Useful Pest Management Products that Should be Considered by Colorado Nurseries

Whitney Cranshaw
Colorado State University
A periodic survey that lists active ingredients of OTC insecticides, arranged by active ingredient

Over-the-Counter Insecticides for Home, Yard and Garden Use
2015 Survey, Fort Collins, Colorado
(Products arranged by active ingredient)

The following insecticides were recorded from the shelves of 3 local nurseries, 3 hardware stores, and 3 “box stores” during a survey of Fort Collins, 22-29 May, 2015*. The number of times the product was found among the nine surveyed locations is in parentheses ( ).

ACEPHATE (Orthene)
  Bonide Systemic Insect Control (2)

ACETAMIPRID
  Ortho Bug B Gon Garden Insect Killer Ready-to-Use (1)
  Ortho Bug B Gon Systemic Insect Killer (1)
  Ortho Flower, Fruit and Vegetable Insect Killer Ready-to-Use (4)
  Ortho Flower, Fruit & Vegetable Ready-to-Spray (4)
  Ortho Flower, Fruit and Vegetable Insect Killer Concentrate (2)

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
Target Pests- Foliar Spray

• **Scale insects** in all stages
• **Whitefly nymphs** on the underside of leaves
• **Spider mites**, some **caterpillars** that winter on trees
Scale Insects

Hemiptera: Many families
Soft Scales  Families Coccidae, Eriococcidae and others
Armored Scales

Family Diaspididae

Pine needle scale

Oystershell scale

San Jose scale

Scurfy scale
Eggs exposed from under the cover of the mother scale
The crawler stage usually occurs in late May and early June. It lasts for about a week.

It is the only mobile stage of the oystershell scale – and all other armored scales.
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 that are allowed to be used on plants with foliage.
Most current horticultural oils can be used on trees with foliage. Crawlers and young settled scales are targets.
Whiteflies
Target stages for oils
Spider Mites

Oils presently are probably the best OTC product for spider mite control.
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
Then usually they disperse in June to an alternate, summer host plant – after curling the leaves.
Overwintered egg near the bud – target for dormant season oil application
Stem mother that hatches from egg – the foundress
Spring leafcurling is avoided
“B List” Need

Insecticidal Soap

- For Use on Flowers, Trees, Shrubs, Ornamentals, Fruits, Nuts and Vegetables
- Kills Aphids, Mites, Mealybugs, Thrips, Whiteflies, and Other Listed Pests

Active Ingredients: By Wt.
- Potassium Salts of Fatty Acids: 49.52%
- Other Ingredients: 50.48%
- Total: 100.00%

Keep Out of Reach of Children

Warning: See back panel for Precautionary Statements and First Aid

Concentrate! Makes up to 12 Gallons

Net Contents: 32 FL. OZ.
Soaps are Salts of the Fatty Acids Found in Plant Oils and Animal Fats.

\[
\text{CH}_3 \quad \text{CH}_2 \quad \text{CH}_2 \quad \text{CH}_2 \quad \text{CH} = \text{CH} \quad \text{CH}_2 \quad \text{CH}_2 \quad \text{CH}_2 \quad \text{CH}_2 \quad \text{COOK}
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<th>Myristic $C_{14}$</th>
<th>Palmitic $C_{16}$</th>
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<td>4-15</td>
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<td>75-90</td>
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* Totals less than 100% indicate the presence of lower or higher acids in small amounts.
Pesticidal Fatty Acid $\longleftrightarrow$ Pesticidal Soap

$$\text{RCOOH} + \text{KOH} \longleftrightarrow \text{RCOO}^- \ \text{K}^+ + \text{HOH}$$
Soap produced from oleic and linoleic acids
Soaps as Insecticides

Insecticidal Soap

MULTI-PURPOSE INSECT KILLER

For Use on Flowers, Trees, Shrubs, Ornamentals, Fruits, Nuts and Vegetables

Kills Aphids, Mites, Mealybugs, Thrips, Whiteflies, and Other Listed Pests

ACTIVE INGREDIENTS

Potassium Salts of Fatty Acids 49.52%
OTHER INGREDIENTS 50.48%
TOTAL 100.00%

KEEP OUT OF REACH OF CHILDREN

WARNING See back panel for Precautionary Statements and First Aid

Concentrate! Makes up to 12 Gallons

NET CONTENTS 32 FL. OZ.
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
What about household products for insect control?
Some soaps will damage plants (herbicidal soaps)
“A List” Need

A broadly labeled product for control of chewing insects

• Historically a role of some organophosphate insecticides (malathion, diazinon) and carbaryl/Sevin
European Earwig
Tobacco (Geranium) Budworm
Flea Beetles
“A List” Need

