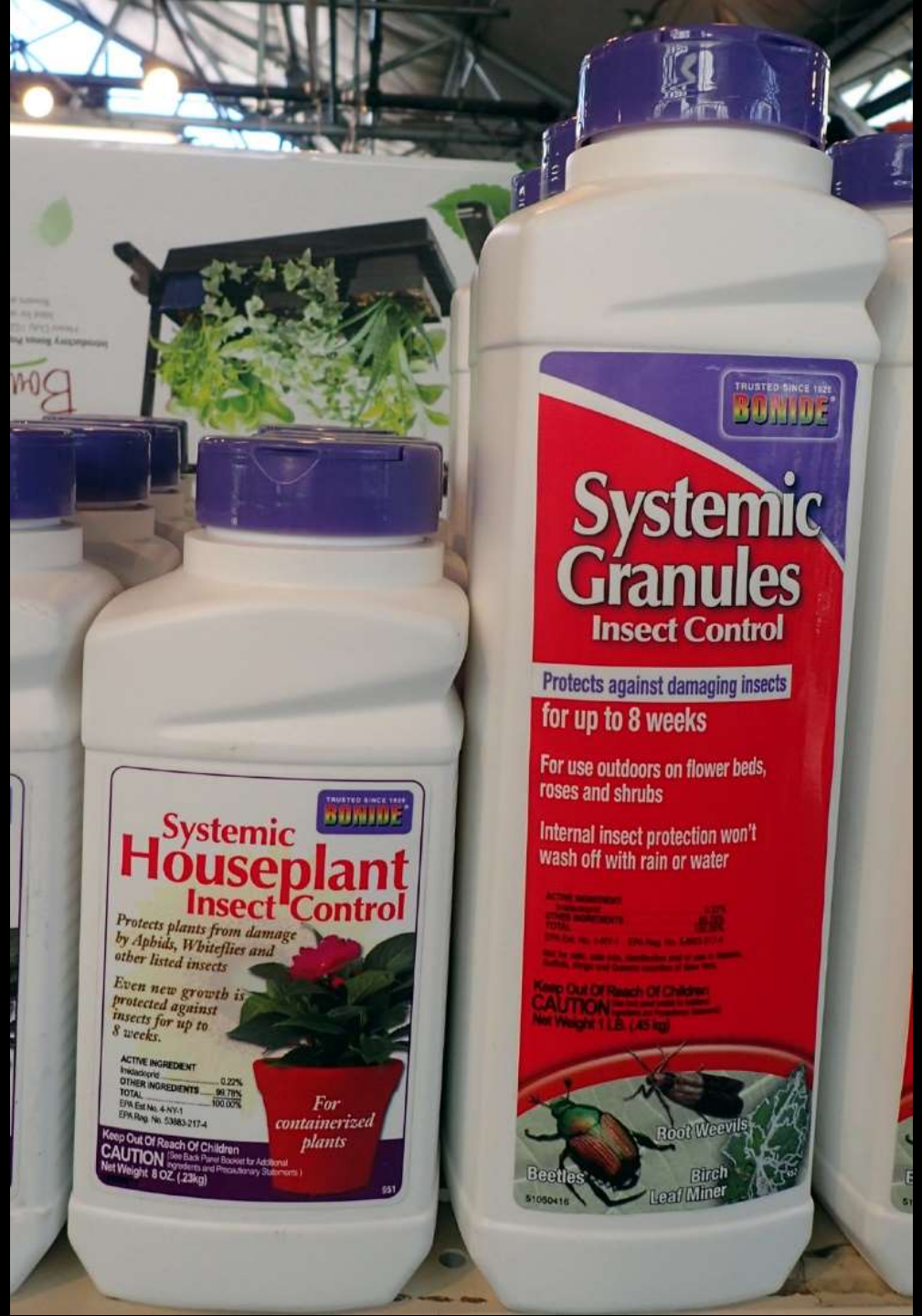
Systemic Insecticides and Pollinators: Bottom Line

Avoid applications to plants *that bees visit* that are in bloom – *or soon will be in bloom*

