Beneficial Pest Program

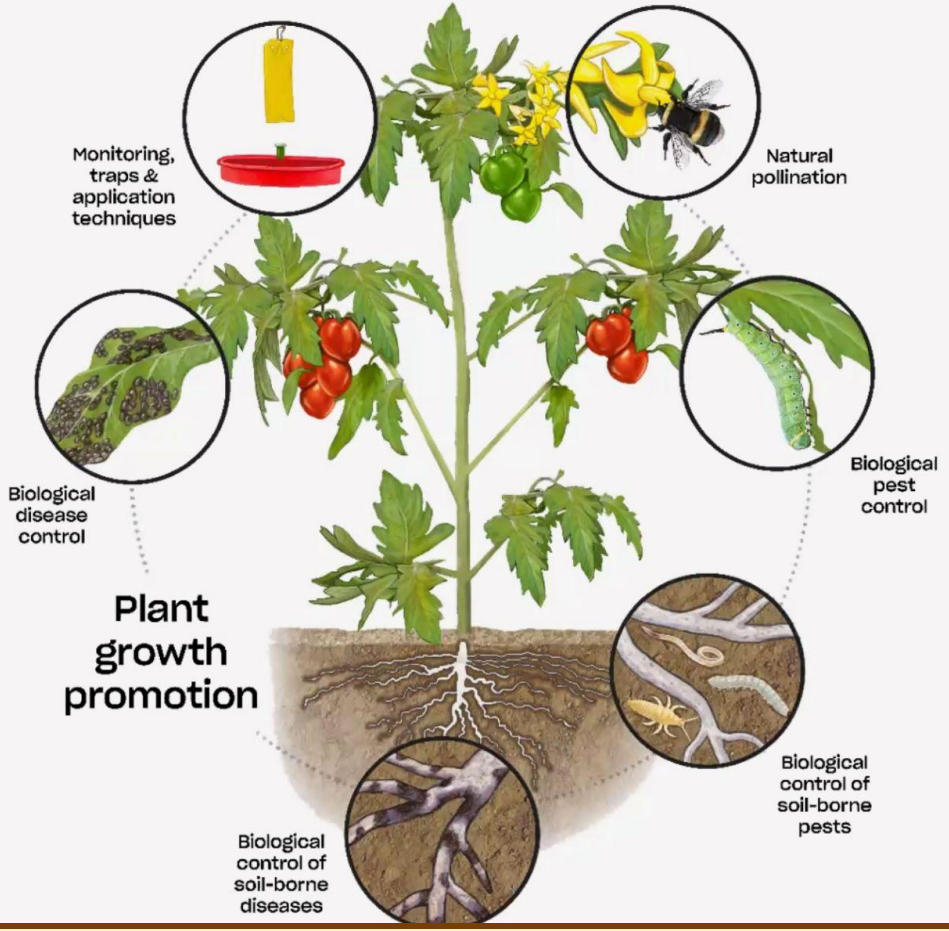
By Julie Lanesey

WHAT ARE BIOCONTROLS?

Natural predators, parasitoids, or microbes utilized to target pests and pathogens

- **Predation** – Active feeding on the pest (e.g. Predatory Mites, Orius, Lacewing larvae, Atheta)
- **Parasitization** – Laying eggs in the pest to incubate and hatch (e.g. parasitoid wasps and entomopathogenic nematodes)
- **Microbes** – Beneficial bacteria and fungi used to combat other bacterial and fungal diseases. Commonly referred to as Biofungicides and Mycoinsecticides (e.g. *Bacillus, Trichoderma, Isaria, Beauveria)*
- Proper pest identification determines the biocontrol(s) to be used - figure out the best MOA

MULTI-FACETED APPROACH



Why should I add beneficial pests to my garden?

1. **Reduce the use of chemicals**
    a. Reduce environmental contamination - Biological pest control methods do not harm the environment and help preserve ecosystems.
    b. Reduce chemical dependency - let beneficial insects naturally reduce harmful pests
2. **Reduce health risks**
    a. Safe for humans and pets and Bees!
    b. Pests carry diseases and spread them to plants
3. **Cost benefits**
    a. Preventing pest a problem is more cost-effective than dealing with an infestation.
4. **Targeted pest control**
    a. Natural enemies only target specific pest species.
    b. Pests do not develop resistance to natural enemies whereas they do with pesticides
    c. Organic methods have prolonged effectiveness compared to chemical pesticides

Identify harmful pests in your garden

1. **Key signs of pest damage**
   a. Holes in leaves
   b. Sucking marks or distorted leaves
   c. Wilting of stunted growth
   d. Sticky residue on leaves
   e. Webbing or fecal pellets
2. **Inspect plant**
   a. Under leaves and on stems
3. **Observe the pest's appearance**
   a. Color, size, shape and features and take a photograph
4. **Useful methods**
   a. Magnifying glass or Jewelers Loupe with 10x magnification
   b. Handpicking
   c. Nighttime inspection
   d. Sticky traps
   e. Consult online resources- Evergreen Growers Resources: Click on ***Margaret's Useful Critter Links***

Evergreengrowers.com/resources

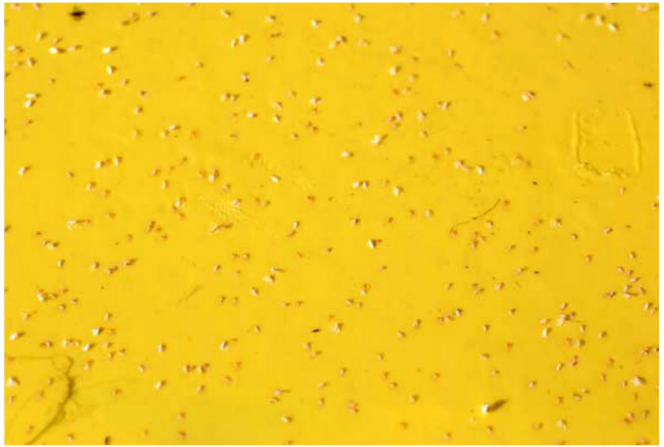
Margaret's Useful Critter Links

Identifying Some Pest and Beneficial Insects on Your Sticky Cards

Leanne Pundt
University of Connecticut
Department of Extension

Thrips

Whiteflies



Do research to determine what pests to add to your garden.

Resources:

Arbico Organics - www.arbico-organics.com

Evergreen Growers Supply - www.evergreengrowers.com

Sound Horticulture - www.soundhorticulture.com

UC IPM: Statewide Integrated Pest Management Program – www.ipm.ucanr.edu

Natural Enemies - www.naturalenemies.com

Koppert - www.koppertus.com

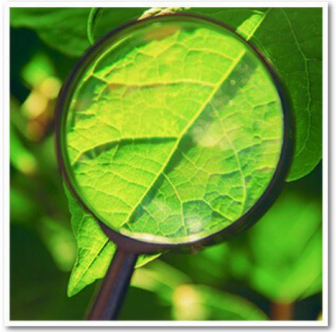
Podcast: No-Till Flowers **(Season 3, Episode 31 and 32)**

Beneficial Insects and Natural Pest Control **with IPM expert Margaret Parks of Evergreen Growers Supply**

Example from Arbico website....click on control by pest

Pest Control Solutions

Click on the links below for everything you will need to create a successful integrated pest management plan.


Control By Pest


Animal and Bird Control


Animal Care Products


Aphids


Beetles


Biopesticides


Caterpillars & Moths


Chemical-Free Home Care

Select the pest you want to target.

Control By Pest

Use this page to identify and learn about pest insects that are damaging plants in your home, garden, greenhouse and farm. Just click on a specific category and find out about their biology, description, and suggested methods of control.

The best approach is to use an **Integrated Pest Management** program, where cultural, physical, chemical and biological tools work together to sustain a healthy environment.

- **Cultural control** involves plant selection, site selection, proper planting and keeping your plants healthy.
- **Physical control** includes barriers, traps and lures, or physical removal to prevent or reduce pest problems.
- **Biological control** brings in proper beneficial insects or organisms to fight the pests.

For optimal results, it is best to use a combination of these methods. A good fertility program will also help by increasing plants' vitality, making them less susceptible to insect pests, weeds and diseases. Use traps to capture and monitor pests, natural insecticides for knock down of large populations of insects, and beneficial insects and organisms to combat developing stages.

Adelgids

Ant Control

Aphids

Apple Maggots

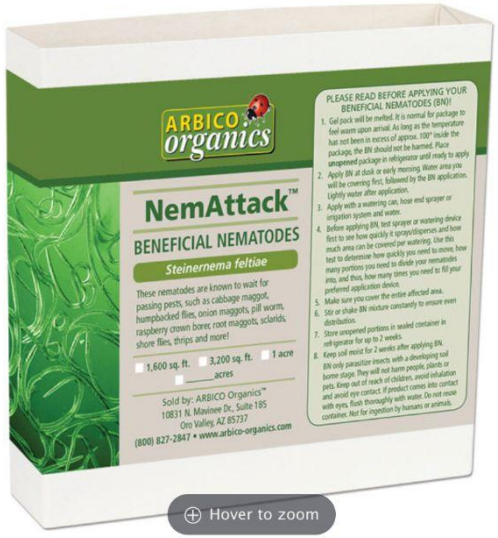
Thrips

How To Treat & Control Thrips Organically

Members of the *Thysanoptera* order, the term 'thrips' includes more than 6,000 species. They can become serious pests indoors, outdoors and in greenhouse settings. In general, they are not host specific; however; species such as onion thrips and tobacco thrips feed on plants in specific families. Adult and larval stages of thrips feed on foliage and flowers causing extensive damage in a short time period under the right conditions. Damage typically shows up as stippling, silvering of the leaves, or discolored patches on the leaf surfaces, but can also be identified by the unique twisting they cause on new growth. Discarded pollen and frass can also be a major issue for orchid, violet and other ornamental growers as the buildup is unsightly and reduces flower longevity.

Thrips Control:

1. **Monitoring & Prevention:** Inspect plants early and often for signs of thrips activity or damage.
   - Hang **Blue** or **Yellow Sticky Traps** within the growing area to monitor pest populations. Blue traps are best when beneficial insects are already present.
   - General predators can keep thrips populations at low levels limiting damage – minute pirate bugs (*Orius insidiosus*), green lacewing and ladybugs.
2. **Biological Controls:** Use when thrips pressure is moderate or minimal for best results. Many insects control different life stages of thrips and there are numerous mycoinsecticides that also target them.
   - **Beneficial Nematodes (Sf)** are the easiest way to control thrips developing in the soil. They interrupt reproduction and reduce local populations leading to less adults and resulting damage.
   - ***Amblyseius cucumeris*** are predatory mites used for thrips prevention, control and continued management. They feed on immature thrips and multiple species of mites. For best results, release before thrips become a serious issue as establishment can take 6-8 weeks.
   - ***Amblyseius swirskii*** can also be used as a thrips control and reproduce more quickly than *N. cucumeris* in optimal conditions (77-85°F, RH 70%).
   - ***Stratiolaelaps scimitus*** feed on a number of soil-dwelling pests including thrips prepupae and pupae.
3. **Insecticide Sprays:** Use insecticides for early knockdown or continued control of high pest numbers.
   - **Neem Oil** is an effective knockdown spray and one of the best sprays for garden thrips control. It can be used prior to releasing beneficial insects and suppresses foliar diseases like powdery mildew.
   - **Azadirachtin** sprays work as feeding/growth inhibitors and can be combined with pyrethrins to increase impact and coverage. Use as a thrips control spray for severe infestations.
   - **PFR-97** has shown great results controlling thrips and other soft-bodied insects, especially in greenhouses or indoor settings. It poses minimal risks to beneficial insects and is compatible with most other pesticides.



NemAttack™ - Sf Beneficial Nematodes

Steinernema feltiae

Best suited for mobile pests that include fungus gnats, ticks, thrips, leafminers, caterpillars, cutworms, sod webworms, onion maggots, subterranean termites and more. **Best Choice for Indoor and Greenhouse Applications.**

FREE SHIPPING IN THE CONTIGUOUS UNITED STATES!

★★★★½ WRITE A REVIEW

5 Million SKU: 1220309	**$36.00**	1	BUY NOW
10 Million SKU: 1220310	**$42.95**	1	BUY NOW
50 Million SKU: 1220311	**$72.00**	1	BUY NOW
250 Million SKU: 1221701	**$198.00**	1	BUY NOW
500 Million SKU: 1221704	**$270.00**	1	BUY NOW

Amblyseius cucumeris

Thrips Predator

Prevent Thrips From Becoming Established With This Excellent Predator.

Ships via Overnight methods on Tuesdays Only. Minimum 7-day lead time prior to shipment. See Shipping Info for details. For Delivery Only. Not available in store.

WRITE A REVIEW

25,000 in Bran/Vermiculite Mix* SKU: 1152207	$30.00	1	BUY NOW
50,000 in Bran/Vermiculite Mix SKU: 1152204	$47.00	1	BUY NOW
50,000 in Vermiculite SKU: 1152224	$47.00	1	BUY NOW
100,000 in Bran SKU: 1152205	$60.00	1	BUY NOW
250,000 in Bran/Vermiculite Mix SKU: 1152206	$115.00	1	BUY NOW
250,000 in Vermiculite	$120.00	1	BUY NOW

DESCRIPTION | INSTRUCTIONS | SHIPPING INFO | TECHNICAL | REVIEWS

Ships via Overnight methods on Tuesdays Only. Minimum 7-day lead time prior to shipment. See Shipping Info for details. For Delivery Only. Not available in store.

Amblyseius cucumeris predatory mites are primarily thrips predators, but will also feed on a range of mite species in different environments. Tan colored and about 0.5mm long, they can be slow to establish - 4-8 weeks under ideal conditions - meaning they are best used for prevention and low-level management of thrips infestations. Control is often seen 3 weeks after release. They will find alternate food sources* in the absence of prey. It is important to pair *A. cucumeris* with a suitable mite predator for control of any of the listed pest mites if populations are established.

Target Prey: Immature Thrips, Two-Spotted Spider Mites, Cyclamen Mites & Broad Mites

Key Features:

- Wide range of food sources.
- Highly compatible with *S. scimitus*, rove beetles and minute pirate bugs for thrips control.
- Often combined with *A. andersoni* for mite control.
- Sustain themselves in low pest levels.
- Multiple release types allows for variable uses in different growing environments.

Optimal Conditions: 68°-77°F, 65-70% relative humidity

Release Rates & Recommendations: Release *A. cucumeris* when thrips populations are low. Early season monitoring can be done with blue or yellow sticky traps. Moisture and humidity help increase hatch rates. Do not use with *A. swirskii*. Some crops, including tomatoes & other highly resinous crops, require higher release rates.

Preventive Release Rates – Make initial releases before thrips issues develop to allow *A. cucumeris* to establish. This can take 4-8 weeks.

- 10-20 mites per sq. ft. or 100-200 per square meter. Make weekly broadcast applications.

Spot Treatment Release Rates (Acute Treatment) – Use when isolated areas of pest pressure are present.

- Apply 20-40 mites per sq. ft. (100-400 per square meter). Reapply weekly in broadcast applications until pest issues have subsided.

For preventative intervention, click here to shop A cucumeris in controlled release sachets.

This Product Controls These Pests or Diseases: Bean Thrips (*Caliothrips fasciatus*), Broad Mites, Russet Mites, Spider Mites, Thrips**, Western Flower Thrips (*Frankliniella occidentalis*)

* Without prey, *N. cucumeris* will feed on the eggs and immature life stages of *P. persimilis* and all life stages of *A. swirskii*. They will also feed on pollen available on the plants.

** When controlling established thrips populations, consider using Minute Pirate Bugs to gain control and *A. cucumeris* to maintain control.

Aphids

How To Control Aphids Organically

Aphids, family name *Aphididae*, are a common pest to gardeners, commercial growers and greenhouses due to their wide species diversity and rapid reproductive cycle. There are some 1,351 species of aphids currently recorded in the US and Canada, of which about 80 species are pests of food crops and ornamental plants. Most get their names from the plants they attack, i.e. the green peach aphid, the cabbage aphid, or the rose aphid.

Identification & Appearance:

Aphids are slow moving and come in shades of green, red, brown, black and yellow. Their oblong bodies have two small tubes, called cornicles, projecting from their rear that are unique to them. These allow aphids to get rid of excess sugar in the form of honeydew. They have needlelike mouthparts which they use to suck juices out of plants. *Aphids do not chew.* If you notice chewing damage on a plant, look to **identify** a different culprit.

Aphid Damage:

Each plant reacts differently to aphid attacks. Some show no adverse response to aphids, while others react with twisted, curled or swollen leaves and/or stems. Symptoms of aphid damage include decreased growth rates, mottled leaves, leaf yellowing, stunted growth, browning, wilting, low yields and death. Due to the way they feed, aphids can vector **bacterial** and **viral** diseases, which can be much more difficult to control than the aphid population. For instance, the green peach aphid (*Myzus persicae*) is a vector for more than 110 plant viruses.

One of the most common annoyances caused by aphids is their excessive waste production, called "honeydew". This sticky substance drips onto plant leaves and stems and can harbor fungal diseases like **powdery mildew** and Black Sooty Mold. These can leave plants with unsightly patches and limit growth potential. Once the aphids are eliminated, the foliar fungal diseases often dry up and die.

5-Step Aphid Control:

1.) Trap & Monitor

- **Yellow Sticky Traps** work well for outdoor and potted plants where localized monitoring is desired.
- **Ribbon Traps** are best for row crops and greenhouse settings. They save time and energy while giving thorough coverage.

2.) Repellent Sprays

- Broadcast spray **Garlic Barrier** for small or large scale applications. It gives broad spectrum insect repellent action with limited contact effects.

3.) General Predators

- Effective releases of **Green Lacewing** limit aphid population growth and can control moderate pest issues in a garden or farm. For severe infestations, consider an aphid parasite (listed below).
- **Assassin Bugs** are less affected by heat than ladybugs and are effective aphid predators. Like other predators & parasites, release assassin bugs at the first sighting of aphids.
- If you need a fast-feeding beneficial, **Minute Pirate Bugs** are best. They continue to control insects after feeding making them reliable for curbing population growth.

4.) Knockdown Sprays

- **Insecticidal Soap** sprays should be used early in the season before high aphid numbers are spotted. Minimize impacts on existing beneficials with these residue-free sprays. *Low risk to beneficial insects when sprayed carefully.*
- **Neem Oil** acts as a growth and feeding inhibitor while preventing respiration. Use as a contact insecticide for moderate infestations. *High risk to beneficial insects in the growing area.*
- **BotaniGard 22WP** should be applied to affected crop area to control ongoing aphid issues. It uses ***Beauveria bassiana*** to infect aphids, spreading White Muscardine disease throughout the pest populations. Provides longer term control than chemical sprays. *Low risk to beneficial insects.*

5.) Aphid Parasites

- ***Aphidius colemani*** are most effective between 70° - 77°F. They require two weeks for development and up to 200-300 aphids are attacked by each female. Fertilized eggs develop into females and non-fertilized eggs develop into males. The female has a pointed abdomen, while the male's abdomen is round-shaped.
- ***Aphelinus abdominalis*** like temperatures beginning at 68°F. They are very versatile because they parasitize a wide range of aphid species and work effectively in fields and greenhouses.
- ***Aphidius ervi*** consume larger aphids and prefer temperatures between 65° to 77°F with relative humidity of 60-80%. They work at higher temperatures but show a decline in activity at temperatures above 86°F.
- ***Aphidoletes aphidimyza*** controls aphids including the green peach aphid as well as the hemlock wooly adelgid. *A. aphidimyza* prefers greenhouse and indoor environments with temperatures 60-77° with relative humidity of 70%.

Green Lacewing

Best General Purpose Predator for Gardens & Greenhouses

Green lacewings are excellent additions to any integrated pest management (IPM) program, providing benefits throughout the growing season. Adults feed on nectar, pollen, and honeydew, while the larvae are active predators of soft-bodied insect pests: **aphids**, **thrips**, **whiteflies**, **leafhoppers**, **spider mites** (especially red mites) and **mealybugs**. Once hatched, green lacewing larvae roam plant foliage looking for prey – pest eggs, nymphs or adults. They feed for 2-3 weeks, spin a cocoon, and emerge as adults 10-14 days later. Lacewing offer season on season benefits because of their ability to tolerate wide temperature ranges and work well with most beneficial insects. Combine lacewing releases with companion planting and **cover cropping** to help keep adults around to lay eggs for coming seasons.

Choose the Best Option for Your Needs:

Green Lacewing Eggs: ***Best low-cost biological control for common garden pests.*** If you want to establish Green lacewing at the beginning of the season or have a limited infestation, choose the appropriate numbers of eggs for your garden or greenhouse. It takes 3-10 days for larvae to emerge depending on the temperature and other environmental conditions. Repeat applications every 1-2 weeks. Green lacewing eggs are available in loose media or on hanging cards for easy release. ***Order a program and save with weekly shipments!***

Green Lacewing Larvae: ***Best for immediate treatment of a pest problem.*** If you have a more severe infestation, consider the larval frames or bottles. They provide the quickest means to control unwanted pests with the larvae arriving ready to feed. The larvae packaged in frames have small compartments that can be peeled open to make releases in various areas. Larvae are also available in a bottle, though it is more difficult to make even applications.

Green Lacewing Adults: ***Best for establishing a population.*** If you are treating a large area and want to create standing populations, order adult lacewing. The adults come ready to lay eggs and do so throughout the release area. They are minor pollinators and feed on pollen/nectar, but do not actively control pests themselves.

PLEASE NOTE: Ants and aphids have a symbiotic relationship. This is due to the fact that ants value the secretions of the aphids (honeydew) as a food source. The ants aggressively protect the aphids from other insect threats and the aphids produce the honeydew they crave. For this reason, before you begin any treatment to control aphids with predatory insects you will need to eradicate the ants in the area to be treated. Otherwise, they will wipe out any beneficials you introduce.

Green Lacewing Eggs

Chrysoperla rufilabris

FREE SHIPPING. Green Lacewing Larvae Consume Large Quantities of Aphids, Mites, Thrips, Whitefly & More!

Free Shipping in the 48 contiguous United States. Quantities 1,000-25,000 ship via USPS. Quantities 50,000-250,000 ship via 2nd Day Air.

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Choose Quantity -

Choose Frequency -

Choose Duration -

Green Lacewing Eggs
SKU: 1110001-G

1

BUY NOW

DESCRIPTION | INSTRUCTIONS | SHIPPING INFO | TECHNICAL | REVIEWS

FREE SHIPPING! Ships Monday-Friday!

Green Lacewing Preferred Food: aphids, mealybugs, spider mites, leafhopper nymphs, moth eggs, scale, thrips, and whiteflies.

Green lacewing eggs provide the best value among the beneficial insects that ARBICO offers. Once hatched, the larvae are voracious predators used to control a wide range of soft-bodied pest insects. Green lacewing are ideal for building a sustainable population within your growing area for continued control. Lacewings are preferred to ladybugs in many climates due to their ability to survive a larger temperature and humidity range while controlling many of the same pests.

Optimal Temperatures: 67-90°F, RH >30%

Green Lacewing Eggs - Hanging Cards

Chrysoperla rufilabris

Easy To Use! Simply Hang Cards To Release These Generalist Predators!

Free Shipping in the 48 contiguous United States!

WRITE A REVIEW

5,000 Eggs on Cards SKU: 1110100	$30.00	1	BUY NOW
10,000 Eggs on Cards SKU: 1110102	$50.00	1	BUY NOW
25,000 Eggs on Cards SKU: 1110105	$100.00	1	BUY NOW

DESCRIPTION | INSTRUCTIONS | SHIPPING INFO | TECHNICAL | REVIEWS

FREE SHIPPING IN THE 48 CONTIGUOUS STATES! Ships Monday-Friday via USPS only. Order processing can take up to 48 hours.

Green Lacewing Eggs on Hanging Cards allow for easy and even release of lacewing eggs throughout the growing area. Ideal for use in orchards, indoor growing, greenhouses and row cropping. Introduce green lacewing at the first sign of pest infestation for best results. Please call us at 1-800-827-2847 to set up a recurring shipment program.

Green Lacewing Preferred Food: aphids, mealybugs, spider mites, leafhopper nymphs, moth eggs, scale, thrips, and whiteflies.

Optimal Temperatures: 67-90°F, RH >30%

Green Lacewing Larvae

Chrysoperla rufilabris

Pre-Hatched Green Lacewing Larvae Ready To Eat Your Pests Upon Arrival.

Overnight Shipping Required. Orders ship on Tuesdays Only. Order by Wednesday for shipment Tuesday. See Shipping Info for additional information.

★★★★☆ WRITE A REVIEW

400 - Hex Frame SKU: 1110005	$27.00	1	BUY NOW
1,000 - Bottle SKU: 1110010	$26.00	1	BUY NOW
5,000 - 5 Liter Bag SKU: 1110030	$105.00	1	BUY NOW
10,000 - 5 Liter Bucket SKU: 1110032	$180.00	1	BUY NOW

DESCRIPTION | INSTRUCTIONS | SHIPPING INFO | TECHNICAL | REVIEWS

Green Lacewing Adults

Chrysoperla rufilabris

Adult Lacewing are delivered ready to lay eggs and will do so immediately throughout your release area.

Overnight Shipping Required. Orders ship on Tuesdays Only. Order by Wednesday for shipment Tuesday. See Shipping Info for additional information.

★★★★☆ WRITE A REVIEW

Pre-Fed Adults - 100 SKU: 1110006	$50.00	1	BUY NOW
Pre-Fed Adults - 250 SKU: 1110004	$90.00	1	BUY NOW
Pre-Fed Adults - 500 (2 x 250) SKU: 1110007	$160.00	1	BUY NOW
Pre-Fed Adults - 1,000 SKU: 1110019	$180.00	1	BUY NOW

DESCRIPTION | INSTRUCTIONS | SHIPPING INFO | TECHNICAL | REVIEWS

Build A Beneficial Insect Population & Maintain A Healthy Garden!

Adult Green Lacewings (*Chrysoperla rufilabris*) are beneficial in establishing a standing population for continued control of pests or for improved pollination. Since lacewing larvae are the predatory stage, introduce adults early in the growing season prior to when garden pest control is needed. Each female adult lacewing lays around 200 eggs in a lifetime.

Preferred Food: Adult green lacewing sustain themselves on pollen, honeydew and nectar, laying eggs as they feed. Larvae feed on soft-bodied insects including Aphids, Mealybugs, Spider Mites, Leafhopper Nymphs, Caterpillar Eggs, Immature & Soft Scale, Thrips, and Whiteflies.

Leafminers

Leafminer is a broad term used to describe the larvae of ***Lepidoptera***, *Diptera* and ***Hymenoptera*** that live inside of plant leaves while feeding and maturing. Growers typically notice erratic lines showing up on foliage often times with frass visible inside the discolored lines. The pattern formed by the feeding tunnel can be indicative of the specific pest afflicting your plants, but pay close attention to which plants are being targeted as that can be helpful in identifying the pest.

Leafminer Damage:

Leafminers prefer to feed on parts of plants with tissues containing lower levels of cellulose and tannins. Damage caused by leafminers is often only cosmetic and leaves the affected plants healthy otherwise; although, unchecked damage can cause excessive leaf drop and other symptoms that may result in more severe effects to the plants. Once emerged, leafminer feeding tunnels can become sites for **Diseases** to be vectored in by other insects or through direct contact with **Fungal** spores, **Bacteria**, or **Viruses**. For this reason, it is imperative that you monitor consistently once leafminer damage is identified.

Controlling Leafminers:

- Monitoring leafminer populations early in the season allows action to be taken early on if needed. **Blue Sticky Traps** attract and trap adults before they can lay eggs that will hatch and damage foliage. Physical removal of leafminer eggs should be done when eggs are spotted.
- Plant trap crops like lamb's quarters, columbine and velvetleaf if you have dealt with leafminers in past growing seasons. They serve as a more inviting alternative for the leafminers and direct them away from the crops being protected.
- ***Diglyphus isaea*** is a beneficial wasp that parasitizes leafminer larvae, killing them before they can perpetuate. Best results are achieved when releases of *D. isaea* are made early in the season before leafminer populations have grown to large numbers.
- If you notice leafminer damage on foliage, thoroughly apply **Spinosad** (**Monterey Garden Insect Spray**) to all plant surfaces. Once ingested, spinosad stops larvae from feeding and they will die within 24-48 hours. Repeat applicatons 2-3 times throughout the growing season if damage persists.

SORT BY $-$$$$ **PER PAGE:** Choose --

Diglyphus isaea

Dicyphus hesperus

NemAttack™ Combo Pa…

NemAttack™ - Sc Benefi…

Monterey Garden Insect Spray - Conc.

OMRI LISTED. A Spinosad Insecticide That's Tough Enough to Take on Fire Ant Mounds.

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8 oz. NEW SIZE! SKU: 1257901	$15.99	Call 800-827-2847 To Order	
Pint SKU: 1257900	$21.99	1	BUY NOW
Quart - Hose-End RTS SKU: 1257906	$35.99	1	BUY NOW
Quart SKU: 1257905	$35.99	1	BUY NOW
Gallon SKU: 1257910	$124.49	Call 800-827-2847 To Order	

DESCRIPTION | INSTRUCTIONS | SHIPPING INFO | TECHNICAL | DOCS | REVIEWS

Monterey Garden Insect Spray is a broad spectrum insecticide that contains Spinosad, which is derived through fermentation of a naturally-occurring soil bacterium. Spinosad works on the insects' nervous system, causing paralysis and death in 1-2 days. Since the insects are paralyzed, they may stay on the plants and be mistaken for live insects; always check 2-3 days after spraying to evaluate control in the insect population.

- For control of foliage feeding worms/caterpillars, thrips, fire ants and many other listed pests.
- For use on vegetables, fruit & nut trees, citrus, berries, herbs, ornamentals, shrubs, flowers, lawns & trees in home gardens and non-commercial greenhouses.
- May be applied with trigger sprayer, hand-held, backpack, or hose-end sprayers

Organic Monterey Garden Insect Spray is safe to use with the following beneficial insects: minute pirate bug, ladybird beetles (ladybugs), green lacewing, and mite predators. However, it is toxic to bees; for this reason, applications should be made in the late evening and on plants that are not blooming, pollen-shedding, or nectar-producing.

Monterey Garden Insect Spray **Ready-To-Use** formulation is also available.

Cucumber Beetle

How To Control Cucumber Beetles Using IPM

There are two common types of cucumber beetle, striped (*Acalymma vittatum*/*A. trivittatum*) and spotted (*Diabrotica undecimpunctata howardi* Barber), whose names refer to the markings on their bodies. Both varieties are common pests of plants in the cucurbit family (*Cucurbitaceae*); however, cucumber beetles also feed on other plant varieties if an optimal host is not readily available.

Identification: Adult cucumber beetles are 5 to 6 mm in length and greenish yellow in color with a black thorax. Eggs are laid in groups of 25-50, are yellow in color, oval in shape, and measure about 0.35 mm in width. They are often deposited in cracks in the soil, but are also found under leaf surfaces requiring five to nine days to hatch (dependent on soil moisture). Once hatched, larvae feed on plant roots and tunnel through stems as they mature through three instars. Complete larval development takes between two to 3 ½ weeks after which the larvae pupate in the soil. Pupation lasts four to ten days and adults emerge to feed, mate and lay eggs.

Cucumber Beetle Damage:

Vegetable crops damaged by the cucumber beetle include cucumber, squash, beet, bean, pea, sweet potato, okra, corn, lettuce, onion, and various cabbages. The cucumber beetle is known to vector viral diseases in beans; however, damage caused by larvae and adults can increase the incidence and severity of bacterial wilt (*Erwinia tracheiphila*). Adult cucumber beetles severely defoliate plants and scar fruit, reducing their marketability.

Controlling Cucumber Beetles:

- Inspection is a key element of prevention and control. Monitor plants and growing areas, including the **growing medium**, for any signs of pests. Use **baited traps** early in the season where cucumber beetles are known to be a problem. Manually remove any visible egg clusters or adults and dispose of them.
- Use **floating row covers** to protect seedlings and new plantings. Maintain monitoring techniques to catch any pest issues early and determine if action is needed.
- Introduce beneficial insects early in the growing season and supplement populations if pest levels increase. **Ladybugs**, **green lacewing** and **assassin bugs** will all feed on various life stages of cucumber beetles.
- **NemaSeek** (*Hb*) beneficial nematodes should be applied to the soil of infested areas to control the pupal stage of the cucumber beetle.
- If adult feeding damage is identified, apply kaolin clay (**Surround WP**) to plant foliage. The film left behind disorients insects and prevents feeding.
- **Spinosad** sprays can be applied as soil drenches to kill larvae before they pupate in the soil.
- ***B. bassiana*** sprays infect and kill cucumber beetles once they have hatched. They are most effective when targeting non-adult stages.
- If immediate action and control is necessary, apply a **pyrethrin** or **azadirachtin** insecticide to the affected areas. Use caution if beneficial insects have been released or pollinators are present.
- Lastly and perhaps most importantly, maintain a clean growing area and rotate cucurbit crops. Remove debris and harvest before fruit drops to the ground. This reduces overwintering habitat for cucumber beetles.

Is there a way to natural way to STOP bugs from wanting to eat your plants???

YES!!!!

Increase the Brix number (sugar content) of your plants! There is a magical Brix level in plant leaves that makes them inedible to all pests.

*********_**The No-Till Flower Podcast**_ - guest Dr. Tom Dykstra, Entomologist

Magical Brix Number = 9-10

How to Measure Brix content? Buy a Brix Refractometer with ATC (link in podcast notes)

Product: Hi-Brix Molasses - 1 cup molasses to 5 gallons water. Spray every 2 weeks.

More great podcasts and resources!

The Dig on Dahlias - Hosted by Joann Hartwell (Blue Sky Dahlias) and Allison Lingbloom (Kale Lane Dahlias). Both located in NW Washington.

***Season 1, Episode 11 - Allison Kutz of Sound Horticulture Interview**

The Backyard Bouquet - Hosted by Jennifer Gulizia (The Flowering Farmhouse) located in Hood River, Oregon.

YouTube - **The Micro Flower Farm** - Galena Berkompas

And website - www.microflowerfarm.com - Offer webinars and courses

Thank you and Follow me, Julie Lanesey, on Instagram @Floralfusion.ca