A broadly labeled product for control of chewing insects

- Historically a role of some organophosphate insecticides (malathion, diazinon) and carbaryl/Sevin

- Current alternatives
  - Pyrethrins
  - Various pyrethroids
  - Spinosad
  - Acetamiprid
Pyrethrum/Pyrethrins

*Tantetum* (= *Chrysanthemum*) *cinerariifolium*  
Pyrethrum daisy – source of pyrethrum
Pyrethrins

• Active ingredient extracted from pyrethrum
• Very broadly labeled
  – Dozens of OTC products on market
  – Combination formulations with oils common
  – Many are allowed in Certified Organic use
• Very short persistence (hours)
Pyrethrins-containing products plus sulfur

plus neem oil

plus insecticidal soap
Pyrethrins

- Active ingredient extracted from pyrethrum
- Very broadly labeled
  - Dozens of OTC products on market
  - Combination formulations with oils common
  - Many are allowed in Certified Organic use

- **Very short persistence** (hours)
Historical Note:

Larimer County was primary U.S. source of pyrethrum production during World War II.
Pyrethroid Insecticides
(a.k.a., synthetic pyrethrins)
Some Pyrethroid Insecticides

Pyrethrins
Pyrethroid Insecticides Found on Nursery Shelves (for plant use)

- Permethrin
- Bifenthrin
- Cyfluthrin
- Cypermethrin
- Deltamethrin
- Lambda/gamma-cyhalothrin
Pyrethroid Uses

• Non-systemic, attach well to organic matter (high Koc)

• Persistence ranges widely
  – **Bifenthrin, cyhalothrin** most persistent (weeks)
  – **Permethrin, cypermethrin, cyfluthrin** quite persistent (days-couple weeks)
  – **Resmethrin, sumithrin, pyrethrins** non-persistent (hours)
OTC Pyrethroids with Uses on Ornamental Plants

• **Bifenthrin/Cypermethrin (combination)**
  - Ortho Max Insect Killer for Lawns & Gardens

• **Cyfluthrin**
  - Bayer Advanced Rose & Flower Insect Killer, Bayer Advanced Vegetable & Garden Insect Spray

• **Gamma-cyhalothrin**
  - Spectracide Triazicide Insect Killer for Lawns & Landscapes

• **Permethrin**
  - Bonide Eight Insect Control Vegetable, Fruit & Flower; Bayer Advanced Complete Insect Dust for Gardens; Ace House & Garden Bug Killer2; probably many others
Pyrethroid Uses

• Generally broad spectrum
  – 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)
  – Marginal to poor on spider mites
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
Acetamiprid

• Neonicotinoid insecticide class
  – Among lowest hazard insecticides to honey bees

• Has systemic activity
  – Used as foliar spray

• Broadly labeled for garden use, including most fruit/vegetable crops
  – 1 to 7 day preharvest interval, depending on crop
Commercial formulation for ornamentals

Retail formulations

Acetamiprid products

Commercial formulation for fruits and vegetables
Spinosad

- Microbial derived insecticide (spinosyns) A bacterium (Saccharopolyspora spinosa)
- Broadly labeled for garden use, including most food crops
Spinosad Features

- Natural source product
- Active against:
  - Most chewing insects
  - Thrips
- Some formulations allow organic use
Some Spinosad Formulations

Turfgrass, ornamentals, many fruits and vegetables

Agricultural label - Organic

Retail formulations of spinosad
Spottedwing drosophila (SWD)

Drosophila suzukii

Diptera: Drosophilidae – the “vinegar flies” or “small fruit flies
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
Control of SWD

Thoroughly pick all ripe fruit regularly (2-3X weekly)
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!*
Insecticides used for spottedwing drosophila must only be applied at dusk, after bees have stopped foraging for the day.
“A List” Need

A broadly labeled product for control of chewing insects

- Historically a role of some organophosphate insecticides (malathion, diazinon) and carbaryl/Sevin

- Current alternatives – non-food crops
  - Pyrethrins
  - Pyrethroids (several active ingredients)
  - Spinosad
  - Acetamiprid
“A List” Need

A broadly labeled product for control of chewing insects

• Historically a role of some organophosphate insecticides (malathion, diazinon) and carbaryl/Sevin

• Current alternatives – food crops
  – Pyrethrins
  – Permethrin, gamma-cyhalothrin
  – Spinosad
  – Acetamiprid
Azadirachtin indica (Neem)

Neem seed extracts contain the active ingredient azadirachtin.
Neem Has Many Human Pharmaceutical Uses