“A List” Need

A systemic insecticide that can be used to control insects on houseplants

This imidacloprid-containing product *can* be used on house plants



This imidacloprid-containing product *cannot* be used on houseplants

Other imidacloprid-containing products that can be used on house plants include:

Bayer Advanced 2in1 Insect Control Plus Fertilizer (2.5% imidacloprid)

Bayer Advanced Dual Action Rose & Flower Insect Killer (0.012% imidacloprid)

“A List” Product

A “Bti” product for Mosquito Larvae – *and Fungus Gnat Larvae*

Bacillus thuringiensis

- **Derived from a widely distributed soil bacterium**
- **Active ingredient a toxic protein crystal that destroys cells of the midgut**
- **Used as a stomach poison**

Bacillus thuringiensis kurstaki strain – used to control caterpillars

Several Bt strains are present, each with specific activity:

- ***kurstaki, aizawi*** strains (leaf feeding Lepidoptera larvae
- ***tenebrionis*** strain (leaf beetles)
- ***israelensis*** strain (larvae of mosquitoes, gnats, black fly larvae)

Mosquito Life Cycle

Adult (left)

Larvae/wrigglers (lower left)

Pupae/tumblers (below)

Target stage

Photograph courtesy of David Cappaert, Michigan State University

Fungus Gnats

Very common associates of soil and decaying organic plant matter

Bacillus thuringiensis var. *israelensis* products

This formulation now allows use for control of fungus gnat larvae

“A List” Product

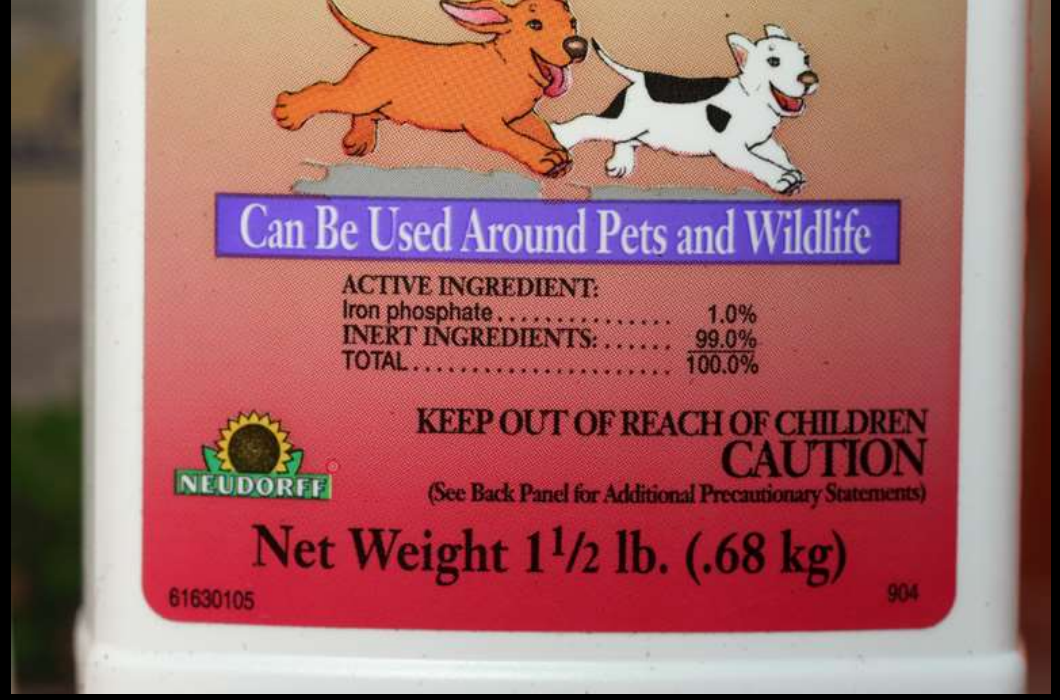
A Slug Control Product

Metaldehyde Products

Iron Phosphate Products

My favorite slug control product – *but only because I like the package!*

A metaldehyde bait



Iron Phosphate

Now nearly completely dominates market

Metaldehyde

Formerly dominant, steadily displaced over past decade

Iron Phosphate Slug Baits

This product is combined with spinosad

“A List” Product

A White Grub Control Product

(*where local problems exist*)

