

# Pests of Vegetables



# Introduction

Managing common insects, weeds, plant diseases and certain animal pests found in the backyard can be a challenge. However, there are a number of ways to approach the problem. Information in this publication will help identify and manage pest problems.

Pest management methods will vary among individuals according to their tolerance of the pest, the damage and a basic philosophy about handling pest problems.

It may not be necessary to control pests if numbers are low and damage is not significant. At other times, simply spraying a tree with water, pruning a branch or digging up a weed will reduce or eliminate the problem. Natural predators may also control the pest problem.

*Backyard Pest Management* is designed to help focus on the key areas of pest management. The first section provides basic approaches to pest management and looks at ways to prevent problems and handle them as they arise. Further sections focus focus on the insects and the types of plants they damage.

There are many ways to deal with backyard pest problems. When using pesticides to control a problem, there is the potential for damage and the possibility of legal issues. Use pesticides with caution and always according to label directions.

## Approaches to Pest Management

Integrated Pest Management (IPM) is an environmentally responsible approach to pest management. IPM focuses on prevention, and if problems occur, the method provides a variety of control strategies.

### Prevention

Prevention is the foundation of an IPM program, and one way to do prevent problems is to choose the right plant for a specific location and provide the best growing conditions.

- Use a variety of plant material in a landscape to avoid a monoculture (growing only one type of plant), which can create potential problems with one species of insect.
- Select plant species that are less prone to pest problems. Some plants are consistently plagued by certain insect pests and diseases.
- Evaluate the planting site for exposure to light, low spots, wind speed and direction. Choosing plants suited to their growing conditions reduces plant stress, which helps prevent insect and disease problems.
- Be aware of soil conditions including pH, drainage, fertility and organic matter. If possible, improve the soil or choose a plant adapted to the conditions.
- Provide the best start for the plants, using good planting techniques. This approach includes proper planting, pruning, staking and mowing practices.
- Provide proper maintenance practices for plants including watering, fertilizing, pruning and weed control. Good maintenance practices will ensure healthy plants that are less likely to be affected by pests and diseases.

### Identifying the problem

The first step in controlling a problem, whether it is an insect, disease or weed, is to identify it correctly. When dealing with insect and disease problems, learning about preferred hosts, the type of damage that occurs and life cycle are important when choosing the best control method. For weeds, having information about their life cycle is important because weeds are usually easier to control at some stages than others.

### Monitoring

Monitoring involves checking plants in a yard regularly for the presence of pests. Frequent monitoring of pests is important so that proper treatment can be started when the outbreak first begins. Monitoring should occur throughout the entire growing season.

# Action decisions

Proper pest control action involves two steps:

- first, identifying the injury threshold
- second, determining the action threshold

The **injury threshold** is the level at which a pest population causes an unacceptable degree of damage so that treatment is necessary. Knowledge of the pest and the plant it is affecting will help when deciding the treatment. For example, most deciduous trees and shrubs can withstand substantial defoliation by insects, especially later in the growing season. However, coniferous trees cannot tolerate defoliation because the needles are not replaced. Having this knowledge about the types of plants, as well as information about the pest, helps in making a decision about treatment when a problem arises.

The **action threshold** is the time to treat the problem to avoid an unacceptable amount of damage or *injury threshold*. It is important to know the life cycle of the pest and have an understanding of the time it takes for a control measure to be effective. For example, the biological control agent *Bacillus thuringiensis Kurstaki* will take longer to control caterpillars than a contact insecticide because the agent must be ingested by the caterpillars to be effective.

## Treatment

Five general types of treatments can be used to control pests.

### Types of treatment

#### *Cultural*

Provide proper maintenance practices such as regular watering, fertilizing, pruning and sanitation. Good maintenance practices keep plants healthy, so they are less likely to be affected by pest problems.

#### *Physical*

One method of physically controlling pests is to remove and destroy the insects, the infested leaves or the part of the plant that is severely affected. Pests such as caterpillars, beetles, slugs and other large pests can be easily removed by hand when infestations are low. Also, removing forest tent caterpillar egg bands on trees in the fall or early spring will reduce the problem the following year.

Another effective way to control insects is with a strong jet of water from a garden hose. Spraying trees and shrubs thoroughly and regularly with water will dislodge and kill small caterpillars, aphids, spider mites, pear slugs and other pests.

Physical barriers may also be used to prevent insects from attacking plants, especially in the vegetable garden. Floating row covers may be used to prevent some insects from attacking plants. Tarpaper discs may also be used around the base of cole crops to discourage root maggot flies from laying eggs in the soil. Cutworms can be prevented from attacking the roots of transplants by sinking large tin cans, with both ends removed, into the soil around plants to act as cutworm barriers.

For diseases, physical control may involve removing plant parts by pruning. For example, the only way to control black knot on mayday is to prune out the affected branches or portions of the branches with the fungus. Also, if an individual plant is affected by a disease, it may need to be removed completely to prevent the spread of the disease to other plants.

Physical control for weeds involves simply hoeing or hand digging the weeds.

#### *Mechanical*

Insect vacuums, heat applicators for weed control and motion-triggered water applicators for wildlife may all be used for mechanical pest control.

#### *Biological*

Biological controls are natural enemies of pests such as predatory and parasitic insects as well as birds. These natural enemies will often come to the garden on their own if there are high populations of a pest insect. For example, an outbreak of aphids will attract the natural predator lady beetles (lady bugs). Beneficial insects can be attracted to a yard by growing plants that are sources of nectar and pollen such as aster, marigold, salvia and monarda. Shallow dishes or bird baths act as a water source for both insects and birds, encouraging them to visit the yard. Also, a bird feeder will help supplement the diets of birds like chickadees and other insect eaters.

Protect birds and beneficial insects by avoiding the use of pesticides. If pesticides are used to control the pest, the pesticide is likely to kill the beneficial insects as well. If pesticides have to be used, choose the product with the lowest toxicity and shortest residual period. Spot or target spray to minimize the area covered.

Beneficial insects are often sold to control backyard insect pests. The most common beneficial insects are ladybeetles and praying mantids. These insects usually have little benefit, as they frequently leave the yard, especially if their food supply is poor. It is preferable to let the native species of beneficial insects control the outbreak.

A bacterium called *Bacillus thuringiensis Kurstaki* is another type of biological control. It can be purchased to control leaf feeding caterpillars including forest tent caterpillars and the larvae of cabbage butterflies. It only affects the larvae of moths and butterflies and does not control any other insects.

### *Chemical*

When purchasing pesticides, choose the product with the lowest toxicity. There are synthetically produced pesticides as well as naturally derived products. When using any product on food crops, follow the label directions for safety precautions and wait periods between spraying and harvest.

Many municipalities are moving to minimum or zero-pesticide tolerance and may have a municipality-wide bio-control program. Be aware of these issues in the community, so an informed decision can be made about pest control.

## Evaluation

The last step in any pest management program is evaluation. Monitoring and record keeping are key factors in determining if the control measure was successful. This information may help in choosing a method in the future.

Many commonly used products for pest control in the home garden are being removed from the market. Many municipalities are creating by-laws to reduce or eliminate the use of pesticides. The principals and practices of integrated pest management will become more important in the future.

Integrated pest management takes time, planning and patience for it to be a successful.

## Aphids



*Aphids*

**Hosts:** pepper, cabbage, spinach, cantaloupe, muskmelon, celery, lettuce, turnip, cucumber, peas, beans, tomato and potato

### *Damage*

Aphids feed by sucking sap from leaves, causing them to turn yellow, curl, become deformed and eventually fall off. The pests may also feed on buds, flowers, stems and even roots. Plant growth may be stunted. Aphids may also transmit viral diseases like potato leaf roll virus.

Aphids excrete a shiny, sticky substance called honeydew that can be seen on the plant. Ants feed on this honeydew and will be attracted to plants with high numbers of aphids. The ants often protect aphids from predators to maintain this supply of honeydew.

### *Description*

Aphids are small (2 mm or less), pear-shaped, soft-bodied insects often found in colonies. Most species are pale green, but some are yellow, brown, black or pink. The adults may or may not have wings; the nymphs are wingless. They also have two cornicles that look like tailpipes at their back end, which is an identifying feature of the insect.

### *Life cycle*

Most species overwinter as eggs on the stems of perennial plants. The eggs hatch in the spring, and after one or two generations, winged aphids fly to summer host crops. Adults produce live young continuously during the summer without mating. Population growth is usually rapid. Male and female winged aphids appear in the fall, mate and lay the overwintering eggs.

### *Control*

- Avoid over-fertilizing plants with nitrogen because lush growth attracts aphids.
- Hose down the infested plants with a strong spray of water from a garden hose to remove the insects. The spray washes off the wingless aphids, which are seldom able to return to their host, but rarely hurts pest predators. Repeat the water spray as often as necessary.
- Effective predators of aphids are lady beetles (bugs), lacewings and flower fly (syrphid) larvae. Many tiny wasps act as parasites of aphids too.
- Recommended products for aphid control include insecticidal soap and/or pyrethrins.
- Other insecticides registered for insect control may be used provided they are safe to use on food crops.
- Aphids build resistance to insecticides very quickly so use an integrated method of control (more than one method of control).

## **Beet leafminer**



*Beet leafminer damage*

**Hosts:** beets, Swiss chard, kale and spinach

### *Damage*

Newly hatched larvae chew into the leaves and begin feeding (mining) between the upper and lower surfaces of the leaves. The mining causes irregular blotches or blisters on the plant leaves. The affected areas peel apart, similar to the way a two-ply tissue peels apart. Damaged leaves are unsuitable for eating.

### *Description*

The adults look like grey houseflies and are 7 mm long. The larvae are slender, white or yellowish and do not have legs.

### *Life cycle*

The insects overwinter as pupae in the soil. The adults appear above ground in late May, mate and then lay eggs on the undersides of leaves. After mining the leaves, mature larvae drop to the ground, tunnel into the soil and pupate. There is usually more than one generation a year.

### *Control*

- Destroy lamb's-quarters and other weeds that would attract this insect.
- Rotate crops.
- Use floating row covers with the edges firmly tucked into the soil. This practice will prevent the flies from laying eggs on the plants.
- Remove and discard damaged leaves to reduce populations.
- No insecticides are registered for control of these pests.

## Carrot rust fly



*Carrot rust fly damage*

**Hosts:** carrots, parsnips, parsley, dill and celery roots

### *Damage*

The larvae cause damage to the plants by feeding on the roots. Young larvae begin feeding on root hairs and small roots. As root crops grow larger, the larvae begin tunnelling into the bottom two-thirds of the roots. The tunnels affect the amount of root that can be used by humans because the vegetables have to be peeled more deeply before being eaten.

The leaves of affected plants may appear rust or bronze coloured. Stunted plants, deformed roots and plant death are other symptoms of rust fly damage. The holes in the roots may also allow disease organisms to enter.

### *Description*

The adult is a shiny black fly with yellowish legs that grows to about 6 mm long. The legless larvae are yellowish white.

### *Life cycle*

The insect overwinters as pupae in the soil. The adult flies emerge and mate. Females deposit their eggs on the ground around host plants. The young larvae begin feeding, and once mature, they leave the carrots and pupate in the surrounding soil.

### *Control*

- Plant carrots as early as possible in the season.
- Apply floating row covers over the seeded area, keeping the edges covered with soil or boards. Leave covers in place until harvest.
- Destroy weeds belonging to the carrot family, like Queen Anne's Lace.
- Avoid leaving carrot tops in piles; compost or destroy them after harvest.
- Remove any infested carrots and destroy them; do not compost.
- Practice crop rotation of at least one year for carrot, celery, dill and parsnips.

## Colorado potato beetle



*Colorado potato beetle damage*



*Colorado potato beetle*

**Hosts:** potato, eggplant, tomato

### *Damage*

The adults and larvae of the Colorado potato beetle eat the leaves of the plants. The larvae do more damage because they feed more heavily than the adults. The plants may be completely defoliated, which reduces tuber development in potatoes and fruit formation in eggplants and tomatoes.

### *Description*

Adults are oval beetles with 10 alternating black and yellow stripes running lengthways down their back. They have a black head and are 6 mm to 12 mm long. The larvae are soft, with a rounded back and reddish-orange with two rows of black spots on either side of their body. The eggs are orange and are laid in clusters on the undersides of leaves.

### *Life cycle*

Adult beetles overwinter deep below the soil surface. They emerge about the time that potato plants begin to grow. Female beetles lay groups of eggs on the underside of leaves. The larvae hatch and feed for about two to four weeks. They pupate in the soil, and new adults emerge about a week later. There is usually one to two generations a year. Heavy snow cover will increase the winter survival of beetles.

### *Control*

- Clean up dead potato plants.
- Hand-pick and destroy insects.
- Remove or squash eggs.
- Control wild tomato weeds in the garden because they are a favourite food of the beetle.
- Recommended products for control are pyrethrins and rotenone. Spray when the damage is first noticed and repeat the application 5 to 10 days later. Try to alternate pesticides to reduce resistance by the insect.

## Cruciferous root maggots



*Cruciferous root maggots  
cabbage damage*



*Cruciferous root maggots  
radish damage*

**Hosts:** cabbage, broccoli, cauliflower, Brussels sprouts, rutabaga, kohlrabi, Chinese greens, radish, turnip and other crucifers

### *Damage*

The larvae damage the plants by feeding on or girdling the roots. The damage is usually first noticed when the plants wilt on hot days. Over time, the leaves begin to yellow; the plants then wilt and eventually die. Infestations early in the season may destroy seedlings. Edible roots like rutabaga may be damaged later in the season as the larvae tunnel into them. This damage will affect the amount of root that can be used because the damaged areas must be cut off.

Tunnelling by the larvae may allow disease organisms to enter the roots, causing further problems.

### *Description*

The larvae are white, legless maggots that grow up to 10 mm long. The adults look like small, dark grey houseflies.

### *Life cycle*

Root maggots overwinter as brown pupae in the soil. Adults emerge in mid-May or around the time that chokecherry and pincherry trees are flowering. The females lay eggs in the soil at the base of the plants. They prefer to lay eggs where the soil surface is moist and cool. Newly hatched larvae feed on the roots of seedlings and young plants.

After about one month, mature larvae pupate and give rise to a second generation of flies in early to mid-August. There can be one to two generations a year, sometimes even a partial third. These generations overlap, so all stages can be found during the summer.

### *Control*

- Remove all cruciferous weeds from the garden, including stinkweed and shepherd's purse.
- Aluminum or tarpaper discs, 20 cm in diameter, should be placed on the soil around the base of the plants. This barrier helps prevent the adult from laying eggs in the soil.
- Use floating row covers after seeding or transplanting, keeping the edges in place with soil or boards. These covers should be left on for the entire growing season. Use them in an area where cruciferous crops were not planted the previous year.

## Cutworms



*Cutworms damage*



*Cutworms larvae*

**Hosts:** tomato, lettuce, pepper, cabbage, peas, beans and squash

### *Damage*

Small holes in the leaves are often a sign that cutworm larvae are present. As the larvae grow, they chew off the stems of seedlings and transplants at the soil surface or just below ground level. A few species climb plants and eat the leaves and fruit. Most cutworms feed at night.

### *Description*

Several species of cutworms damage plants, but the most common is the redbacked cutworm. They are greyish with a reddish stripe running down their back. Cutworms grow up to 35 mm long and curl up in a C-shape when disturbed. The adults are the miller moths, which are attracted to lights in the summer and their colour can vary from tan to reddish.

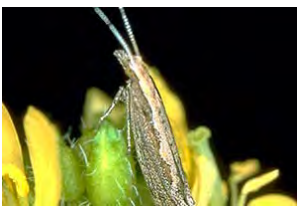
### *Life cycle*

The redbacked cutworms overwinter as eggs in the soil. The eggs hatch in early spring, and the cutworms feed until late June. Pupation occurs in the soil, and adult moths emerge in July or August. There is one generation a year.

### *Control*

- Keep weeds under control and turn over soil in the fall.
- Digging the garden or rototilling in the spring may expose cutworms to birds.
- Use physical barriers, such as milk cartons or tin cans around individual plants. Push these barriers into the soil at least 8 cm.
- Hand-pick cutworms from under the soil surface around newly damaged plants.
- If climbing cutworms are suspected, use a flashlight to check the damaged plants at night, and then remove and destroy any larvae.

## Diamondback moth



*Diamondback moth*



*Diamondback moth damage*

**Hosts:** cabbage, broccoli, cauliflower, Brussels sprouts, rutabaga, turnip, kohlrabi and Chinese greens

### *Damage*

Young larvae “mine” the leaves by feeding between the upper and lower surfaces of the leaves. This action makes whitish blotches on the leaves. Other damage appears as holes in the leaves for the larvae to escape and feeding on the undersides of the leaves. The larvae may eat entire leaves except for the veins. Later in the season, the larvae attack other parts of the plants including buds, flowers, stems and seed pods.

### *Description*

Diamondback larvae are yellowish green to bright green, narrow and tapered at both ends. They grow up to 12 mm long. They may be difficult to see because they wriggle away when disturbed and hang from the plant on fine webs.

The adults are small, brownish or greyish moths with white marks on their wings. These marks look like diamonds when the moth has its wings folded back. The insect pupates in white, lacy cocoons on the leaves, stems and pods of the plants.



### *Life cycle*

Adult moths are brought in on the wind from the southern United States in early spring. They mate and eggs are laid on the leaves. After hatching, the larvae enter the leaves and begin feeding for approximately one week. Then, they move outside the leaf and continue feeding until they mature, then pupate on the plants. Adults appear from the cocoons in a week or two, mate and lay eggs again. There are three generations a year, and all stages of the life cycle can be found on the plants at any one time.

### *Control*

- If possible, hand-pick larvae when small.
- Remove all cruciferous weeds like stinkweed or shepherd's purse from the garden.
- Effective predators of the diamondback moth include flies, lacewing larvae, wasps, plant bugs, spiders and birds.
- Recommended products for control are *Bacillus thuringiensis Kurstaki* and rotenone.

## European corn borer



*European corn borer*

**Hosts:** sweet corn, beans, beet, celery, pepper and potato

### *Damage*

The larvae of the European corn borer begin feeding on the leaves by chewing small holes. Later in the season, they tunnel into the stalks and ears, which cuts off the water supply. Leaf, tassel, stem and ear breakage are indicators of the pest being present. As the corn cobs develop, the larvae may enter the ear at the base, side or tip and feed on the kernels.

Although most commonly found on corn, the pest also feeds on the foliage and fruit of peppers and other vegetables. The European corn borer is only found in southern Alberta.

### *Description*

The larvae are light brown to pinkish with dark spots. They grow up to 2.5 cm long. The adult moth is tan with yellow markings.

### *Life cycle*

The European corn borer overwinters as fully grown larvae in the base of infested stalks and cobs as well as in plant debris. They pupate in the spring, and moths emerge in mid-June and mate. Eggs are laid in mid-July on the underside of the leaves.

After hatching, the larvae begin to feed. Pin-sized holes are an indication the insect is present. As the larvae mature, they feed on the silks, kernels and cobs. There is only one generation a year.

### *Control*

- Destroy infested ears. Remove plants after harvesting or in the fall.
- Deep cultivation before May 1 will prevent the moths from reaching the soil surface in the spring.
- Recommended products for control are *Bacillus thuringiensis Kurstaki* and pyrethrins.
- Spray the silk of corn plants in mid-July. Repeat at 10-day intervals.
- Pyrethrins and other insecticides are harmful to bees, so only use these products in the evening.

## Flea beetle



*Flea beetle*



*Flea beetle damage*

**Hosts:** cabbage, broccoli, cauliflower, Brussels sprouts, rutabaga, kohlrabi, Chinese greens, radish and turnip

### *Damage*

The adult flea beetles damage the leaves by chewing small, round holes called “shot-holes.” This damage can destroy the leaves of young plants. Small seedlings and transplants may be killed if there are large numbers of flea beetles or if the attack occurs over a long period.

### *Description*

Several species of flea beetle cause the damage. Adult beetles are 2 mm to 3 mm long, black or black with yellow stripes. They are called flea beetles because they jump actively like fleas. The small, white larvae do little damage to the plant roots.

### *Life cycle*

Adults overwinter under plant debris or in the top 2 cm to 5 cm of soil. They begin feeding early in the spring on young seedlings. Females lay eggs in the soil near the plants. Larvae feed on root hairs for three to four weeks before pupating. After the adults emerge, they feed until freeze-up. Most species have only one generation a year.

### *Control*

- Clean up garden refuse.
- Remove all cruciferous weeds from the garden, including stinkweed and shepherd’s purse.
- Keep young plants well watered, so they can outgrow the damage.
- Use floating row covers after seeding or transplanting, keeping the edges in place with soil or boards. Use the covers in an area where cruciferous crops were not planted the previous year.
- Check seedlings for flea beetle damage regularly until the plants are established.
- If flea beetle populations are high, treat seedlings immediately.
- Once plants have five leaves or more, they can tolerate more damage.
- Recommended products for control are pyrethrins and rotenone.

## Grasshoppers



*Grasshopper*

**Hosts:** lettuce, potato, beans and corn

### *Damage*

Adults and nymphs eat all parts of garden plants including leaves, stems, flowers, fruit and seeds. Large numbers of grasshoppers may completely destroy plantings of garden crops. Serious outbreaks may occur after two or three years of hot, dry weather and good snow cover.

### *Description*

The colour of grasshoppers will vary depending on the species. They can be brown to yellowish-brown, yellowish-green or black and can grow up to 40 mm long. Grasshoppers have large hind legs and wings that fold up behind them when they are resting. Most adult grasshoppers are strong flyers. Nymphs look similar except they are smaller and wingless.

### *Life cycle*

Most grasshoppers overwinter as eggs in pods in the soil. They hatch in early spring, and nymphs feed for two to four weeks before their final moult to the adult stage. Adult females begin laying eggs in late July.

### *Control*

- Cultivate garden and weedy areas in the fall to discourage egg laying.
- Row covers may be the only protection against very severe infestations. Make sure the edges are covered with soil or boards.
- Birds are natural predators, so attract them to the yard with feeders and water.
- Control young grasshoppers with registered chemical sprays before they become egg-laying adults.

## Imported cabbageworm



*Imported cabbageworm*



*Imported cabbageworm damage*

**Hosts:** cabbage, broccoli, cauliflower, Brussels sprouts, rutabaga, turnip, kohlrabi and Chinese greens

### *Damage*

The larvae of the imported cabbageworm chew ragged holes in plant leaves. Later in the season, the larvae may tunnel into heads and contaminate edible portions of the plants with their droppings.

### *Description*

The larvae are 20 mm long and pale green with a light gold line down their backs. The adult butterflies are white with black spots on the wings.

### *Life cycle*

The cabbageworm overwinters as pupae in crop debris or on fences and buildings. The butterflies appear in mid-May, mate and lay eggs on the undersides of leaves. Larvae hatch within a week and begin feeding. Once mature, they find a location to pupate. There are two to three generations a year.

### *Control*

- Hand-pick larvae when small.
- Remove all cruciferous weeds from the garden, including stinkweed and shepherd's purse.
- Use floating row covers after seeding or transplanting, keeping the edges in place with soil or boards. These covers should be left on for the entire growing season. Use them in an area where cruciferous crops were not planted the previous year.
- Recommended products are *Bacillus thuringiensis Kurstaki* and pyrethrins. Apply as soon as damage is noticed.

## Leafhoppers



*Leafhopper*

**Hosts:** carrot, lettuce, celery and potato

### *Damage*

The adults and nymphs feed on the leaves by sucking the sap. Damage is usually minimal unless there are large numbers of insects. Nymphs are more numerous and destructive than the adults. The sticky honeydew excreted by the insect can be seen on the leaves.

Some leafhoppers carry and spread a disease called aster yellows. On potatoes, leafhopper damage causes hopperburn, which appears as small, triangular brown brittle areas that appear on the leaf tips and gradually spread around the entire leaf edge.

### *Description*

The adults are small, lime green to yellow green insects that grow up to 4 mm long. Their wings are held at an angle and cover their body. They can jump or fly. The nymphs look like the adults, but are smaller and wingless.

### *Life cycle*

Leafhoppers overwinter as eggs or are blown in by winds from the west or south. Eggs are inserted into leaf tissue. There may be two or more generations a year.

### *Control*

- Control weeds in the garden.
- Remove all plants showing symptoms of aster yellows.
- Use certified seed potatoes.
- Use floating row covers early in the spring to protect the plants from this insect.
- Lacewings, lady beetles, minute pirate bugs and spiders are natural enemies of leafhoppers.
- Recommended products for control are insecticidal soap or pyrethrins.

## Onion maggot



*Onion maggot*

**Hosts:** onion, chive, green onion, garlic and leek

### ***Damage***

Damage is caused by the larvae feeding on the roots of seedlings and transplants. Wilting foliage is the first sign of insect attack, followed by the death of the plants. The larvae may tunnel into bulbs later in the season. The plants may be able to withstand the damage at this stage, but disease organisms may enter the damaged bulbs and cause them to rot. The onions may continue to rot in storage.

Onions grown in new vegetable gardens planted on previously grassy areas are most likely affected by this insect.

### ***Description***

The larvae are legless white maggots about 8 mm long. Adults are greyish, 6 mm long and resemble houseflies.

### ***Life cycle***

Root maggots overwinter as pupae in the soil. Adults first emerge in mid-May, mate and begin to lay eggs. The females lay white eggs on the soil at the base of plant stems or on the leaves. The larvae begin to feed and after about one month, the mature larvae pupate. A second generation of flies appear in early to mid-August. There can be up to three generations a year depending on soil and weather conditions.

### ***Control***

- Rotate crops.
- Destroy infested plants and remove dead plants in the fall.
- Root maggots prefer to lay their eggs in moist, organically rich soil, so avoid over-fertilizing with manure.
- Use floating row covers after seeding or transplanting, keeping the edges in place with soil or boards. These covers should be left on for the entire growing season.

## **Plant bug/Lygus bug/tarnished plant bug**



*Plant bug/Lygus bug/tarnished plant bug*

**Hosts:** various garden plants

### ***Damage***

Adults and nymphs suck the sap from the leaves of a variety of garden plants causing yellowing, brown spots and distorted growth. They also feed on the pods, stems and blossoms. This feeding causes blossoms and young pods to drop from the plants.

Feeding on older pods damages them and makes the seed pitted and undesirable for food. Damage may also cause “blind plants,” which means that cabbages do not produce heads and curds do not form on cauliflower plants.

### ***Description***

There are many plant bug species, but the tarnished plant bug is the most common. The adults are 5 to 6 mm long, 2.5 mm wide and flattened. They are pale green to reddish brown with a distinct triangle shape on their back. This is characteristic of all plant bugs. Young nymphs are difficult to see because they move quickly or fly away. They are a dull bluish green.

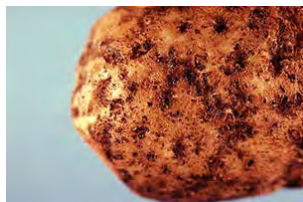
### ***Life cycle***

The insects overwinter as adults under debris or plants. In the spring, the plant bugs feed on early growing plants, mate and lay eggs. The eggs hatch into nymphs usually when the plants are flowering. The nymphs develop into adults in 2 to 4 weeks, depending on the weather. Warmer weather will promote faster development.

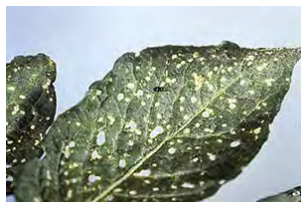
### ***Control***

- Destroy weeds in and around the garden.
- Keep grass mown into the fall to reduce overwintering sites.
- Practice fall cultivation and clean up garden refuse.
- Recommended control products are insecticidal soap and pyrethrins.

## **Potato flea beetle, tuber flea beetle**



*Potato flea beetle, tuber flea beetle*



*Potato flea beetle, tuber flea beetle damage*

**Hosts:** potato, tomato, eggplant and other garden plants

### ***Damage***

The adult flea beetles damage the leaves by chewing small, round holes called “shot-holes.” The larvae cause more significant damage by feeding on the potato tubers. They tunnel into the tubers on the surface and into the flesh to a depth of 6 mm. These tunnels look brown when the potato is peeled. The amount of edible potato is reduced because they have to be peeled deeply. On the outside, the tubers have a rough appearance, resembling potato scab.

### ***Description***

The adult tuber flea beetle is about 2 mm long with a black, oval body. The beetles can hop long distances because of their strong back legs. The larvae are whitish and approximately 5 mm long.

### ***Life cycle***

Adult flea beetles overwinter in the soil. They emerge in the spring and feed on weeds and other plants until garden crops are available. Females deposit their eggs at the base of potato plants. The larvae feed on the tubers for up to four weeks before pupating. The adults appear again, feed and then prepare for overwintering.

There may be two generations in southern Alberta, but only one in other locations. Hot, dry summers favour a population increase, and severely cold winters contribute to heavy mortality.

### ***Control***

- Remove garden residues, especially dead potato plants.
- Destroy weeds like wild tomato that would attract flea beetles to the garden.
- Destroy severely infested plants to reduce flea beetle populations.
- Plant more tolerant potato varieties such as Pontiac, Warba and Kennebec.
- Recommended products for control are pyrethrins and rotenone.
- Treat potato tops when beetles or their damage is first observed on the leaves. Repeat at 7 to 10-day intervals or as necessary to control the adult beetles before they lay eggs. For the best control, treat both the upper and lower leaf surfaces.

## Red turnip beetle



*Red turnip beetle*



*Red turnip beetle - larva*

**Hosts:** radish, cabbage and other cruciferous crops

### *Damage*

Adults and larvae feed on the seedlings, leaves, stems, flowers and seed pods of plants in the cruciferous family. Adults cause the most damage by chewing large holes in leaves.

### *Description*

The adult beetles are bright red with three black stripes on their back and black patches on their head. They grow up to 10 mm long. The larvae have segmented bodies and are black with a rounded back. They have 6 legs and grow up to 12 mm long.

### *Life cycle*

The insects overwinter as eggs in the soil. They hatch in late April or early May, and the larvae feed on cruciferous weeds until the garden crops begin to grow. After feeding, they pupate in the soil.

The adults appear in early June and feed for approximately three weeks before resting in the soil for about one month. They reappear at the end of July or early August and move to other food sources. The females deposit eggs near the base of plants, under lumps of soil or leaf litter.

### *Control*

- Remove all cruciferous weeds like stinkweed and shepherd's purse.
- If possible, hand-pick adults.
- If the insect has been a problem in previous years, cultivate in the late fall or early spring to destroy the overwintering eggs.
- A recommended product for control is pyrethrins.

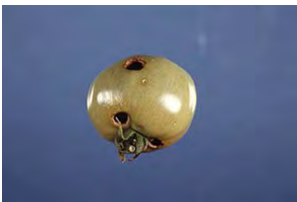
## Slugs



*Slug damage - peas*



*Slug damage - potato*



*Slug damage - tomato*

**Hosts:** most garden crops

### *Damage*

Slugs feed on all plant parts including leaves, flowers, seeds pods and fruit. The pests will even go underground and feed on potato tubers and carrot roots. They scrape the surface of the leaves, making irregularly shaped holes. Slugs feed mostly at night from two hours after sunset to two hours before sunrise. Slugs usually feed in a relatively small area, returning to the same spot to hide during the day, unless the spot dries out.

### *Description*

Slugs are soft-bodied and depending on the species, are grey to greyish-brown to almost black. They are covered in a clear slime that protects their bodies from drying out. Slugs leave shiny slime trails as they move from one area to another. They grow up to 30 mm in length. Damp, shady locations provide the ideal condition for slugs.

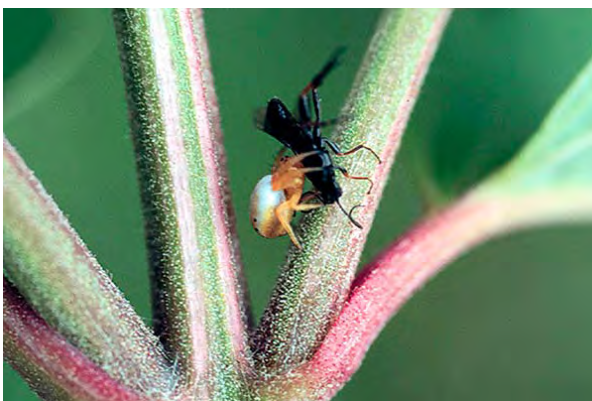
## Life Cycle

Slugs overwinter as clear round eggs under boards, debris or in the soil. A jelly-like substance protects the eggs from drying out. The eggs are very tolerant of severe winter temperatures and will lie dormant until there is sufficient moisture for hatching. Eggs hatch in late spring, and young slugs are usually observed in midsummer. Occasionally, they will overwinter as adults.

### *Control*

- Attract natural predators like ground beetles, garter snakes and frogs by planting permanent walkways of clover, sod or mulch between the rows to provide refuge.
- Dispose of all residues where slugs can hide and lay eggs.
- Maintain a border of bare soil around the garden.
- Do not overwater the garden.
- Hand-pick slugs in the evening or early morning.
- Look for slugs on the plants or under vegetation near damaged plants.
- Place a floating row cover or fine screen to protect small plants and new shoots. Make sure no slugs are trapped under the cover.
- A barrier of crushed eggshells or diatomaceous earth around plants damages the body of slugs, leading to dehydration and death. Replace the diatomaceous earth regularly.
- Keep generous spacing between plants in the garden to allow good air circulation and reduce hiding spots for the slugs.
- Avoid mulching the soil with grass clippings or any damp material that the slugs could use as a hiding spot.
- Lay boards, grapefruit or melon rinds, cabbage leaves or cut raw potatoes on the soil. These objects will give the slugs a hiding place, so the pests can then be gathered every few days and killed.
- Shallow containers of beer or any yeasty-smelling fermented product can be dug into the soil, so the container edge is even with the soil surface. These products will attract slugs, which will fall into the containers and drown.
- Copper stripping or flashing can be used as a barrier that slugs will not cross.
- Spade the garden in the fall either to bury the eggs or to bring them to the surface over the winter.
- Apply slug baits or pellets according to label directions. Do not allow the product to come into contact with plants. Protect baits from pets and wildlife.
- Putting the bait under boards will keep the bait dry, and the slugs will be drawn to the area naturally. Replenish the bait once it has dissolved. Start control early in the season, although warm nights are best for baiting.

## Spider mites



*Spider mites*

**Hosts:** peas, beans, cucumbers, zucchini, squash, muskmelon, cantaloupe, beans and tomato



### ***Damage***

The first sign of spider mite damage is a white speckling on the upper leaf surface. Spider mites feed by sucking the contents of the cell out. As feeding progresses, leaves appear bleached or brown or yellow, depending on the plant's reaction to the feeding.

Webbing in combination with the leaf colour change is a definite indicator of high spider mite populations. Plants and fruits are stunted.

### ***Description***

Spider mites are small, less than 1 mm long. They are oval, yellowish or green except for two dark spots. Adults have eight legs, while the nymphs have six.

### ***Life cycle***

Females overwinter under leaf litter, tree bark or in other protected areas. They emerge in late spring and begin laying eggs. The optimum temperature for mite development is 30°C; at this temperature, a new generation of mites will be produced every 8 days. At 12°C, it can take 6 weeks for new generations to be produced. Generally, hot, dry weather increases populations.

### ***Control***

- Natural control is provided by heavy precipitation, accompanied by high winds and high humidity.
- Predatory mites can also offer some form of control. Predatory mite populations do not build as fast as spider mite populations.
- Monitor plants regularly for the presence of mites.
- Spray down garden plants with a forceful spray of water from the garden hose once a week or more often if conditions are favourable for mite population explosions.
- Preferred products for chemical control: insecticidal soap and pyrethrin.
- If infestations persist at damaging levels, apply a foliar spray of insecticide. Insecticides must be applied in such a way that the spray penetrates the webbing. A follow-up spray can be necessary two weeks after the first spray.

## **Spinach carrion beetle**



*Spinach carrion beetle*

**Hosts:** spinach, beet, Swiss chard, pumpkin, squash and other garden plants

### ***Damage***

The adult beetles and larvae make large holes in the leaves and along the edges. They feed early in the season so can damage seedlings and small plants. The insects can devastate large numbers of plants if the pests are numerous.

### ***Description***

The adults are flattish, oval black beetles that grow up to 12 mm in length. The larvae are black, segmented and tapered from the head to the abdomen.

### ***Life cycle***

The insects overwinter as adults in the soil. The beetles appear in May and mate; then females lay eggs in the soil. About a week later, the larvae hatch and begin feeding, mostly at night. When disturbed, the larvae drop to the ground and hide under clumps of soil. When mature, the larvae move into the soil to pupate, and adults emerge two to four weeks later.

### *Control*

- Destroy lamb's quarters, redroot pigweed and other weeds attacked by this insect.
- Use floating row covers early in the season.
- A recommended product for control is rotenone.

## Thrips



*Thrips*

**Hosts:** onion, cabbage, pea, bean and other crops

### *Damage*

Thrips feed on the upper surface of the leaves by scraping them and leaving whitish to silvery marks. Damaged areas turn brown over time. Small black droppings are left on the leaves, which are often quite noticeable.

### *Description*

Thrips are very small and pale yellow, brownish or black depending on the species. They are difficult to see because they are only 1 mm to 2 mm long.

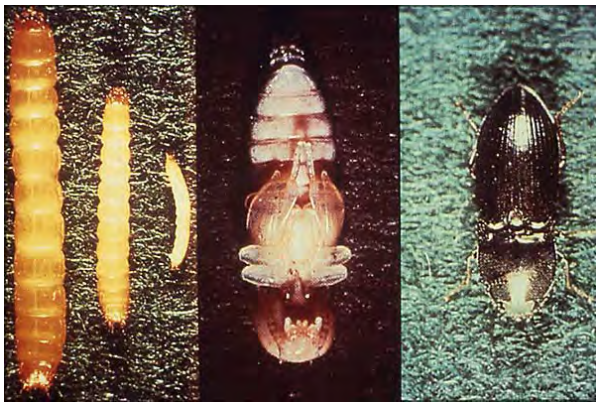
### *Life cycle*

Adult thrips overwinter in crop refuse, weeds or grass. Eggs are laid in leaves in the spring and hatch about a week later. Nymphs feed for a few weeks and then drop to the ground to pupate. There are three or more generations a year. Hot, dry weather usually causes an increase in the numbers of these insects.

### *Control*

- Keep the garden well weeded.
- Remove dead plants at the end of the season.
- Use floating row covers after seeding or transplanting, keeping the edges in place with soil or boards. The covers should be left on for the entire growing season.
- Recommended products for control are insecticidal soap and pyrethrins.

## Wire worm



*Wire worm larvae and adult beetle*

**Hosts:** potato, corn, lettuce, sunflower and seed onions

### *Damage*

The larvae feed on germinating seeds and seedlings. They chew on the stems, which causes the leaves to die. Eventually, the whole plant wilts and dies. Later in the season, the pests tunnel into potato tubers, making holes that allow disease organisms to enter.

### *Description*

Adults are narrow black beetles, also known as click beetles. They grow up to 13 mm long. Young larvae are white, but change to yellowish-brown and then dark brown as they mature. The larvae are long and segmented with three pairs of legs. Fully grown larvae can reach a length of 20 mm.

### *Life cycle*

Adults emerge in April and early May from their overwintering sites in the soil. Females lay eggs in loose soil from late May through June. Young wireworms hatch three to seven weeks later and begin feeding. The larval stage can last 4 to 11 years. They pupate in the soil in July, but the adults do not appear until the spring.

### *Control*

- New vegetable gardens planted on previously grassy areas are most likely affected by this insect. Do not plant in these areas for one year, and cultivate the soil regularly to allow birds to control the wire worms.
- Hand-pick the worms when seen.

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**Authors:** Pam North and Shelley Barkley

**Editor:** Chris Kaulbars

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R. Howard

S. Barkley

B. Casement

J. Jones

M. Dolinski

T. Pheh

V. Sowiak

H. Philip

J. Emond

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A. Tellier

G. Rankin

D. Johnson

University of Alberta

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