- Tooth care
- Diuretic
- Burn ointments
Neem-derived Insecticides

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

• Extracted from seeds of the neem tree, *Azadirachta indica*

• Active Ingredients: *Azadirachtin* primarily, oil fractions have some uses.
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
- Can aid in suppression of powder mildew fungi
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 various *neonicotinoid* insecticides
  - Imidaclorpid (various products)
  - Dinotefuran
Systemic insecticides are able to translocate (to various extent) in plant tissues.
Some older organophosphate insecticides with systemic activity
The New Systemic Insecticides - Neonicotinoids

• Imidacloprid
  – Foliar use products
  – Soil use products

• Dinotefuran
  – Soil use products only

• Acetamiprid
  – Foliar use products only
Systemic Insecticides
– Soil Applications

Di-Syston
Systemic Insecticide Granules

Organophosphates

Neonicotinoids

Spikes
Systemic INSECTICIDE for Roses

Ortho
Tree & Shrub Systemic Insect Drench

Kills
Tree & Shrub INSECT CONTROL

Ortho
Tree & Shrub SYSTEMIC INSECT DRENCH
Over-the-Counter Imidacloprid Formulations
Commercial formulations for ornamentals

Retail formulation

Dinotefuran formulations
Soil applications can substitute for whole plant sprays

Spraying whole plant

Soil application of systemic insecticide
Aphids on trees and shrubs
Some gall producing insects on trees (e.g., hackberry psyllid)
Elm Leaf Beetle
Leafminers
‘Soft’ Scales

Armored Scales
Effectiveness of neonicotinoid insecticides against scale insects varies by type of scale and mobility of the insecticide.
Soft Scales - Imidacloprid can be very effective
Armored Scales – *Imidacloprid is not very effective*
Armored Scales – *Dinotefuran* can be very effective
Primary method of imidacloprid application – soil applications for root uptake
Optimal Application – Soil drench within 18-24 inches of the Trunk

Yes

No?
Soil Injection Patterns

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

Circular Pattern

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

***************

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).
Soil applications of systemic insecticides should not be made if there are flowering plants at the application site.
The only systemic insecticide I can find labeled for use on indoor plants

- Whiteflies
- Mealybugs
- Soft brown scale
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 ……..
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
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
Neonicotinoids and Pollinators: Bottom Line

Avoid applications to plants *that bees visit* that are in bloom – *or soon will be in bloom*
Systemic Insecticides – Foliar Applications
Acetamiprid is replacing acephate (Orthene) and other organophosphates as a systemic insecticide to be sprayed.
Pesticide that is Selective because of the **Inherent Toxicity of the Pesticide**

What this means

higher $LD_{50}/LC_{50} = \text{less toxic}$

lower $LD_{50}/LC_{50} = \text{more toxic}$

**LD50**: Lethal dose that will kill 50% of the test population
### Acute Toxicity of Neonicotinoids to Adult Honey Bees

(Oral LD50 – micrograms/bee)

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<tr>
<td>Acetamiprid</td>
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<td>Imidacloprid</td>
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<td>Dinotefuran</td>
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<td>Thiamethoxam</td>
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<tr>
<td>Chlothianidin</td>
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Commercial formulation for ornamentals

Retail formulation

Acetamiprid formulations

Commercial formulation for fruits and vegetables
Insects that Develop under the Bark of Trees, Shrubs

- Bark Beetles
- Wood Borers
- Tip Moths, Twig Borers
“A List” Need

A product to control borers and bark beetles on trees

- Historically a role of some organophosphate insecticides (chlorpyrifos/Dursban) and carbaryl/Sevin
  - Present alternatives – soil applied
    - Imidacloprid (limited)
  - Present alternative – trunk spray
    - Permethrin (only one formulation apparently available OTC)
“A List” Need

A product to control borers and bark beetles on trees

- Historically a role of some organophosphate insecticides (chlorpyrifos/Dursban) and carbaryl/Sevin

- Present alternative – soil applied
  - Imidacloprid (limited range of borers)

- Present alternative – trunk spray
  - Permethrin (only one formulation apparently available OTC)
Preventive Use of Trunk Sprayed Insecticides

#1 Treatment used for other Borers and all Bark Beetles

Timed for Egg Laying/Egg Hatch Period!
Products to Control Borers & Bark Beetles in Other Markets

- Bifenthrin (Onyx)
- Permethrin (Astro and others)
- Carbaryl (Sevin)
Only One OTC product, containing permethrin, has a label and use rate that allows effective use against Borers and Bark Beetles!
Imidacloprid for Borers?

