



FIELD GUIDE

Arthropod Pests of NYC Vegetables

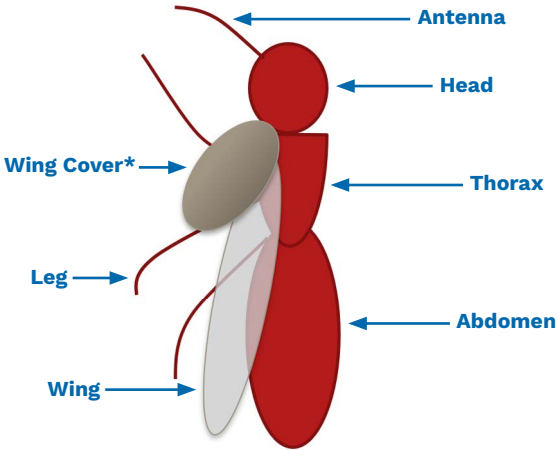
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Cornell
Cooperative
Extension



On the cover: A young imported cabbageworm (*Pieris rapae*) chews holes in a kale leaf, with a cluster of cabbage whitefly eggs (*Aleyrodes proletella*) at bottom right.

Insect parts



* Not all insects have wing covers, but for those that do, the wing covers are often folded over the wings.

Special thanks to Angela Ochterski, Elizabeth Lamb, Yolanda Gonzalez, and Judson Reid.

All photos property of Cornell University unless otherwise noted.

Support for this project was provided by:

The Towards Sustainability Foundation

USDA National Institute of Food and Agriculture, Smith
Lever project 2020-21-108

Cornell Cooperative Extension Summer Internship
Program

Key

Watch for these shortcuts to help you with scouting, identifying, and understanding the pests in this guide.

Order of insect (or other arthropod). For example, *Coleoptera* are beetles, *Hemiptera* are “true bugs.”

Parts of the plant **most often** attacked/affected.

Is this primarily an **indoor** 🏠 or **outdoor** ☁️ pest in NYC?

Thysanoptera 🏠 ☁️ **leaf, stem, fruit, flower**

Thrips

Onion thrips (*Thrips tabaci*)
Western flower thrips (*Frankliniella occidentalis*)
(And several other less common species)

Where it's found:
Onions, scallions, leeks, other alliums
Brassicas
Various other crops

What you'll find:
Damage (piercing/sucking)
Larvae/nymphs

Which vegetable **crops** and **plant families** typically host this pest in NYC? The most severely affected crops are in **bold font**.

What to look for when scouting for this pest, e.g. life stages and types of damage. You're especially likely to see the indicators in **bold font**.

“Larva” and “nymph” both refer to immature phases; nymphs change more gradually into adults, with no pupa (resting phase).

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Introduction

This guide aims to help you find, identify, and understand the most common and important arthropod pests of New York City farms and gardens. Most are insects, but some other arthropods appear as well (e.g. twospotted spider mite), along with an honorary mollusk mention.

Much of the information on these pages comes from urban farmers' own experiences and from our direct observations on farms and gardens in New York City. We focus on pests of vegetable crops, though some of these are also pests of perennial fruits (e.g. spotted lanternfly, tarnished plant bug).

You may notice the pests are grouped by the type of damage they cause. This is meant to help you narrow down a culprit when you suspect something is damaging your plants.

Chewing damage often appears as visible holes chewed through leaves or fruit, as with many beetles and caterpillars. It could also involve tunneling inside of a stem (e.g. squash vine borer) or leaf (e.g. spinach leafminer).

Piercing/sucking damage usually shows up differently, from tiny light-colored flecks (“stippling”), to wrinkling and curling leaves, to yellowing and general wilting of the whole plant.

Other damage may be more indirect, such as transmitting plant diseases (e.g. thrips, fungus gnats, cucumber beetles) or being physically attached to the leaves (e.g. cabbage whitefly).

This guide focuses on identification and scouting rather than how to control the pests, but we have included some integrated pest management (IPM) resources on the last page.



Aphids

Cabbage aphid (*Brevicoryne brassicae*)

Other aphids (e.g. *Aphis gossypii*, *Myzus persicae*, *Macrosiphum euphorbiae*)

Where it's found:

Brassics (esp. kale, collards, broccoli, cabbage)

Various other crops

What you'll find:

Adults

Nymphs

Damage (piercing/sucking)



Left: Potato aphid (*Macrosiphum euphorbiae*) and/or green peach aphid (*Myzus persicae*) on lettuce in a greenhouse. **Right:** Cabbage aphid (*Brevicoryne brassicae*) nymphs and winged adult on broccoli leaf.

Overview: Aphids are perhaps the most recognized pests of vegetables on NYC farms and gardens. A variety of aphid species are present in the city, appearing on a wide range of plants, from okra to tomatoes. Some are significant pests of indoor agriculture, especially on lettuce. One species, cabbage aphid, is a common pest of brassicas in spring and fall. We find that on most outdoor crops in the city, aphid populations decrease in summertime, possibly due to predation (e.g. by ladybeetles and lacewing larvae).



Above left: Cabbage aphids overwintering on kale, including several light brown “mummies,” aphids which have been parasitized by a wasp.



Above right: Aphids on purple kale.

Right: Melon aphid (*Aphis gossypii*) on okra, with black wingless adult and green nymphs.



Scouting & damage: Aphids are most often found on leaf undersides, but may also appear elsewhere on the plant. Small numbers of aphids might cause no noticeable damage; large populations may eventually cause visible signs such as **leaf curling** and stunted growth. **Cabbage aphids** are chalky whitish gray or green, often clustered together on fall brassicas, where they may remain all winter. Other aphid species, such as **green peach aphid**, range widely in color, from bright green to red to black. Aphids typically have a **pear-shaped body** and distinctive **cornicles** (see image above), with multiple generations of different sizes present in the same colony; most will be wingless, but winged forms may also be present. Size: 0.06 to 0.1 in.



Cabbage whitefly

(*Aleyrodes proletella*)

Where it's found:

Brassicas (esp. kale, collards, broccoli)

What you'll find:

Adults

Nymphs

Eggs



Left: Cabbage whitefly adults and eggs on kale leaf underside. **Right:** Cabbage whitefly nymphs, magnified (with parasitoid *Encarsia* wasp).

Overview: In North America, most of the resources on whiteflies deal with the types commonly found in greenhouses (see p. 20); but cabbage whitefly is a different species, and a major farm and garden pest in New York City, especially of kale, collards, and broccoli. Unlike its mostly-indoor cousins, cabbage whitefly easily survives our winters and feeds primarily on the brassica family. The main problem: Large numbers of whitefly nymphs stuck to leaf undersides, which are very difficult to wash off and very unappetizing to most humans.



Above left: Cabbage whitefly adult.



Above right: Cabbage whitefly nymphs and adults on kale leaf underside, late infestation. (The darker-colored nymphs may have been parasitized by an *Encarsia* wasp.)

Right: Cabbage whitefly adults and eggs on kale leaf underside.



Scouting & damage: **Adults** resemble tiny white moths with gray spots on each wing. They are weak fliers, often seen fluttering around brassicas after you disturb the leaves. The **nymphs** go through several phases, but mostly appear as whitish-yellow or brown **ovals attached to leaf undersides**, sometimes in large numbers. (If you see very dark nymphs, almost black, those have likely been parasitized by a tiny wasp, *Encarsia tricolor*.) **Eggs** are white or yellow, often appearing in a circle or semicircle surrounded by **powdery white residue**. Eggs and larvae are almost always on leaf undersides. Plant **damage** is typically subtle, similar to aphid damage (slightly yellowing and curling leaves) until an infestation is very severe. You may also see black sooty mold, a side effect of honeydew (the waste product of nymphs' feeding). Size: 0.06 in.



Harlequin bug

(*Murgantia histrionica*)

Where it's found:

Brassicas (esp. kale, collards, broccoli, cabbage)

What you'll find:

Adults

Nymphs

Eggs

Damage (piercing/sucking)



Left: Harlequin bug adult on broccoli leaf. **Right:** Harlequin bug nymph.

Overview: Harlequin bug is a stink bug native to the southern U.S. which has become one of the most common pests of brassicas in New York City, affecting everything from kale and cabbage to turnips and mustards. They overwinter as adults, benefiting from the city's mild winters. A generation takes 50 to 80 days. Adults and several stages of nymph often appear alongside each other, with numbers building in July and August. The bad news: Harlequin bugs have few natural enemies in the city to keep them in check. The good news: All their life stages are easy to see and to pick off by hand.



Above left: Feeding damage from harlequin bug on kale.



Above right: Multiple stages of nymph. (Photo: Whitney Cranshaw, Colorado State University Extension)



Middle right: Harlequin bug eggs on leaf underside.

Bottom right: Adult and nymphs on kale.



Scouting & damage: Conspicuous at every life stage, starting with their unique eggs, double rows of **black and white striped cylinders** on leaf undersides. After hatching, they progress through several nymph stages with different patterns of orange, black, and white. Adults are winged and shield-shaped, like other stink bugs. Adults and larvae make less effort to hide than many other pests; you will often see them feeding on top of leaves, not just leaf undersides. **Damage** from their piercing-sucking mouthparts shows as **light-colored spots and splotches** on leaves, progressing to leaf curling and wilting. