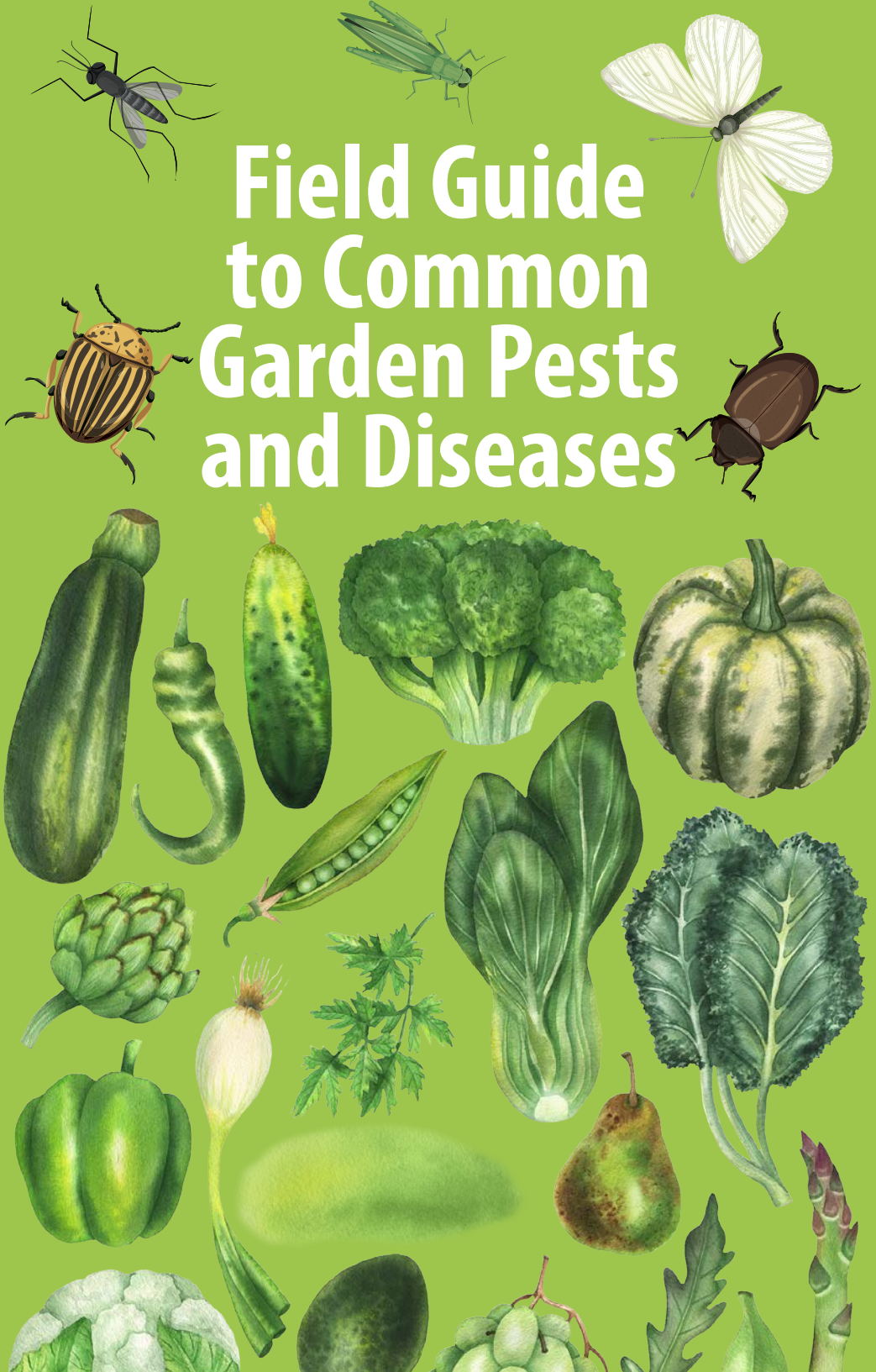


Field Guide to Common Garden Pests and Diseases



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Garden vegetables and associated common insects

Cucurbitaceous vegetables • Squash, pumpkin, zucchini, cucumber, watermelon, muskmelon, chayote, cassabanana, gourd

Harmful Insects • Squash bug, Cucumber beetle
• Downy mildew, Powdery mildew

Solanaceous vegetables • Potato, tomato, eggplant, ground cherry, pepper

Harmful Insects • Colorado Potato Beetle, Aphids, Tarnished Plant Bug
• Tomato Hornworm, Late blight of potato and tomato
• Early blight of potato and tomato
• Cat-facing and Zippering in tomato fruits
• Fruit Cracking, Blossom-end rot

Cruciferous vegetables • Cabbage, cauliflower, broccoli, Brussels sprouts, Chinese cabbage, canola, collards, kale, kohlrabi
• Turnip, rutabaga, rape plant, radish

Harmful Insects • Crucifer flea beetle, Swede midge, Imported cabbage worm, Diamondback moth, Slugs, Bacterial soft rot

Liliaceous vegetables • Onion, shallot, leek, garlic, chive and asparagus

Harmful Insects • Leek moth, Downy mildew, Asparagus beetle

Beneficial Insects • Ladybird beetles
• Green lacewing
• Predatory stink bugs
• Spiders
• Dragonfly/damselfly

Squash Bug

Identification

- Bullet-shaped eggs are laid in small clusters, usually on the underside of the leaf, turning reddish-brown as they mature.
- have pear-shaped, pearly gray bodies with darker legs and antennae.
- Adults have flattened, tear-shaped bodies, brownish-gray with yellow-to-orange markings.

Host Plants

- Squash, pumpkin, zucchini, gourds, cucumber, and melons.

Damage

- Both adults and nymphs damage foliage by sucking nutrients from leaves and disrupting the flow of water and nutrients, causing wilting. Adults feed on fruits late in the season.
- Under heavy feeding pressure, small plants can be killed; larger plants can have many affected leaves and vines.

Management Options

- Hand-picking of eggs, nymphs, and adults can be very effective. Nymphs and adult-infested leaves can be submerged in a bucket with soapy water.
- Clear debris and mulches around the base of plants where squash bugs often seek shelter.
- Place wood planks, shingles, boards, or newspapers between the rows/plants. Flip them over in the early morning and kill them or brush them off into a bucket of soapy water.
- Using a trellis for vining types of squash and melons can make them less vulnerable to squash bug infestation.
- Consider introducing natural predators such as tachinid flies and parasitic wasps, which can help reduce squash bug populations.



Nymphs



Eggs and young nymphs



Adult

Cucumber Beetle

Identification

- There are two species of cucumber beetle in Ontario.
- The adult striped cucumber beetle is 5-6 mm long and marked by three black stripes.
- The spotted cucumber beetle is 6-7 mm long and yellow-green with 12 black spots on its back.

Host Plants

- Cucumber, cantaloupe, winter squash, pumpkin, gourd, summer squash, and watermelon, etc.

Damage

- They cause four types of damage: seedling destruction, flower and foliage damage, feeding on roots, and transmission of bacterial wilt disease.
- The beetles feed on newly emerged cotyledons, stems, leaves, and flowers. They go below ground level to feed on plants as they emerge.

Management Options

- In fields of pumpkin or squash, use Seneca zucchini as a trap crop planted several weeks earlier than the main crop around the field margins.
- Floating row covers can be an extremely effective barrier against the beetles, provided they are removed before flowering to allow for pollination.
- Use "Surround WP"; a naturally occurring kaolin clay material that deters insects by forming a white clay barrier coating on crops.
- Use sticky traps: Plywood board painted yellow and coated with Tanglefoot and cotton wicks stuck to the boards. Soak the wicks in a Eugenol-based oil, clove oil, or allspice.
- Rotate crops annually to disrupt the life cycle of the cucumber beetle.



Striped-cucumber beetle adult



Spotted-cucumber beetle adult



Damaged flower

Downy Mildew

Identification

- Initial symptoms appear as small greenish-yellow spots on the upper surface of older leaves 4-12 days after initial infection.
- Lesions are often confined by leaf veins, giving an angular appearance. The center turns tan-to-dark-brown, with a greyish-purple downy growth on the lower leaf surface.



Infected leaf of cucumber

Host Plants

- Gourd, cantaloupe, cucumber, pumpkin, squash, and watermelon; cucumber is the most susceptible.

Damage

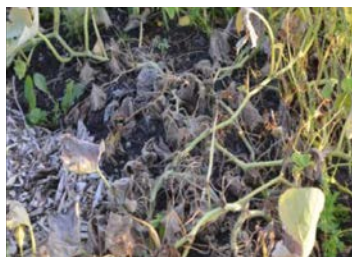
- Downy mildew infects leaves, reducing photosynthesis, leading to undersized and misshapen fruits.
- In favorable conditions, it can defoliate plants and destroy an entire crop within a week.



Infected leaf of watermelon

Management Options

- Ensure transplants are free from disease.
- Follow recommended plant spacing, prune or stake plants, and remove weeds to improve air circulation.
- Water in the early morning hours (avoid overhead watering) to allow plants to dry during the day.
- Keep the ground under infected plants clean. Remove and destroy plants with serious infection.
- Apply copper spray/dust to diseased and surrounding plants every 7-10 days until harvest. Apply fungicides recommended for organic growers.
- Implement a crop rotation strategy to prevent soil-borne diseases.



Dead plants

Powdery Mildew

Identification

- Initial symptoms develop on the undersides of older shaded leaves, with white powdery masses that spread down the petiole to the upper leaf surface.
- Late July through August is usually the critical period for powdery mildew.

Host Plants

- Gourd, cantaloupe, cucumber, pumpkin, squash, zucchini, and watermelon.

Damage

- Powdery mildew infects leaves, reducing photosynthesis and can cause sunscald in fruits.
- Fruits may remain undersized if plants are infected during early fruit development.

Management Options

- Plant powdery mildew-resistant varieties for all types of cucurbits.
- Avoid dry, shady places and areas with poor air circulation.
- Inspect plants regularly during warm, dry conditions, removing any infected leaves. Destroy infected plants. Do not compost!
- Treat existing powdery mildew with Neem oil and protect plants against further infection.
- Ensure adequate soil moisture and nutrient levels to help plants resist powdery mildew.



Infected leaves



Spores on underside of infected leaf



Infected zucchini stem

Colorado Potato Beetle

Identification

- Bright yellow/orange eggs are laid in clusters of 20-60 on the underside of leaves.
- Adults are dome-shaped, about 8-12 mm long, yellow with 10 black stripes on wings.
- Larvae are 12 mm long when mature, orange/red with a black head and legs; two rows of black spots run along their bodies.

Host Plants

- Potato, tomato, eggplant, and ground cherry.

Damage

- Adults and larvae chew irregular holes in leaves and occasionally stems. They may also feed on unripe green fruit.
- They can defoliate plants, often killing them prematurely and reducing yield.

Management Options

- Early planting of fast-maturing potato varieties for harvest before beetle damage.
- Delay planting of potatoes to avoid damage from overwintering adults.
- Dig a ditch with steep sides lined with sheet plastic around the field perimeter to trap beetles.
- Hand-pick adults and egg masses.
- Straw mulching can delay beetle development and enhance biological control.
- Green lacewings and ground beetles are effective predators.
- Utilize insect-resistant potato varieties, if available, to minimize beetle damage.



Eggs



Larvae feeding on potato



Adult

Aphids

Identification

- Aphids are soft-bodied, pear-shaped insects, usually wingless, about 2.0 to 3.5 mm long.
- Nymphs and adults are pale green to yellow, with long tubes called cornicles at the end of the abdomen. Adults may appear pinkish and may be winged.

Host Plants

- Potato, tomato, cole crops, spinach, eggplant, sunflower, pepper, pea, bean, apple, turnip, corn, sweet potato, asparagus, etc.

Damage

- Aphids have piercing-sucking mouthparts and suck juices from plants, attacking young tissue first, especially at the growing tip.

Infestation may stunt growth, cause blossom drop, fruit deformities, and support growth of a black sooty mould on the surface of leaves or fruit.

Management Options

- Destroy weeds like ragweed, lamb's quarters, jimsonweed, pigweed, shepherd's purse, and wild lettuce.
- Avoid excessive nitrogen fertilizer.
- Biological control agents are available: Ladybird beetles, lacewing larvae, and parasitic wasps.
- Insecticidal soap concentrate (20-25 ml per liter of water) can be effective.
- Regular monitoring and early intervention are crucial to control aphid populations effectively.



Nymph



Adult (two tubes at the back)



Winged adult

Tarnished Plant Bug

Identification

- Nymphs are 2-3mm long, pale green, and move very fast, resembling aphids but without cornicles (tubes).
- Adults are 5 to 5.5 mm long, oval, with flattened bodies, shiny yellow to brown/black with red-brown markings on the wings. A distinguishing feature is a small yellow triangle in the center of the back behind the head, turning whitish-brown in older adults.

Host Plants

- Potato, tomato, eggplant, strawberries, celery, lettuce, broccoli, cauliflower, Chinese cabbage, edible amaranths, snap beans, pepper, and spinach.

Damage

- Adults and nymphs feed on stems, flowers, and fruit, sometimes causing flower drop.
- Feeding can cause punctures or deep dimples; fruit may develop deformities and may crack at the wound.

Management Options

- Destroy broadleaf weeds in and around fields to reduce overwintering populations and prevent build-up in summer. Weed hosts include wild carrots and other umbelliferous crops, redroot pigweed (and other amaranths), lamb's quarters, mustards, shepard's purse, rocket, goldenrod, and mullein.
- Encourage natural predators like ladybird beetles, spiders, and parasitic wasps.
- Floating row covers just after pollination can effectively barrier adults.
- Regular scouting and monitoring are essential to detect early infestations.



Nymph



Young adult



Older adult

Tomato Hornworm

Identification

- Larvae (caterpillars) are pale green with eight white and black V-shaped marks on each side. A black projection or “horn” on the last abdominal segment gives it the name “hornworm.” They reach 8-10 cm when fully mature.
- Fully-grown larvae pupate in soil all winter and emerge as a moth the following spring.

Host Plants

- Tomato, potato, eggplant, and pepper.

Damage

- The larva feeds initially on upper leaf portions, leaving dark green or black droppings. They blend in with the plant canopy and can go unnoticed until most damage is done.
- Late instar larvae destroy several leaves and fruits.

Management Options

- Destroy Solanaceous weeds like horse nettle, jimsonweed, and nightshade that serve as alternate hosts.
- Handpick hornworms from infested plants and squash or drown in soapy water.
- Destroy burrowing larvae attempting to pupate by tilling soil after fruit picking.
- Encourage wasps which kill and feed upon larvae.
- Apply *Bacillus thuringiensis* (Bt) against smaller larvae if infestation is high.
- Crop rotation and maintaining garden hygiene can help prevent hornworm infestations



Larva feeding on fruit



Pupa



Damaged fruits

Late Blight

Identification

- Identified by black to brown spots on leaves and stems that may be small initially and appear water-soaked.
- Potato tubers become infected when the fungus is washed from the foliage into the soil, turning the infected tissue copper brown, reddish, or purplish.
- Tomato plants also succumb to late blight, with symptoms similar to those on potatoes. Infections produce dark brown, firm spots on tomato fruit, potentially destroying it entirely.

Host Plants

- Potato and tomato.

Damage

- Late blight infection occurs under wet and cool conditions, typically in late August and September, affecting all plant parts, including tubers and fruits.
- An extremely destructive disease that can decimate a crop in 1-2 weeks.

Management Options

- Destroy infected tubers at harvest's end; freeze, burn, or bury them at least 1.5 m deep.
- Use only disease-free certified seeds.
- Sow early and choose mid-season varieties to harvest before severe infection in August.
- Copper is an effective fungicide; apply before disease onset and spray thoroughly on a sunny day after leaves have dried.
- Ensure proper field sanitation and avoid overhead irrigation to reduce the risk of late blight.



Infected potato leaf



Infected tomato plant



Infected tomato fruit

Early Blight

Identification

- First signs are dark brown to black spots, usually on older foliage, 8-13 mm in diameter, circular to angular with dark concentric rings. Large dead areas on the leaf may appear as these spots enlarge and merge.
- Similar spots may also appear on stems and blossoms. Infected fruits have a blackened area at the stem end.



Infected tomato leaf

Host Plants

- Tomato, potato, eggplant, pepper.

Damage

- Severe early blight infection affects stems and blossoms, causing blossom drop and diseased fruits in tomatoes.
- Potato tubers can also be infected.



Infected potato leaf

Management Options

- Use disease-free certified seed and eradicate weed hosts.
- Practice recommended plant spacing to promote good air circulation.
- Stake tomato plants for proper aeration. Remove and burn infected plant debris.
- Follow a 3- to 4-year crop rotation with non-host crops (e.g., small grains, corn, or soybean).
- Avoid irrigation in cool, cloudy weather and schedule irrigation to allow plants to dry before nightfall.
- Avoid planting highly susceptible cultivars.
- Allow tubers to mature before digging, dig when the soil is not wet, and avoid excessive wounding during harvesting and handling.
- Regular foliar applications of fungicides can be effective in controlling early blight.



Infected tomato plant

Cat-facing and Zippering

Identification

- Cat-facing affects large-fruited tomato varieties, characterized by scars and openings on the blossom-end of the fruit. It is caused by low temperatures (below 15°C) during flower development.
- Zippering is caused by temperature extremes or high humidity during pollination.

Host Plants

- Tomato.

Damage

- Cat-faced fruit shows scars and openings at the blossom-end. Zippering appears as thin, linear scars extending from the stem-end to the blossom-end.
- The fruit wall may crack open along the scar.

Management Options

- Avoid planting large-fruited susceptible tomatoes.
- Sow 2-3 weeks later in the season to bypass low temperature periods.
- Avoid high nitrogen fertilizer and excessive pruning.
- Maintain uniform soil moisture and prevent waterlogging.
- Selecting resistant varieties and providing wind protection can mitigate cat-facing and zippering in tomatoes.



Cat-facing



Fruit cracking and Zippering



Zippering

Fruit Cracking

Identification

- Radial cracking originates from the stem end and progresses towards the blossom end.
- Concentric cracking occurs in rings around the stem scar.

Host Plants

- Tomato.

Damage

- Cracking in green tomatoes can lead to rot before fully ripening if left on the vine.
- Fruits ripening off the vine or on the vine during cloudy, rainy weather are less flavorful.

Management Options

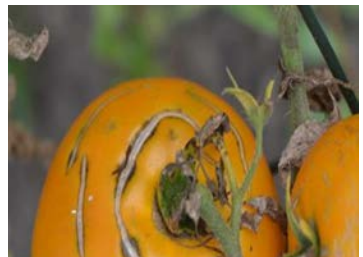
- Choose drought-tolerant varieties.
- Increase irrigation frequency following high temperatures.
- Avoid standing water and irrigate regularly to reduce soil moisture fluctuations.
- Maintain good foliage cover with proper fertilizer application.
- Harvest fruits before rotting and ripen indoors.
- Using mulch can help maintain consistent soil moisture, reducing the likelihood of fruit cracking.



Radial cracking



Concentric cracking



Concentric cracking

Blossom-end Rot

Identification

- The rot begins with light tan to light brown water-soaked areas, enlarging to turn black and leathery. It typically appears around the blossom-end of the fruit when green or ripening.
- The disease can affect over half of the fruit, with other organisms invading the lesion.

Host Plants

- Tomato.

Damage

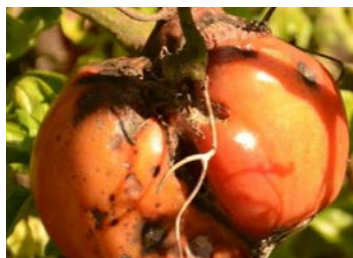
- Blossom-end rot may affect half of the fruit.
- Damaged fruits are susceptible to infection by other micro-organisms.

Management Options

- Avoid stress factors, such as dry conditions during periods of rapid fruit growth.
- Irrigate regularly after high temperatures.
- Apply proper fertilization, avoiding high ammonium-nitrogen fertilizers and preventing calcium deficiency.
- Remove infested tomatoes and compost them.
- Mulch to keep soil evenly moist and minimize moisture-related problems.
- Regular calcium applications and maintaining consistent soil pH can help prevent blossom-end rot.



Early stage



Late stage



Damaged fruits

Crucifer Flea Beetle

Identification

- Adults are small, 2-3 mm long, shiny black beetles, known to jump when disturbed.

Host Plants

- Cabbage, turnip, cauliflower, Brussels sprouts, canola, collards, kale, cucumbers, squash, melons, pumpkins, gourds, eggplant, potatoes, lettuce, celery, peppers, spinach, sweet potatoes, carrots, watermelon, tomatoes, horseradish, radish, potatoes, wild mustard, stinkweed, lamb's quarters.

Damage

- Damage is characterized by numerous 'shot-holes' 1-5 mm in diameter, particularly severe when feeding on the growing point of the plant.
- At the seedling stage, flea beetle feeding can cause stunting or wilting, delaying seedling establishment or resulting in plant death.

Management Options

- Clear the garden of all debris and weeds to minimize overwintering by adult flea beetles.
- Delay planting until later in the season, especially after mild winters. Early plantings can be protected with row covers.
- Transplants are less susceptible to damage than direct-seeded crops.
- Black or red plastic mulch can help control flea beetle adults emerging from the ground.
- Biological control agents like entomopathogenic nematodes can be effective against flea beetles in certain conditions.



Adult flea beetle feeding



Adult flea beetle



Heavy infestation

Swede Midge

Identification

- The Swede midge adult is a tiny, light brown fly (1.5-2 mm).
- Larvae are small (0.3 mm long initially, growing to 3-4 mm), transparent, and typically feed in groups near the growing point.

Host Plants

- Broccoli, Brussels sprouts, cabbage, cauliflower, kale, collards, canola, radish, mustard, wild radish.

Damage

- Larvae feed on heart leaves, causing crinkling and crumpling; young shoots and leaf stalks may be swollen, distorted, and twisted.
- Flower buds do not open and become swollen, resulting in deformed and asymmetrical heads.
- Brown corky scars along stems and destruction of the main stem result in multi-stemmed or multi-headed plants.

Management Options

- Start with clean transplants. Avoid growing under shades of large trees.
- Plant less susceptible varieties, e.g., Everest and Triathlon varieties of broccoli.
- Plant early-season varieties in early June to reduce damage levels.
- Destroy weeds, including field pennycress, wild mustard, wild radish, shepherd's purse, pepper grass, etc.
- Wash soil from boots and equipment when leaving an infested field to prevent transferring pupae.
- Crop rotation not including crucifer crops is essential to break the life cycle of Swede midge.



Infested cauliflower plant



Infested leaf



Larva

Imported Cabbage Worm

Identification

- The larva is green, velvety, with a slender yellow stripe down the middle of the back and a broken yellow stripe along the sides. Larvae grow to about 3 cm long.
- The pupa is light green to light brown and attached to lower leaves, buildings, or fence posts.
- The adult is an off-white butterfly with 2 or 3 black spots on its wings.

Host Plants

- Cabbage, turnip, cauliflower, Brussels sprouts, canola, collards, kale, horseradish, radish, mustard.

Damage

- Larvae feed on foliage, reducing mature plants to stems and large veins. They may burrow into broccoli and cabbage heads.
- Larvae produce dark green pellets of frass which contaminate produce.

Management Options

- Clean up gardens after harvest and remove plant debris to eliminate overwintering sites.
- Use paper caps and floating row covers to prevent egg-laying.
- Grow fast-maturing cultivars. Handpick and destroy larvae.
- Use *Bacillus thuringiensis* for younger larvae.
- Encourage beneficial insects and birds.
- Egg parasitoid *Trichogramma* spp. can be released in larger fields for biological control.



Larva



Pupa



Adult butterfly

Diamondback Moth

Identification

- Mature larvae are 8-10 mm in length, wriggle frantically and dangle over the edge on a silken thread when disturbed.
- Pupate in delicate, white, open-mesh cocoons on the host plant.
- The adult is a small, grayish-brown moth with distinctive yellow diamond-shaped marks on its back.



Larva

Host Plants

- Cabbage, turnip, cauliflower, Brussels sprouts, canola, collards, kale, etc.

Damage

- Larvae feed on leaves, buds, flowers, and seed pods, causing significant damage, especially to seedlings, small plants, and heads or growing points in cabbage, broccoli, and cauliflower.



Pupa

Management Options

- Use insect-free transplants.
- Control cruciferous weeds and volunteer canola host plants.
- Grow glossy varieties, which are somewhat resistant.
- Conserve the tiny wasp *Diadegma insularis* for biological control.
- Ground beetles, spiders, lacewing larvae, and birds also help control populations.
- Apply foliar sprays of *Bacillus thuringiensis* (kurstaki and aizawa strains).
- Humid conditions can spread fatal fungal diseases in diamondback moths.
- Regular monitoring for early detection and timely intervention is crucial.



Adult moth

Slugs

Identification

- Slugs have a soft, unsegmented, slimy body, tear-drop shaped, and legless. Colors vary: dark grey, black, yellow/grey, or brown.
- Most species are active at night, overcast days, or in the shade of a thick plant canopy.

Host Plants

- Cabbage, cauliflower, Brussels sprouts, beans, and many garden vegetables.

Damage

- Slugs attack seedlings, roots, tubers, and young plants, leaving large, regularly shaped holes and sticky silvery deposits.
- Can cause significant damage, eating up to 40 percent of their weight in a day.
- Young seedlings are often completely destroyed.

Management Options

- Remove decaying organic matter, fallen leaves, trash, and other food sources.
- Keep rows weed-free for faster foliage drying. Irrigate early in the day.
- Avoid thick straw mulch which may provide shelter.
- Hand pick using a flashlight in the evening and destroy in soapy water.
- Encourage predators like beetles, centipedes, toads, and wild birds.
- Use barriers: sand, wood ashes, crushed eggshells, or diatomaceous earth at plant bases.
- Set traps with boards, melon/grapefruit peels, inverted pots, or moistened newspaper, and remove slugs daily. Use beer traps with stale beer.
- Copper tape around planters or garden beds can act as a deterrent for slugs



Slug feeding



Damaged broccoli head



Damaged broccoli head

Bacterial Soft Rot

Identification

- Infected leaf or head tissue becomes moist and mushy, often tan-colored, with a foul odor. Depressions in broccoli heads and tipburn in cabbage heads can lead to breakdown by soft rot bacteria.
- Root infection by cabbage maggots shows mushy, foul-smelling decay along maggot tunnels.

Host Plants

- Cabbage, turnip, cauliflower, Brussels sprouts, canola, collards, kale, etc.

Damage

- Smaller infected plants die, and infected heads are unfit for consumption.

Management Options

- Plant in well-drained/raised beds and space plants for air circulation.
- Take care while weeding to prevent wounds serving as disease entry points.
- Avoid splashing water during irrigation to prevent spreading the disease.
- Manage cabbage maggots, which can spread the disease. Destroy infected plants.
- Apply fertilizers appropriately and avoid nitrogen deficiency.
- Sanitation and proper handling during harvest can prevent the spread of bacterial soft rot.



Infected cauliflower heads



Infected broccoli heads



Infected cauliflower heads

Leek Moth

Identification

- Larvae are 13-14 mm long, yellowish-green with a pale brown head and 8 small grey spots on each abdominal segment. Reddish pupae are encased in a loosely netted cocoon.
- The adult leek moth is a small, reddish-brown moth with a white triangular mark on the middle of the folded wings.



Infected leek plant

Host Plants

- Leek, onion, garlic, shallots, and chives.

Damage

- On onions, larvae feed on the inside tissue, leaving visible signs after moving on to pupate.
- On garlic and leeks, larvae feed on leaf surfaces and sometimes tunnel through leaves, often found in the folded leaves, causing noticeable damage to garlic scapes.



Larva

Management Options

- Remove old and infested leaves to destroy pupae or larvae.
- Delay planting after May to avoid damage by the first generation caterpillars.
- Harvest early to avoid damage by the last generation larvae.
- Remove and destroy visible caterpillars and pupae. Destroy severely infested plants.
- Use lightweight floating row covers for protection, removed during the day for weeding.
- Encourage predators: birds, bats, frogs, and beetles eat moths, pupae, and caterpillars.
- Regular inspection and removal of infested plant parts are key to controlling leek moth populations.



Adult moth

Onion Downy Mildew

Identification

- Yellow spots or patches appear on leaf tips, developing a fine whitish down on infected patches, turning dull brown-purple.

Host Plants

- Bulb onions, salad onions, shallots, perennial onions, and some ornamental onions.

Damage

- Infected plants produce small, soft onions that do not store well.

Management Options

- Grow resistant varieties, e.g., Santero.
- Avoid planting soft onion sets or shallots.
- Destroy infected plants and bulbs.
- Rotate crops every 4 years.
- Clean up remaining infected material after harvesting.
- Proper plant spacing (30 cm between rows) aids airflow.
- Avoid low-lying sheltered areas or poorly drained sites.
- Use raised beds for heavy soils.
- Fungicidal treatments can be effective, especially when applied as a preventative measure.



Infected onion plant



Infected onion leaf



Infected onion plants

Asparagus Beetle

Identification

- Larvae have light grey bodies and black head capsules. Egg cases are oval.
- Asparagus beetles are oval, 8-12 mm, with bluish-black wing covers, 6 rectangular yellow markings, and red margins.

Host Plants

- Asparagus.

Damage

- Adults and larvae feed on tender growing tips and spears, causing a scarred appearance and brownish discoloration.

Management Options

- Clean up plant debris and weeds at season's end to limit overwintering sites.
- Allow a row or a few plants to go to fern without harvesting in spring, attracting adult beetles. Handpick adult beetles during early mornings.
- Use a soft broom to brush plants and knock larvae to the ground.
- Cutting shoots cleanly and just below ground level regularly will tend to remove the eggs.
- Interplant with tomato, basil, pot marigold, Nasturtiums, and Calendula to discourage the beetle.
- Dust plants with rock phosphate. If infestation is serious, apply Entrust/Malathion.
- Introducing natural predators like ladybugs and lacewings can help control asparagus beetle populations.



Eggs



Larva



Adult

Spinach & Swiss Chard Leafminer

Identification

- The adult leafminer is a fly about 1 cm long, gray with black bristles.
- Larvae are pale white, legless maggots feeding inside the leaf, migrating leaf to leaf. Mature maggots drop into the soil to pupate.

Host Plants

- Chard, beets, spinach, tomato, cucumber, celery, as well as weeds like lamb's quarters and pigweed.

Damage

- Maggots burrow between leaf layers, eating all but the skin. Initial infestation appears as slender winding 'mines', later expanding into blotches.
- One maggot can damage many leaves.

Management Options

- Plant in areas where leafy vegetables weren't grown the previous year.
- Deep spring plowing to bury/destroy overwintering pupae.
- Regularly inspect plants and weeds for eggs and destroy them.
- Remove host weeds (chickweed, lamb's quarter, nightshade).
- Use row covers when plants are small.
- Remove infested leaves or cut out damaged areas with maggots and destroy.
- Implementing a crop rotation can significantly reduce the incidence of leafminers.



Infected chard leaf



Infected spinach leaf



Adult fly

Ladybird Beetle

Identification

- Several species of lady beetles exist in Ontario.
- Mature larvae are 8-11 mm, black with bright yellow-orange patches, usually covered in spines.
- Pupae are dark or yellow-orange, hunched, motionless, attached to leaves.
- Adults are often brightly colored with spots, warning potential predators of their unpleasant taste.
- Attract lady beetles to gardens with plants that provide nectar/pollen or sugar/water mixtures.

Importance

- Both adults and larvae have chewing mouthparts and prey on other insects.
- They feed on aphids, small caterpillars, scale insects, mealybugs, thrips, mites, insect eggs, as well as pollen and nectar.
- Larvae eat 200-300 aphids as they grow, and adults can consume several hundred aphids per day.
- Encouraging ladybird beetles in gardens can significantly reduce populations of harmful pests.



Larva



Pupa



Adult

Ladybird Beetle



Multicolored Asian lady beetle



Multicolored Asian lady beetle



Spotted lady beetle



7-Spotted lady beetle



14-Spotted lady beetle



20-Spotted lady beetle

Green Lacewing

Identification

- Eggs are less than 1 mm, oval, white/pale, laid individually or in small groups on long silken stalks attached to leaves.
- Larvae grow to 1.2 cm, spindle-shaped with large sickle-shaped mouthparts, resembling tiny alligators.
- Adults up to 1.5 cm long, light green, with long antennae, large golden eyes, and large-veined wings held roof-like over the body.

Importance

- Larvae have sickle-shaped jaws to pierce prey and suck out body juices.
- Known as “aphid lions”, they feed on aphids, small caterpillars, leafhoppers, psyllids, thrips, mites, insect eggs, mealybugs, and immature whiteflies.
- One larva can eat 100 aphids or 1,000 mites in a day.
- Green lacewings are valuable for biological pest control in gardens and should be encouraged.



Single egg on stalk



Larva



Adult

Predatory Stink Bugs

Identification

- Stink bugs are large (1–2 cm) oval-shaped insects with a well-developed pointed shield and a gland secreting an odor when touched.
- Podisus stink bugs, common in gardens, are light pinkish-brown when newly emerged and darken to brown.
- Adults usually walk on trunks and branches, rarely flying.
- Young nymphs are red with dark brown to black areas, while older nymphs have orange abdomens with black borders.
- Anchor stink bugs display variable markings and colors, ranging from dark blue to black, white, pink, yellow, orange, or red.

Importance

- Both adults and nymphs insert their beaks into prey, sucking out the contents.
- They feed on various life stages of suitable prey, including beetle, butterfly, and moth larvae.
- Encouraging predatory stink bugs can help control populations of harmful caterpillars and other pests.



Podisus stink bug adult



Podisus stink bug adult



Anchor stink bug adult

Helvegen

Identification

- Dragonfly adults are larger than damselflies and cannot fold their wings. Dragonflies are direct and powerful fliers.
- Damselflies have longer abdomens than their wings at rest, with more widely spaced eyes.
- Immature stages of both dragonflies and damselflies live in water.
- Preserving wetlands is crucial for their survival and effectiveness in controlling insect pests.

Importance

- Adults feed on mosquitoes, midges, moths, butterflies, and other flying insects.
- The larvae feed on aquatic insects and small fish.
- Maintaining wetlands and aquatic habitats is essential for the proliferation of these beneficial predators.



Dragonfly adult



Dragonfly adult



Damselfly adult

Spiders

Identification

- Spiders have two body regions with four pairs of legs.
- They are beneficial inhabitants of any garden, contributing to the biological control of insect pests.
- Different types of spiders include jumping spiders, crab spiders, sac spiders (hunt for prey in foliage), orb weavers, cobweb spiders, mesh-web weavers, and sheet-web spiders (spin webs to trap prey).
- Harvestmen, although not spiders, are closely related and eat very small insects.

Importance

- Spiders are generalist predators that consume almost any insect pests, including larvae, nymphs, and adults.
- Encouraging spiders in gardens aids in maintaining a balanced ecosystem and controlling pest populations.



Jumping spider



Spider feeding on squash bug



Harvestmen spider

Glossary

Alternate hosts:	Plants not intended as the primary crop but can support a pest's complete lifecycle, from egg to adult.
Bacillus thuringiensis:	A bacterium used as a biological insecticide to control various insect pests.
Bacterial wilt:	A plant disease caused by bacteria leading to wilting and eventual plant death due to disrupted water transport.
Beetle:	An insect characterized by hardened front wings forming a protective shell.
Broadleaf weeds:	Weeds with wide leaves; examples include wild carrots, pigweed, lamb's quarters, mustards, shepard's purse, mullein, etc.
Bug:	Informally refers to an insect. The term is also used for disease-causing organisms.
Caterpillars:	The larval stage of butterflies and moths, often responsible for significant plant damage.
Chewing mouthparts:	Insect mouthparts adapted for chewing plant tissues, e.g., in potato beetles.
Conservation:	Practices that aid the survival and multiplication of natural pest enemies.
Cornicles:	Small tubes on an aphid's back, used for emitting defensive fluids and honeydew.
Cotyledons:	The first leaves of a seedling, distinct from true leaves.
Crop rotation:	The practice of alternating different crops in the same area across different seasons, aiding in soil nutrition and pest control.
Cultivars:	Plant varieties selected for desirable traits.
Defoliation:	The shedding of leaves, typically caused by pests or diseases.
Diatomaceous earth:	A powdery substance made of fossilized diatoms, used as an insecticide. It removes waxy layers from insects, leading to dehydration.
Discoloration:	The loss of normal coloration, typically in leaves.

Disease:	Plant abnormalities caused by bacteria, fungi, viruses, or nematodes.
Egg parasitoid:	An organism that completes its lifecycle inside a host's egg.
Encourage natural enemies:	Providing food, nectar, water, and shelter to beneficial organisms.
Floating row covers:	Lightweight fabric used to protect plants from pests, placed directly over them, with or without support.
Foliage:	The collective leaves of a plant.
Fruit rot:	The decay of fruit, typically caused by fungi or bacteria.
Fungicide:	A chemical used to prevent or eliminate fungal infections in plants.
Honeydew:	A sweet secretion produced by some insects.
Infection:	The invasion of plants by disease-causing organisms.
Insect:	An organism with three body segments, six legs, and typically four wings.
Insecticides:	Chemicals used to control insect pests.
Instar:	A stage in the larval development of an insect.
Larva:	An immature stage of an insect, following hatching from an egg.
Leafminer:	An insect larva that feeds between the upper and lower layers of a leaf.
Lesions:	Abnormal growths or areas on plant organs.
Maggot:	The legless larva of a fly.
Micro-organisms:	Extremely small organisms, visible only under a microscope.
Midge:	A term for small flies.
Natural enemies:	Organisms that naturally prey on pests.
Nymph:	An immature stage of certain insects, resembling the adult but usually lacking wings.
Overwintering:	The process by which pests survive the winter.
Parasitoids:	Organisms that live at the expense of their hosts, often leading to the host's death.

Pest:	An organism that harms humans or their interests, including plants and animals.
Petiole:	The stalk attaching a leaf blade to a plant stem.
Piercing-sucking mouthparts:	Specialized mouthparts used to pierce plant or animal tissue and suck out fluids.
Plant debris:	Dead plant material found on the ground, typically after the growing season.
Plant protection products:	Substances used to manage pests and diseases in plants.
Pollination:	The transfer of pollen from the male to the female part of a flower.
Predators:	Organisms that hunt and consume other organisms.
Pupa:	A non-feeding, often immobile stage in the lifecycle of some insects.
Rotenone:	A natural insecticide derived from plant roots.
Signs:	Indicators of disease-causing organisms, especially fungi.
Soapy water:	A mixture of water and a small amount of soap or detergent.
Sooty mould:	A black fungus growing on sweet secretions from insects.
Sticky traps:	Traps coated with a sticky substance to capture flying pests.
Sunscald:	Damage to fruit caused by direct sunlight.
Surround WP:	A kaolin clay-based material used to deter insects by forming a protective coating on plants.



PUBLICATION