Yes.....but
Imidacloprid *will not* work well on borers that are the larval stage of moths.
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.
Locust Borer
*Megacyllene robiniae*

- Larvae within trunk
- Adult pair on trunk
- Full-grown larvae
- Exterior symptoms on trunk
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
Imidacloprid will not work well if there has already been extensive damage to the cambium.
“A List” Product
A Slug Control Product
Iron Phosphate

Can Be Used Around Pets and Wildlife

ACTIVE INGREDIENT:
Iron phosphate .............. 1.0%
INERT INGREDIENTS: .......... 99.0%
TOTAL: ..................... 100.0%

KEEP OUT OF REACH OF CHILDREN
CAUTION
(See Back Panel for Additional Precautionary Statements)

Net Weight 1½ lb. (.68 kg)

Metaldehyde

ACTIVE INGREDIENT:
Metaldehyde (2,4,6,8-
Tetramethyl-1,3,5,7-
Tetraoxycyclo-octane) .... 4.0%
OTHER INGREDIENTS: .96.0%
Total: ..................... 100.0%

6/2003
Iron Phosphate Slug Baits

KILLS SNAILS & SLUGS

Use around pets and wildlife

Active Ingredient:
Iron Phosphate ................. 1.0%
Inert Ingredients: ............ 99.0%
TOTAL .................. 100.0%

Can Be Used Around Pets and Wildlife

ACTIVE INGREDIENT:
Iron phosphate ................. 1.0%
INERT INGREDIENTS: ........ 99.0%
TOTAL .................. 100.0%

KEEP OUT OF REACH OF CHILDREN
CAUTION

Net Weight 1 1/2 lb. (.68 kg)
My favorite slug control product—*but only because I like the package!*
“A List” Product
A White Grub Control Product
(where local problems exist)
White Grubs
(Coleoptera: Scarabaeidae)

Larvae of scarab beetles – chafers, May/June beetles, dung beetles, etc.
Primary white grub of turfgrass in western Colorado

Southwestern Masked Chafer

*Cyclocephala hirta*
White grubs prune the roots, producing drought stress symptoms
White Grub Treatments – Active Ingredients

- Imidacloprid
- Trichlorfon
- Chlorantraniliprole
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 mid July*
Trichlorfon for White Grubs

• Presently only one OTC product
  – Bayer Advanced 24 Hour Grub Killer Plus Granules
• Organophosphate insecticide
• Fast acting
• Very short residual
  – Degrades very rapidly in high pH

Primary use: Rescue treatment for an existing white grub outbreak in August, early September
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

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

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

Commercial applicator formulations

Homeowner formulation
Presently marketed only on-line

**grubGONE!**

*Bacillus thuringiensis var. galleriae*

**Biological Insecticide Granule Controls Annual White Grubs in Turf and Ornamentals**

**ACTIVE INGREDIENT**: bacillus thuringiensis subsp. galleriae, Strain SDS-582 fermentation solids, spores, and insecticidal toxins

**OTHER INGREDIENTS**: 

**TOTAL**: 100.0% w/w

*Contains a minimum of 1 x 10^6 CFU per gram.*

**KEEP OUT OF REACH OF CHILDREN**

**CAUTION**: See side/back panel for additional precautionary statements.

**EPA Reg No.:** 88347-2
**EPA Est. No.:** 9198-DH-1, 9198-DH-2

**FIRST AID**

- **If on skin or clothing:**
  - Take off contaminated clothing.
  - Rinse skin immediately with plenty of water for 15-20 minutes.
  - Call a poison control center or doctor for treatment advice.

- **If inhaled:**
  - Move person to fresh air.
  - If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.
  - Call a poison control center or doctor for further treatment advice.

- **If swallowed:**
  - Call a poison control center or doctor immediately for treatment advice.
  - Have person sip a glass of water if able to swallow.
  - Do not induce vomiting unless told to by a poison control center or doctor.
  - Do not give anything by mouth to an unconscious person.