White grubs prune the roots, producing drought stress symptoms

Adults of the primary white grubs of turfgrass

Southwestern Masked Chafer
Cyclocephala hirta

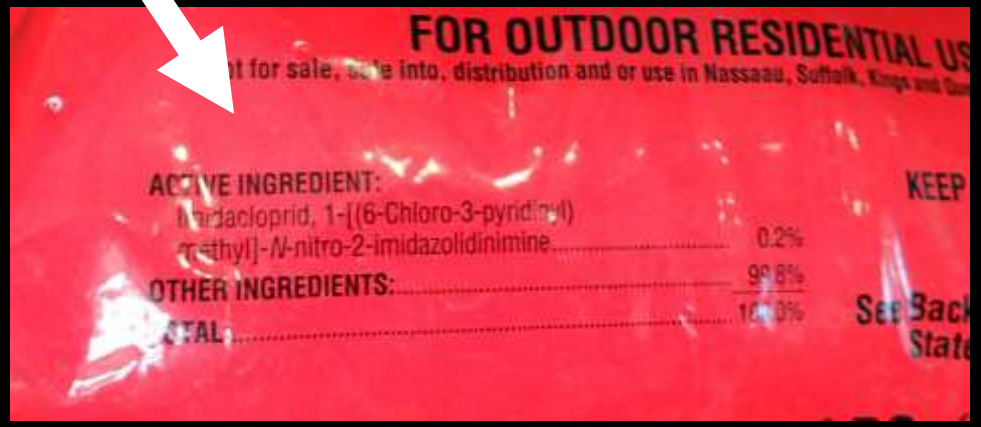
Japanese beetle
Popillia japonica

White Grub Larval Treatments

- **Insecticides**
  - Imidacloprid (Merit, Zenith, Criterion, etc.)
  - Chlorantraniliprole (Acelepryn, Scott’s GrubEx)
- **Biological Controls**
  - *Heterorhabditis* spp. parasitic nematodes
  - *Bacillus thuringiensis* var. *galleriae* (grubGONE!)

Imidacloprid for grub control

Products include: Bayer Advanced Season-long Grub Control, Bonide Insect and Grub Control, Hi-Yield Grub Free Zone II



Imidacloprid for White Grubs

- Several OTC products
  - Hi-Yield Grub-free zone, Bayer Insect Killer Soil & Turf, others
- Neonicotinoid insecticide with systemic activity in plants
- Relatively slow acting
- Provides control for several weeks

Optimal time for application: Early period of egg hatch – ***typically late June through midJuly***

Systemic insecticides and Pollinators – *Should we be concerned about their use on turfgrass?*

A key risk to pollinators when using insecticides on turfgrass

Application to flowering weeds

Mowing before application >greatly< decreases hazard to pollinators!

Anthranilic Diamide Insecticides

Ryania speciosa

Botanical source that lead to development of the anthranilic diamides

Powdered stems are the source of the insecticide ryania.

Active ingredient: ryanodine

Chlorantraniliprole for White Grubs

- Anthranilic diamide insecticide
  - Limited systemic activity
  - Very low hazard to applicators
  - Very low hazard to bees
- Relatively slow acting
- Provides control for months weeks
- Only one product in OTC market

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Recommendations for Japanese Beetle Larval Control

- Cultural Controls
- Chemical Controls
- **Biological Controls**
  - Insect parasitic nematodes (*Heterorhabditis* spp.)
  - *Bacillus thuringiensis* var. *galleriae*
  - Milky spore

Milky Spore for Japanese Beetle?

Used to permanently establish a biological control organism – ***not useful for immediate control.***

Milky Spore for Japanese Beetle?

Long term: ***May help*** **produce some reduction in numbers of larvae surviving to adulthood. However, infections typically only affect a small percentage of population.**

“A List” Product

An Effective Wasp/Hornet Spray

Typical Wasp and Hornet Spray Product

- Has a quick knockdown insecticide (a pyrethroid)
- Has a more persistent insecticide (another pyrethroid)
- Has a propellent, often designed to produce directed jet with some force

Control of paper wasps with "wasp and hornet" sprays

Colony is exposed
Generally easy to access
Generally effective with a single application

Control of yellowjackets with "wasp and hornet" sprays

Colony is not exposed and may be hidden deeply
Generally difficult to access
Generally required multiple treatments with persistent insecticides

Yellowjackets almost always nest below ground. The nest are never exposed.

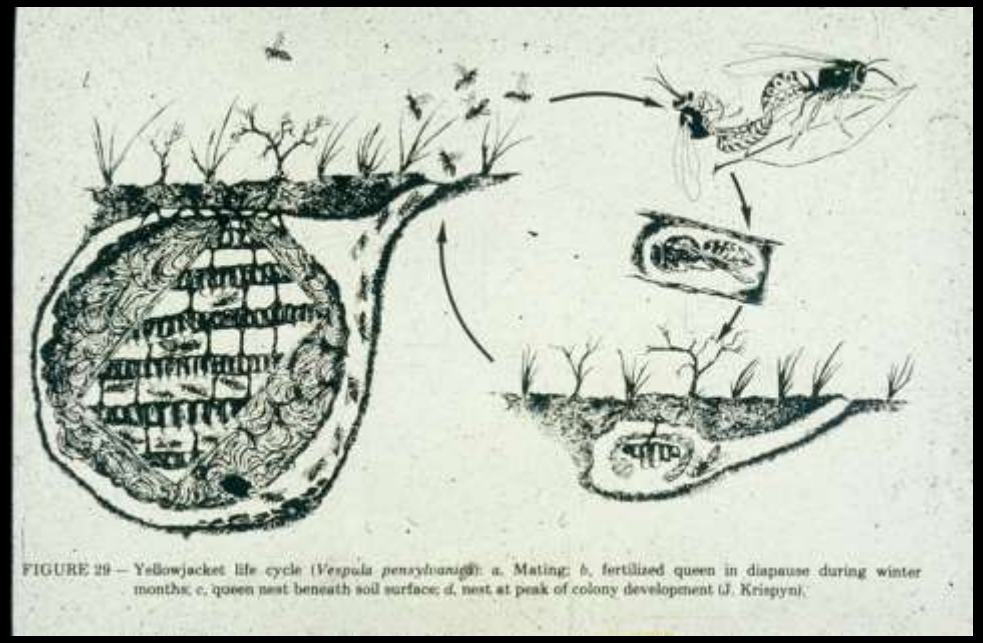

FIGURE 29 — Yellowjacket life cycle (*Vespula pensylvanica*): *a*, Mating; *b*, fertilized queen in diapause during winter months; *c*, queen nest beneath soil surface; *d*, nest at peak of colony development (J. Krispyn).

Spraying Wasp Nests

- Best done at night or when temperatures are cool enough to prevent flight
- If treating at night do not hold the light!

“B List” Product

An Effective Yellowjacket Trap

Western Yellowjacket – No. 1 Stinging Insect

Many traps are sold to capture yellowjacket wasps

The Rescue! yellowjacket trap, baited with heptyl butyrate, works well for capturing yellowjackets

Traps that caught the most western yellowjackets in 2015 trials

Rescue! OrnamenTrap (Liquid trap)

