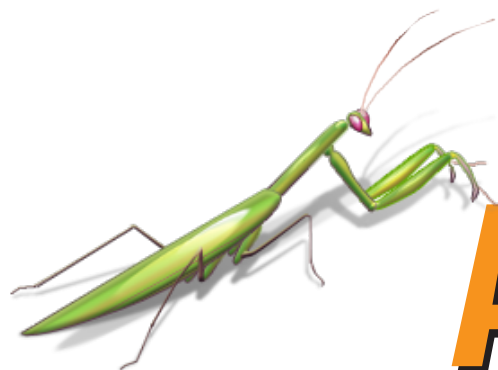
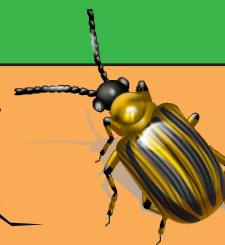




A Guide to

Controlling Insects in the School Garden



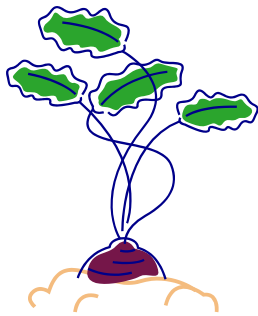


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Key Words

Beneficial Insect

Any insect that performs valued services like pollination or serves as a predator or parasite of insect pests.

Days to Harvest Interval

The number of days between applying a chemical to food crops and harvesting those food crops for consumption that is deemed necessary to protect someone's health.

Garden Pest

An animal or plant that is not wanted in the garden, usually because it causes harm to a plant of value to humans.

Insect

One of the many small arthropods in the class Insecta. Insects have an adult stage characterized by three pairs of legs and a body segmented into head, thorax and abdomen. They usually have two pairs of wings.

Integrated Pest Management (IPM)

An environmentally sensitive approach to pest management that relies on a combination of practical methods. It combines control methods that prevent or kill pests using the most economical means – and with the least possible hazard to people, property and the environment.

Life Cycle

A period involving different life stages of a species (from egg to adult, for example).

Metamorphosis

A change in form during development.

Overwinter

A sedentary state in which animals and plants stay alive through the winter.

Predator

An insect that hunts and kills another insect.

Plant Family

A taxonomic category of related organisms ranking below an order and above a genus. A family usually consists of many genera and species. Genus and species names are always written in Latin.

Re-entry Period

The amount of time between the application of a chemical and re-entering the area where a chemical was applied that is deemed necessary for protecting a person's health.

Scientific Name

This is usually derived from Latin and put together from words that represent what the insect is or what it can do.

U.S. Environmental Protection Agency (EPA)

An independent federal agency established to coordinate programs aimed at reducing pollution and protecting the environment.

Weed

Any plant out of place.



Using Integrated Pest Management in Your School's Garden Program to Control Insects



Gardening in Louisiana is not for pansies – with the exception of those planted by your front door. Growing a garden requires teachers and students to be physically and mentally active in the garden space.

One of the most challenging aspects of growing a garden in a school setting is pest management. Planting, watering and harvesting are enjoyable gardening activities. We hope this publication helps to make insect control fun – or, at the very least, a little less stressful!



Have you heard of the term integrated pest management, also referred to as IPM? Your school probably has an IPM coordinator. As a school garden coordinator, you should get to know this person and let him or her know about your gardening activities.

IPM

So what is integrated pest management and how does it relate to controlling insects in a school garden?

The U.S. Environmental Protection Agency defines integrated pest management as “an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information about the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means and with the least possible hazard to people, property and the environment.”

Let's use the EPA's definition of IPM to relate to your own school garden effort so you can easily incorporate it into your insect management plan.



Think of IPM in your school garden as a four-step plan that will help you correctly identify insects and manage them in a safe and effective manner around students who work and eat in the garden.

IPM Step 1. Prevention

Insect-free zones do not exist in Louisiana. But you, as a school gardener, can practice several control methods to help reduce insect populations in your garden space.



Manage Weeds

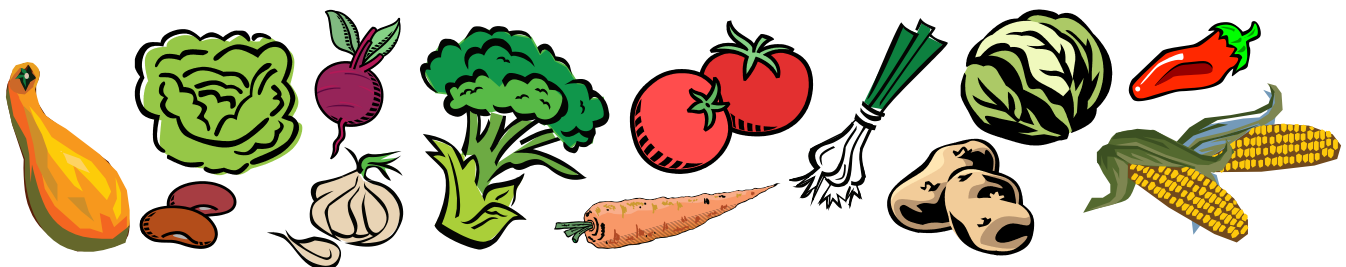
Keep the area around the garden mowed and remove all weeds in the garden and the surrounding lawn as weeds emerge. Many insects overwinter in weeds. By reducing winter weed populations you also will reduce the number of insects in your spring garden. The same is true during the summer. Many insects feed on warm-season weed species. A reduction in weed food sources will help to limit insect populations. How are you going to control weeds in your school garden? The students should be the primary caretakers of the garden. If teachers, parents or other volunteers are managing the garden space (planting, watering, weeding, harvesting), then it really isn't a student garden. Students must do the "work" in the garden so they can learn by doing. They will take responsibility for living organisms other than themselves – and thus take ownership of the garden space. A class of 20 students is the equivalent of 40 hands pulling weeds. Weeds pulled earlier in their life cycles are less likely to go to seed, less likely to create additional weed problems and less likely to provide habitat for unwanted insects.



Rotate Crops

Try to rotate crops by family. See the chart below. We can grow fruit and vegetables 12 months out of the year in Louisiana. So we must rotate families to deplete food sources of insects that feed on particular crops. Think of some insects as picky eaters – just like students! If you have cabbage, carrots and lettuce in your school garden during the fall, rotate those families for your spring crop by planting beans, tomatoes and squash or other plants from different families. During each of the fall, spring and summer seasons, try to rotate crops in different families.

Family	Crops
Legume	Peas and beans
Goosefoot	Spinach, beets, chard
Mustard	Cabbage, collards, broccoli, Brussels sprouts, kale, cauliflower, turnips, radish
Parsley	Carrots, parsley, celery, parsnip
Nightshade	Tomato, potato, pepper, eggplant
Squash	Squash, pumpkin, watermelon, cantaloupe, cucumber, gourd
Composite	Lettuce, endive, Jerusalem artichoke
Lily	Onion, garlic, shallot, asparagus
Grass	Corn



Pick Up Litter

Don't leave rotten produce or pruned plant material in the garden area. After removing any unwanted plant parts, immediately take them to the trash or compost pile. Rotten produce is a magnet for insects.



Keep Fruit and Vegetable Crops Adequately Watered and Fertilized

A healthy plant can tolerate more insect damage than a stressed plant. Most fruit and vegetable crops require 1 inch of water per week. See Steps to Growing a Successful School Garden (<http://www.lsuagcenter.com/NR/rdonlyres/5345334A-2839-4A66-9343-A68F6A528C06/73491/pub3145schoolgardensHIGHRES1.pdf>) or the Louisiana Vegetable Planting Guide (http://www.lsuagcenter.com/en/lawn_garden/home_gardening/vegetables/home_garden_crops/Louisiana+Vegetable+Planting+Guide.htm) for fertilizer requirements of commonly grown fruits and vegetables in the state.



IPM

Step 2. Correctly Identify the Garden Pest

Not all pests are harmful to fruit and vegetable plants. Just the opposite, many insects are beneficial to the garden. Beneficial insects eat unwanted insects or help pollinate plants. Integrated pest management works best when you correctly identify a pest prior to using control methods. There are a number of ways to identify garden pests.

Your local LSU AgCenter county agent will be able to identify the pest if you bring in a sample. Tell your agent where you found the insect and what plant the insect was living on. If you cannot find the insect, bring samples of the damaged plant parts. Or you may want to upload a picture and description of the insect onto the "Ask the Expert" section on the LSU AgCenter's website at www.lsuagcenter.com. The correct identity will be emailed to you.

Located at the end of this publication is a set of insect identification pages. Each page has a picture of an insect. The pages include information about each pest's life cycle, body parts and interesting facts. **Use these in your garden to help you correctly identify insects.**

Remember that insects don't always look the same. As an insect grows it goes through either incomplete or complete metamorphosis. Incomplete metamorphosis is when the insect looks similar to the adult insect in all stages of development. Complete metamorphosis is when the insect looks completely different in each stage of its lifecycle. Life cycle stages are egg, larva, pupa and adult only for insects that go through complete metamorphosis. Insects that undergo incomplete metamorphosis start at egg, molt in the nymph stage several times then go to the adult stage, so it would look more like egg, nymph, nymph, nymph, adult.

IPM

Step 3. Set Action Thresholds



We know insect-free gardens do not exist in Louisiana. As members of a school garden program, you should use the least amount of pesticides needed to control insects without jeopardizing the integrity of your fruit or vegetable crop. When you see insects in the garden, decide on a level of damage that you are willing to "live with" prior to applying insecticides. This may seem a daunting task, but we are providing sample photos on page 6 of the thresholds the LSU AgCenter uses in the model school garden at Burden Museum and Gardens.





Flea beetle damage on eggplant foliage.



Leaf miner damage on citrus foliage.



Flea beetle damage on mustard greens.



Stink bug damage on tomatoes.

Before insecticides are sprayed in the LSU AgCenter model school garden, we first look at where the damage is occurring. For example, if all insect damage is located on the foliage and the fruit is the portion of the plant we are going to eat, we probably won't apply an insecticide at all. An excellent example of this is flea beetle damage to eggplants. The flea beetles feed on the leaves, leaving small holes, but they do not damage the eggplant itself. Therefore, we would not spray.

Another example of foliar damage is leaf miner on citrus trees. Unless the damage to the foliage is so intense that it actually interferes with photosynthesis (causing more than 50 percent leaf drop) we will not use an insecticide. Leaf miners can move into the fruit causing a cosmetic damage to the outside of the fruit but the inside is still edible. Leaf miner damage to trees in most cases is so little, insecticidal usage is not warranted.



On the other hand, if the insect was damaging the foliage of plants such as mustard greens, cabbage or lettuce, we would need to establish a level of tolerance at which we would spray insecticide, since the insect is damaging the edible portion of the plant.

If the insect is damaging the fruit of the plant, such as stink bugs on tomatoes, you would need to develop a level of tolerance before resorting to chemical spray.

By combining prevention methods, correct identification of the insect in question and established tolerance levels of crop damage, we are beginning to correctly use integrated pest management to manage our school garden pests. Please remember to first contact your school's IPM coordinator about using pesticides in the garden before you spray.

That covers three of the four steps. Now, this final step helps us determine how to combat insects when they are above our threshold levels.

Flea beetle damage to eggplant foliage

(David Cappaert, Michigan State University, Bugwood.org)

Leafminer damage on citrus foliage

(Lars Sandved Dalen, Norwegian Forest and Landscape Institute, Bugwood.org)

Flea beetle damage on mustard greens

(Howard F. Schwartz, Colorado State University, Bugwood.org)

Stink bug damage on tomatoes

(Sarah Bertrand, Louisiana State University)

IPM

Step 4. Control

As a final measure, once the pest has been correctly identified, preventive practices are no longer effective and damage is exceeding your reasonable level of tolerance, you are left with two choices. You can remove the infected plant and throw it in the trash, or you can resort to using insecticides.

If pesticides are your choice, pick less risky pest controls first. These include insecticides that are “highly targeted chemicals,” such as pheromones to disrupt pest mating, or mechanical control, such as trapping or weeding. If using these less risky controls doesn’t stop the insect from causing damage to your fruit and vegetable crops, additional pest control methods may be warranted, including targeted spraying of pesticides. Broadcast spraying of nonspecific pesticides is a last resort.

When spraying any insecticide (organic or synthetic, targeted or nonspecific), make sure you minimize any risk to students and beneficial insects by taking the following precautions:

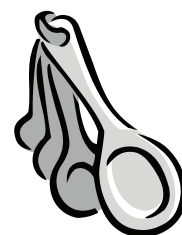
- Wear personal protection equipment that may be required, particularly as specified on the product label, when applying any insecticide (for example, long-sleeved shirt, eyeglasses, mask, etc.).
- Spray only the recommended rates. Do not add more chemical to “get a better effect.” Applying higher rates than indicated on the label/instructions eventually may cause insects to become resistant to a product’s effect.
- Actually measure the insecticide you are using. For instance, if the label indicates that 1-2 ounces of chemical per gallon of water be used, be sure to measure both the water and the insecticide concentrate. Since you probably have a small garden space, you may only need about a gallon. Fill the sprayer with about half the amount of water you need. Measure the insecticide in the appropriate amount and add it to the water in the sprayer. Carefully rinse the measuring instrument with water over the spray tank until you reach the

amount of water you need. (For example, fill a 1-gallon sprayer half full. Use the amount of insecticide for a gallon of water. Then rinse the pesticide measuring instrument over your spray tank until you have filled it to the 1-gallon mark.)

- Do not mix more pesticide than you intend to spray immediately. When mixed in a tank of water, unused insecticides break down after several days to a few weeks. They also will become less effective the following time you spray.
- Do not dump excess solution at or near the garden site.
- Prior to spraying, make sure both the insect and the crop you are growing are listed on the label. See the LSU AgCenter’s Pub. 1838 Louisiana Insect Pest Management Guide (LSUAgCenter.com/managementguide) for a list of labeled insecticides for fruit and vegetable crops.
- Look for the re-entry period on the label. The re-entry period is the number of hours you should wait after spraying a chemical before returning to the garden area by yourself or with students.
- Look for the days to harvest interval. The days to harvest interval is the number of days you must wait after spraying before you should harvest or consume the produce.



Tip: Keep a set of measuring spoons and measuring cups with your garden equipment. These are to be used only for gardening purposes, not cooking! Keeping a measuring cup with your garden tools also helps accurately measure in ounces when labels do not provide doses in teaspoons and tablespoons.



We hope including these four simple steps in your garden insect management plan will help you have better success controlling insects in a safe and effective manner!

Insect Scavenger Hunt

Insects are everywhere. You can find them on plants, in the sky and probably even on the outside of your school building. Have students read the insect pages in this publication. Then send them on a scavenger hunt to find these critters alive outside. If a student finds an insect we haven't identified, use the Internet or contact your LSU AgCenter county agent for help with identifying any "unknown" insects.

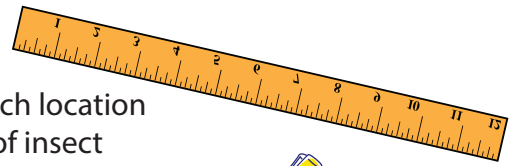
Materials Needed:

Hand trowel
Ruler or yardstick
Pencil
Internet access
Insect guidebooks
Insect pages
Digital camera (can be on a phone)
Poster paper
Markers

Insect Extension Activities for the Classroom
This publication is your first step toward engaging students in the world of insects. Don't just stop at reading these pages. Get outside and see some insects firsthand!

Directions:

Take a walk outside of the classroom. Visit each location on this sheet and take a photo of each type of insect you see. After you have visited each location, bring the pictures back into the classroom and identify the insects using the insect pages, the Internet or books.



On the sidewalk, I found: _____

Near an outdoor light, I found: _____

In our school garden, I found: _____

On a flower, I found: _____

On a tree, I found: _____

In a small pile of leaves, I found: _____

After digging 3 inches into the ground, I found: _____

After digging 6 inches into the ground, I found: _____

After digging 9 inches into the ground, I found: _____

In or near a puddle, I found: _____

I found another insect in the _____ (choose a different location at your school). It was a _____

After correctly identifying all the insects you found, pick your favorite four. Using poster paper, decorate with the pictures you took of the insects. Label each picture with the insect's common and scientific names. Write the location where you found the insect. Label each insect as having complete or incomplete metamorphosis. Finally, write one neat fact about each insect! Share your information on the poster with the rest of the class.

Building Bug Homes

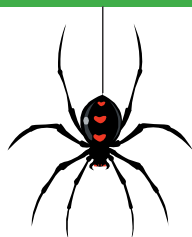
Insects live almost everywhere, but sometimes they are hard to find. Build these simple bug homes and see if that helps your class find insects more easily.

1. Fill an old pot with bamboo sticks until the container is so tight the sticks cannot lean over. Place it in a partially sunny area and describe what climbs in over the next two weeks. _____

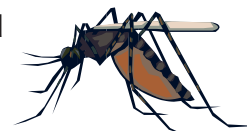
2. Cut 10 bamboo sticks into 8-inch lengths. Tie together with a ribbon so the sticks are tightly bound. Next, use additional ribbon to hang the bundle from a low tree branch. Wait a week or two and describe what decides to live on your bundle. _____

3. Place a square of plywood on a patch of soil. After two weeks, lift the board and describe what is living under there. _____

Musical Insects



The sentences below contain a number of popular songs that mention insects. Have students use the Internet or books to find the scientific name for the insect and write it after the common name of the insect in each song title.



1. The Ants _____ Go Marching One by One (Red Imported Fire Ant)
2. I'm Scooping Up a Baby Bumble Bee _____ (Black and Gold)
3. The Itsy Bitsy Spider _____ (Black and Yellow Garden Spider)
4. I Know an Old Lady Who Swallowed a Fly _____ (House fly)
5. Lucky Little Cricket _____ (Field Cricket)
6. Herman the Worm _____ (Earthworm)
7. If I Were a Butterfly _____ (Monarch Butterfly)
8. I Wish I Was a Little Musky-Toe _____ (Asian Tiger Mosquito)

Miscellaneous Activities

Identify the Insect

Draw a line from the insect name to the correct picture.

Ant
Bee
Butterfly
Beetle
Lady Beetle
Praying Mantis



True or False

Circle the True for true statements or the False for false statements below.

1. IPM stands for Identifying Pest Management. True False
2. A garden pest is an animal or plant that is not wanted in the garden. True False
3. It is best to remove weeds in the garden as they emerge. True False
4. All pests are harmful to fruit and vegetable plants. True False
5. Leave rotten produce or pruned plant material in the garden for mulch. True False
6. We can grow fruit and vegetables year-round in Louisiana. True False

Insect Cool Facts

Write the name of the correct insect in the cool fact statement below. Choose name from those listed on the right.

1. There are more than 40,000 species of the _____.
2. The _____ has only one ear.
3. _____ and _____ release an unpleasant odor if bothered.
4. _____ has 12 spots on its back.
5. _____ are a type of beetle that hunts at night.
6. _____ wings are covered in tiny shiny scales.
7. _____ bite and sting at the same time.
8. _____ can be as large as an adult's pinkie.

Butterfly
Praying Mantis
Tomato Hornworms
Squash Bugs
Fire Ants
Weevil
Spotted Cucumber Beetle
Fireflies
Stink Bugs

Aphid

Feeds on most plants.

Order

Hemiptera

Scientific Name

Various species of
Aphididae

Metamorphosis

Incomplete

Control Methods

Lacewings, lady bird beetles and parasitic wasps eat aphids. Aphids also can be controlled with soapy water applied to the foliage of plants.

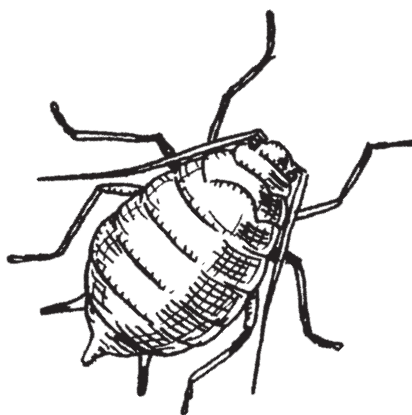


Description

Piercing / sucking mouth parts

Six legs

Up to six body segments



Cool Facts

Aphids
can have
offspring
without
mating.



Assassin Bug

Adults and larvae feed on soft-bodied insects.

Order

Hemiptera

Scientific Name

Zelus longipes

Metamorphosis

Incomplete

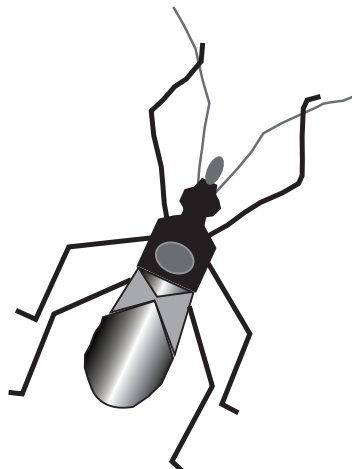
Feeding Habits

Assassin bugs inject their prey with a toxic liquid that paralyzes the other insects and liquefies their tissues. Some assassin bugs hunt. Others just lie in wait for a meal to come by.



Description

Beneficial
Predator
Six legs



Cool Facts

Assassin bugs get their name because they are so fast at catching their prey.

Braconid Wasp

Eat caterpillars, aphids, beetles and fly larvae.

Order

Hymenoptera

Scientific Name

Bracon spp.

Metamorphosis

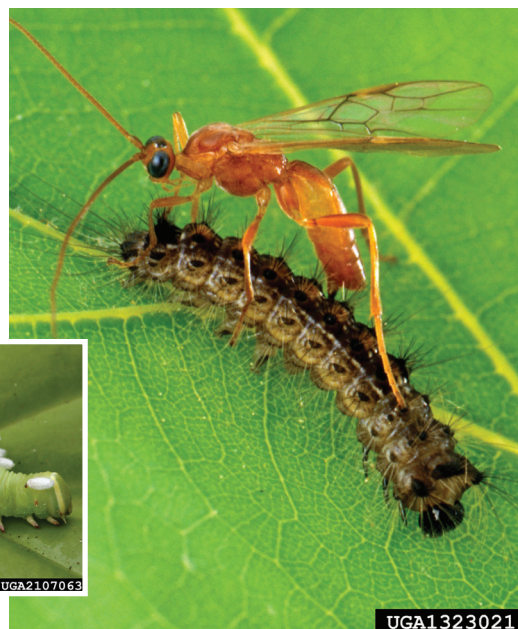
Complete

Feeding Habits

These parasitic wasps inject their egg or eggs into larval caterpillars and beetle and fly larvae. The eggs hatch while the other insects are still alive, and the newly emerged wasp larvae feeds on the host insect.



Cocoons



Description

Beneficial

Parasite

Six legs



Cool Facts

There are 1,900 North American species of Braconid wasps.

Bumble Bee

Bumble bees pollinate flowers and feed on pollen and nectar.

Order

Hymenoptera

Scientific Name

Bombus spp.

Metamorphosis

Complete

Family Life

About 6 percent of all bees live in a colony. These colonies consist of one queen bee, hundreds to thousands of female worker bees and only a few male drone bees. The other 94 percent of them live as solitary insects.



Description

Beneficial
Pollinator
Six legs



Cool Facts

The bumble bee's order, part of its official biological classification, is named after the Greek God of marriage. Only bumble bee queen larvae are fed royal jelly. All other bees feed off a mixture of royal jelly, pollen and diluted honey.

Butterfly

Butterflies pollinate flowers. Larvae eat plants and adults drink nectar.

Order

Lepidoptera

Scientific Name

Varies

Metamorphosis

Complete

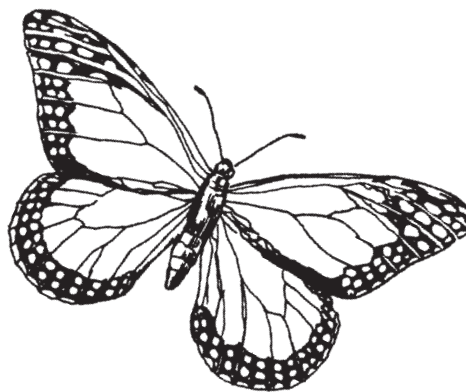
The Good, the Bad,...the Ugly

Butterflies sort of even out their contributions to our world. As larval caterpillars, they do major damage in the plant world, but as adults, they keep the plant cycle going.



Description

Beneficial
Pollinator
Six legs



Cool Facts

Butterfly wings actually are covered in tiny shiny scales.

Firefly (Lightening Bug)

Fireflies eat slugs, snails and worms, as well as soft-bodied insects.

Order

Coleoptera

Scientific Name

Pyractomena sp.

Metamorphosis

Complete

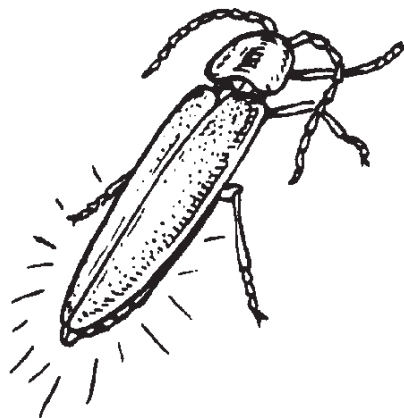
Cold Light

Fireflies light up because they are attracting mates. This light occurs when oxygen reacts with a chemical called luciferin in the firefly's abdomen. It is called a cold light because it produces little heat!



Description

Beneficial
Predator
Six legs



Cool Facts

Fireflies are a type of beetle that hunt at night.

Flea Beetle (Tumble Beetle)

Flea beetles feed on corn, potatoes, crucifers (cabbage family) and some fruit trees.

Order

Coleoptera

Scientific Name

*Chaetocnema
pulicaria*

Metamorphosis

Complete



Control Methods

Use trap cropping (plants that attract insect pests away from nearby crops), sticky traps (glue-based traps frequently used in pest control) and remove debris at the end of harvest.

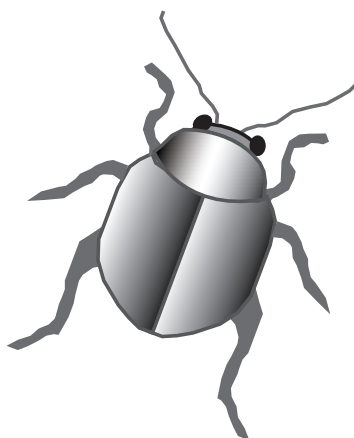


Description

Chewing mouth parts

Six legs

Three body segments



Cool Facts

Flea beetles are sometimes called tumble beetles because they often tumble off plants.

Green Lacewing

Food sources: (as larvae) aphids, caterpillars, beetles, (as adults) nectar, certain insects.

Order

Neuroptera

Scientific Name

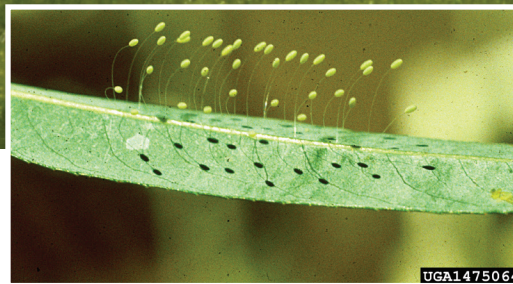
Chrysoperla spp.

Metamorphosis

Complete

They Hide

The eggs are laid on a long slender stalk off of the host plant. Predators like lady beetles can't see the eggs and therefore don't eat them. The eggs on stalks can be laid on leaves, stems and even fruit of the plant.



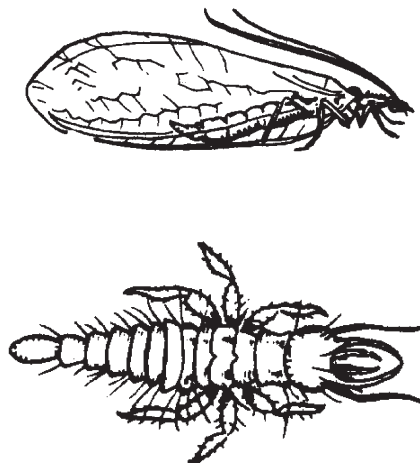
Eggs

Description

Beneficial

Predator

Six legs



Cool Facts

Lacewing larvae are called aphid lions and feed on a wide range of pest insects. Lacewing adults have mandibles and feed on aphids and other small insects. They also consume honeydew and pollen.

Hunting Wasp (Cicada Killer)

Larvae eat cicada bugs and the adults drink nectar.

Order

Hymenoptera

Scientific Name

Sphecius spp.

Metamorphosis

Complete

Slow Killer

Hunting wasps find their prey (another insect) and bring it back to their nest. When the wasps' eggs hatch, its young use that prey as a feeding source.



Description

Beneficial

Predator

Six legs



Cool Facts

Cicada killers sting and inject venom into their prey. The venom allows the young to feed on the prey while it is still alive.

Lady Beetle (Ladybug)

Adults and larvae feed on soft-bodied insects.

Order

Coleoptera

Scientific Name

Coccinella septempunctata

Metamorphosis

Complete

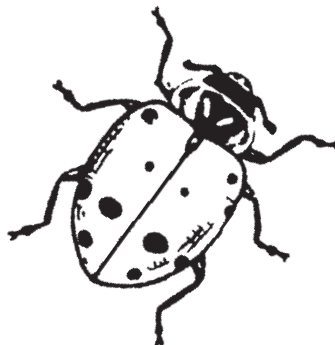
Harvest

Lady beetles survive winter as adults and usually huddle together in large numbers. This allows them to be harvested and sold to gardeners everywhere, since they are beneficial insects.



Description

Beneficial
Predator
Six legs



Cool Facts

Lady beetles secrete a noxious defensive chemical, called reflex bleeding, when a predator appears.

Praying Mantis

The mantis eats many different species of harmful insects.

Order

Mantodea

Scientific Name

Stagmomantis carolina

Metamorphosis

Incomplete

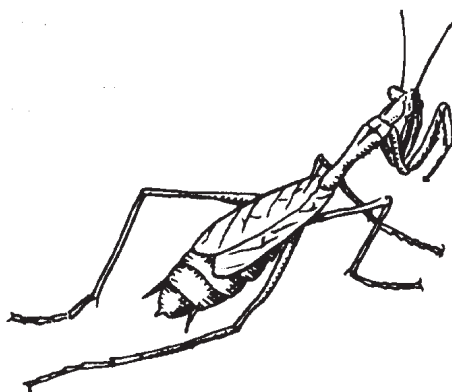
The Enforcer

Since all mantis eat insects and are active during the day, some gardeners call this bug the “garden enforcer.” That’s why early American gardeners brought this bug from Europe.



Description

Beneficial
Predator
Six legs



Cool Facts

The praying mantis has only one ear, which uses the same frequency as bats — the mantis’ greatest predator. A mantis’ front legs are modified to help them grasp prey.

Red Imported Fire Ant

Mounds prevent harvesting of crops and are unsightly.

Order

Hymenoptera

Scientific Name

Solenopsis invicta

Metamorphosis

Complete

Control Method

Treat ant mounds located outside the garden area with granular baits. The worker ants take the granular bait into the nest inside and it kills the young ants and other workers. Or, treat the perimeter of the garden with spinosad, an ingredient safe to use near edible plants.

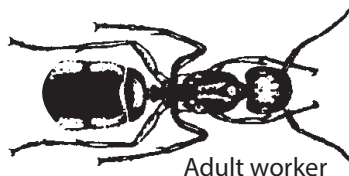


Description

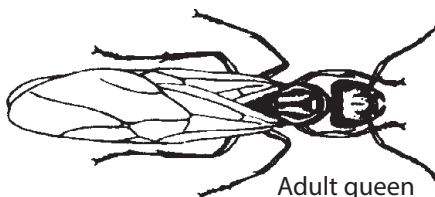
Chewing mouthparts

Six legs

Three body segments



Adult worker



Adult queen

Cool Facts

Fire ants bite and sting at the same time.

Spider Mite

Attacks a wide range of garden plants, including many vegetables, fruits and flowers.

Order

Trombidiformes

Scientific Name

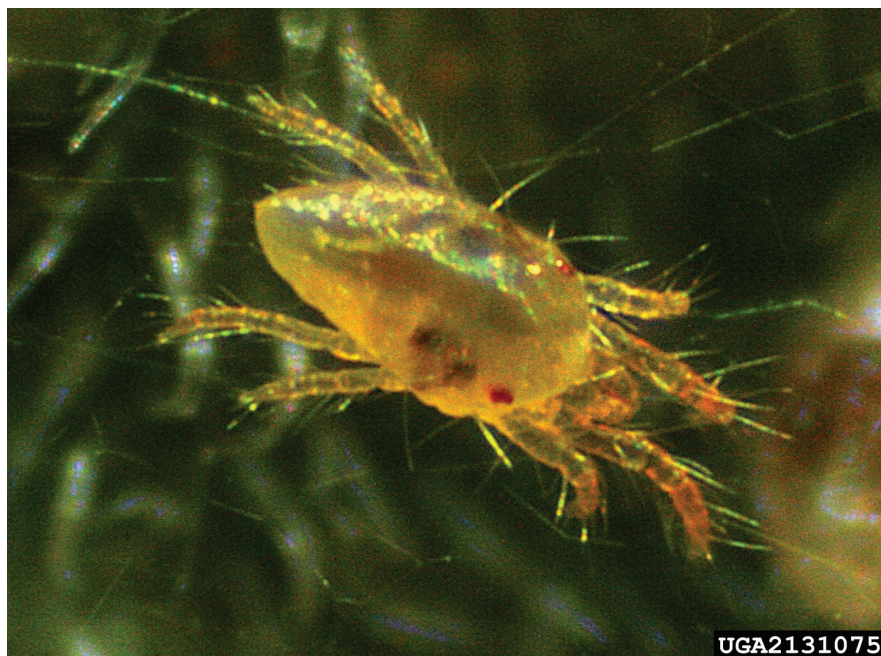
Tetranychus urticae

Metamorphosis

Incomplete

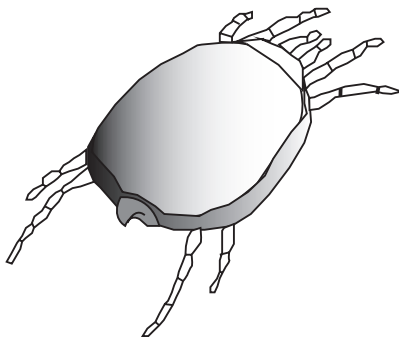
Control

Natural enemies include small lady beetles, predatory mites, minute pirate bugs, big-eyed bugs and predatory thrips.



Description

Piercing and sucking mouthparts
Eight legs



Cool Facts

Mites actually are arachnids (they have 8 legs). That means they're relatives of spiders, ticks and scorpions.

Spotted Cucumber Beetle

Larvae feed on roots of a wide range of plants, including many field crops.

Order

Coleoptera

Scientific Name

*Diabrotica
undecimnotata*

Metamorphosis

Complete

Control

Use floating row covers to keep beetles away from plants. But row covers must be removed before plants bloom so other insects can pollinate the flowers.

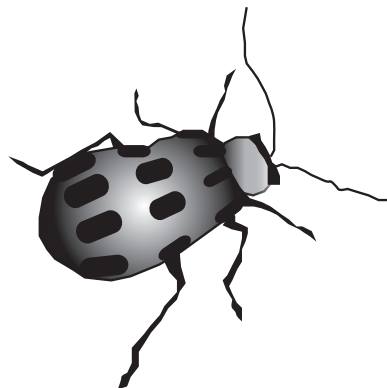


Description

Chewing mouthparts

Six legs

Three body segments



Cool Facts

The scientific name indicates this insect has 12 spots on its back.

Squash Bug

As its name implies, this bug damages squash, pumpkins and other gourds.

Order

Hemiptera

Scientific Name

Anasa tristis

Metamorphosis

Incomplete

Control

Fertilizing your crop can help vegetables outgrow damage from squash bugs. Some varieties of squash are resistant to this insect, such as butternut and royal acorn. Hand pick adults and eggs off of plants. Place small boards next to plants. At night, squash bugs gather under boards. Collect boards and destroy bugs each morning.

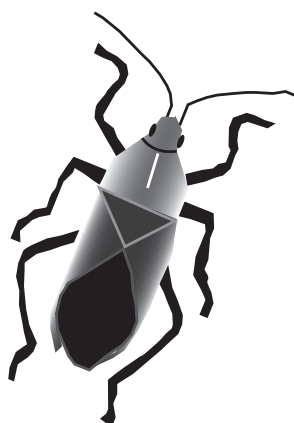


Description

Piercing/sucking mouth parts

Six legs

Three body segments



Cool Facts

These bugs can release an unpleasant odor if bothered.

Stink Bug

Destructive to many plants, from corn to cabbage.

Order

Hemiptera

Scientific Name

Euschistus servus

Metamorphosis

Incomplete

Control

You can plant marigolds, mums and herbs that have smell to try to ward off these insects. Stink bugs are attracted to sunflowers, so those can be used as trap cropping plants at the edge of the garden area.

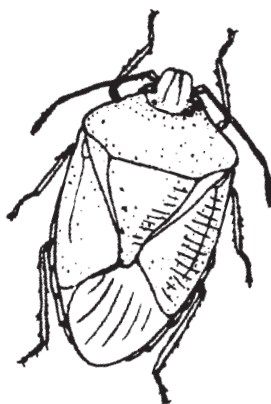


Description

Piercing/sucking mouthparts

Six legs

Three body segments



Cool Facts

Stink bugs release an unpleasant odor when bothered. It smells something like a skunk or cilantro, depending on who is smelling it.

Tomato Hornworm

Larvae feed on leaves of potatoes, tomatoes and tobacco.

Order

Lepidoptera

Scientific Name

*Manduca
quinquemaculata*

Metamorphosis

Complete

Control

Hand pick and stomp on these large insects. You also can kill them by dropping them in a bucket of soapy water.



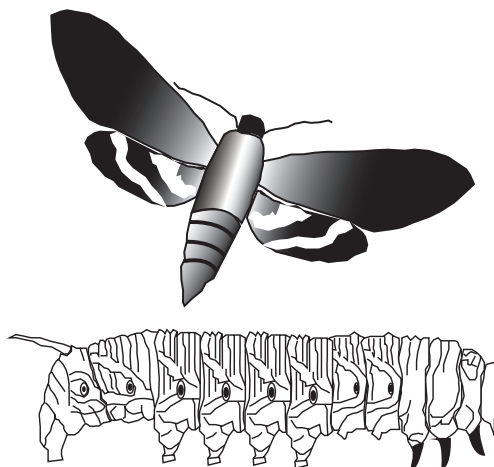
Adult

Description

Chewing mouthparts

Six legs

Three body segments



Cool Facts

Horn worms can be as large as an adult's pinkie.

Variegated Leafhopper

Highly specific in what they eat — for example, potato leafhoppers only eat potato leaves.

Order

Hemiptera

Scientific Name

*Erythroneura
variabilis*

Metamorphosis

Incomplete

Control Method

Wash young insects off with a strong spray of water. Be sure to wash both the tops and undersides of leaves.

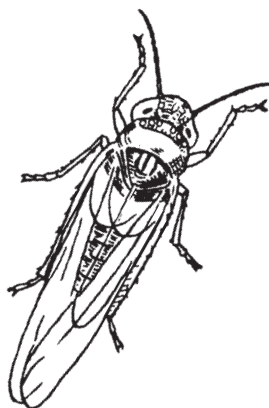


Description

Piercing/sucking mouthparts

Six legs

Three body segments



Cool Facts

Nymphs of variegated leafhoppers can be much more colorful than they are in the adult stage.

Weevil

Eats grain, cotton, fruit and some vegetables.

Order

Coleoptera

Scientific Name

Listroderes spp.

Metamorphosis

Complete

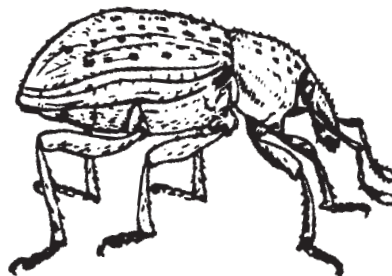
Control

Parasitic wasps can be used to control these insects. Rotate crops planted in the garden to reduce population sizes of these pests.



Description

Chewing mouthparts
Six legs



Cool Facts

There are more than 40,000 species of the weevil.

Whitefly

Feeds on many plants ranging from food crops to flowers.

Order

Hemiptera

Scientific Name

*Trialeurodes
vaporariorum*

Metamorphosis

Complete

Control

Ladybird beetles eat whiteflies. Planting dill or yarrow will attract ladybird beetles.

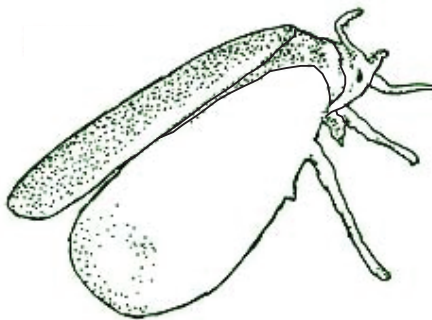


Description

Piercing/sucking mouthparts

Six legs

Three body segments



Cool Facts

Whiteflies
transmit many
plant
diseases.



Page Number and Insect Photo Credits

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Cocoons. Scott Bauer, U.S. Department of Agriculture's Agricultural Research Service, Bugwood.org.

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Weevil. Pest and Diseases Image Library, Bugwood.org.

Page 30

Whitefly. W. Billen, Pflanzenbeschaustelle, Weil am Rhein, Bugwood.org.

Extension Activities Answers

Page 9 – Musical Insects

1. *Solenopsis invicta*
2. *Bombus auricomus*
3. *Argiope aurantia*
4. *Musca domestica*
5. *Gryllus* sp.
6. *Lumbricus terrestris*
7. *Danaus plexippus*
8. *Aedes albopictus*

Page 10 – Identify the Insect

- Butterfly
- Lady Bug
- Ant
- Praying Mantis
- Beetle
- Bee

Page 10 – True or False

1. False
2. True
3. True
4. False
5. False
6. True

Page 10 – Insect Cool Facts

1. Weevil
2. Praying Mantis
3. Squash Bugs
Stink Bugs
4. Spotted Cucumber Beetle
5. Fireflies
6. Butterfly
7. Fire Ants
8. Tomato Hornworms



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