**HOT LINE NUMBER**

Have the product container or label with you when calling a poison control center or doctor, or when going for treatment. For emergency information concerning this product, call the National Pesticide Information Center (NPIC) at 1-800-858-7378 seven days a week, 6:30 am to 4:30 pm, Pacific Time (NPIC website: www.npic.orst.edu). During other times, call your poison control center at 1-800-222-1222.
“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
Several Bt strains are present, each with specific activity:

- *kurstaki, aizawi* strains (leaf feeding Lepidoptera larvae)
- *tenebrionis* strain (leaf beetles)
- *israelensis* strain (mosquito, gnat, black fly larvae)
Mosquito Life Cycle

Adult (left)
Larvae/wrigglers (lower left)
Pupae/tumblers (below)
Fungus Gnats

Very common associates of soil and decaying organic plant matter
This formulation now allows use for control of fungus gnat larvae.
“A List” Product
A Good Ant Bait
Baiting for Ants
Other Food Preferences

• Oily materials
  – Pharaoh ant
  – Pavement ant (often)

• Sweet materials
  – Field ant
  – Carpenter ants
  – Odorous house ants
  – Pavement ants (sometimes)
Fundamentals of Ant Baiting

- Match bait to feeding habits of target ant species
- **Use slow-acting toxicant**
  - Boric acid
  - Hydramethylnon
  - Indoxcarb
  - Fipronil
- Remove alternate food sources
- Place bait near foragers
- Maintain bait quality
- Replenish baits as needed
Borax or Boric Acid based baits
Boric acid can be used as a *tracking powder*

Boric acid is picked up and returned to the colony – similar effects of baiting.
Hydramethylnon – an insect growth regulator type of insecticide
A hydramethylool product used on ants outdoors.
Fipronil – the active ingredient most used by professional pest control operators
Carpenter Ant Baits

- Special baits are designed for these type of ants
  - Must be liquid or moist gel
  - Sugar based
Fundamentals of Ant Baiting

- Match bait to feeding habits of target ant species
- Use slow-acting toxicant
- Remove alternate food sources
- Place bait near foragers
- Maintain bait quality
- Replenish baits as needed
"A List" Product

A Product to Control Yellowjackets and other Nuisance Wasps
Typical Wasp and Hornet Spray Product

• Has a quick knockdown insecticide (a pyrethroid)
• Has a more persistent insecticide (another pyrethroid)
• Has a propellant, 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.
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!
“A List” Product
An Effective Yellowjacket Trap
Western Yellowjacket – No. 1 Stinging Insect
Many traps are sold to capture yellowjacket wasps.
Traps that caught the most western yellowjackets in 2015 trials

- Rescue! OrnamenTrap (Liquid trap)
- SpringStar (Oak Stump) Liquid Trap
- AlphaScent Lure with Yellow Card
Traps that are very poor in capturing yellowjackets
Most effective use of yellowjacket traps?

Probably early in the year targeting overwintered queens
European Paper Wasp
Traps do not capture the European paper wasp or any other paper wasps
WHY Trap

Wasp

Hornet

Yellowjacket
The Original Waspinator

EXCLUSIVELY FROM DEWITT

Watch those pesky wasps disappear with the Original 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!

1 unit/1 unité Patent Pending Brevet en instance

Keeps Wasps, Yellow Jackets and Hornets Away!!!

* sans guêpes
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 Waspinatorator proximity
If it sounds too good to be true – it is!
This presentation will be posted at the Insect Information web site

• **Housed at** Department of Bioagricultural Sciences and Pest Management
  – **Search** “BSPM CSU”

• **Within** “Outreach”
  – “Insect Information”
  – **Extension presentations for 2017 posted at bottom of page**
BIOAGRICULTURAL SCIENCES & PEST MANAGEMENT
PROSPECTIVE STUDENTS
GIVE NOW

Outreach

Katie Cleary, an undergraduate researcher at the Argueso lab, was awarded High Honors for her...
Insect Information

All materials needed in another accessible format can be made available upon request.

Colorado Bug Mugs
The Colorado Bug Mugs project is an innovative approach to helping country Extension offices in Colorado identify the arthropods most likely to be brought by clients for diagnosis. This project is ongoing, and additional species may be added if requested and needed by Extension personnel.

Arthropods of Colorado
Information on many Arthropods of Interest in Colorado have been developed by the Colorado State Extension Entomology program. Many of these are treated in Extension Fact Sheets that can be accessed at Extension Insect Publications.

Quick Links
- Colorado State Beekeepers Association
- Western Colorado Entomology
PowerPoint Talks- Cranshaw

February 5th, Gillette Entomology Club (Fort Collins, CO)

• Some Interesting Insects of Tanzania

February 9th and 10th, ProGreen Expo (Denver, CO)

• Creating Landscapes for Insects – Or Not
• Insect Update
• ProGreen Handout Relative Visitation of Plants by Bees

February 9th, Boulder Beekeepers (Longmont, CO)

• A Review of Colorado’s Bee and Wasp Species

February 14th, Tri-Rivers Pest Management Conference (Montrose, CO)

• Stinging and Biting Insects

March 2nd, Colorado Arborists and Lawn Care Professional Spring Conference