SpringStar (Oak Stump) Liquid Trap

AlphaScent Lure with Yellow Card

Some traps are *very poor* in capturing yellowjackets

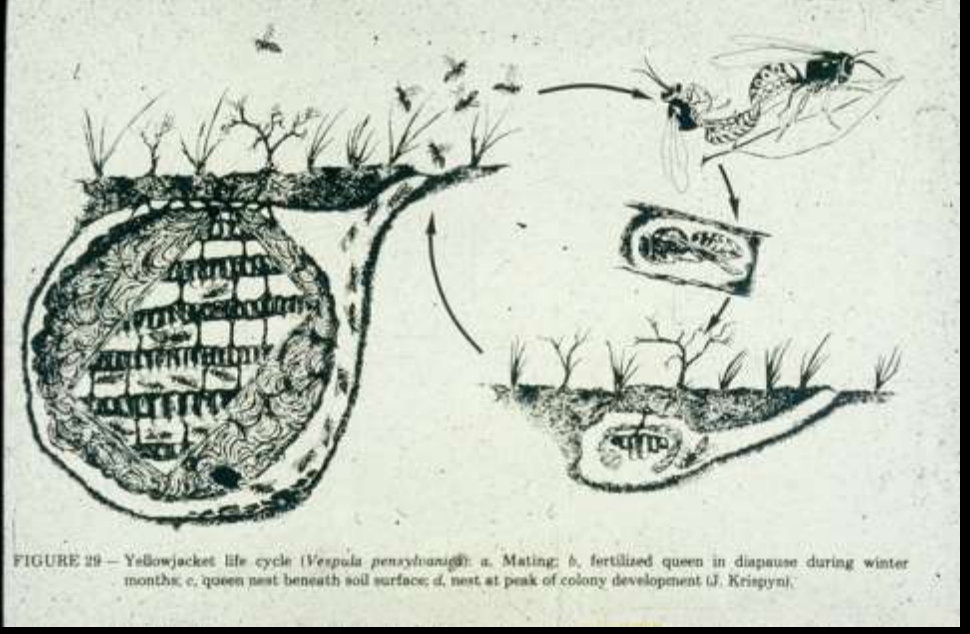

FIGURE 29 — Yellowjacket life cycle (*Vespula pensylvanica*): *a*, Mating; *b*, fertilized queen in diapause during winter months; *c*, queen nest beneath soil surface; *d*, nest at peak of colony development (J. Krispyn).

Most effective use of yellowjacket traps?

Probably early in the year (late April-midJune) targeting overwintered queens

European Paper Wasp

Traps do not capture the European paper wasp or any other paper wasps

WHY Trap

Wasp

Hornet

Yellowjacket


Watch those pesky wasps disappear with the Original Waspinator!*
Regardez les vilaines guêpes disparaître sous l'effet du véritable Waspinator !*
EXCLUSIVELY FROM DEWITT
The Original
Le véritable
Waspinator
• No pesticides - Sans pesticides
• Nothing to clean - Rien à nettoyer
• No mess - Non salissant
Easy to use and comes with everything you need. Enjoy WASP FREE* family picnics, dinners on the deck, or parties on the beach. Eat your corn on the cob in peace with the Waspinator!
Facile à utiliser, vendu avec tout le nécessaire. Passez d'agréables pique-niques familiaux, soupers sur la terrasse ou fêtes sur la plage, SANS GUÊPES*. Savourez votre épi de maïs en paix grâce au Waspinator!
1 unit/1 unité
Patent Pending
Brevet en instance
Keeps Wasps Yellow Jackets and Hornets Away!!!

Trap next to Waspinator

Paired trap out-of-sight of Waspinator

9.6 Western yellowjackets/day

10.6 Western yellowjackets/day

Results – No significant differences in capture of western yellowjackets related to Waspinator proximity

If it sounds too good to be true – it is!

“A List” Products

- Horticultural oil of some type
  - Mineral oil, neem oil, seed oil
- A contact insecticide with some persistence
  - Pyrethroid, spinosad
- A permethrin product for control of borers/bark beetles
- Systemic insecticide used as a spray
- Systemic insecticide that can be used as soil application
- Systemic insecticide that can be used on houseplants
- Bti product for fungus gnats
- Effective white grub control
- Effective wasp/hornet sprays

Two products that it would be good to have sold at retail

- A good product to control spider mites
- A product that can be used to control Japanese beetle on plants in bloom

A product I would like to see available through retail

Bacillus thuringiensis var. *galleriae*

Sold as ***beetleGONE!*** in commercial/ag markets

Sold as ***beetleJUS*** in the gardener market

Adult control

Grub control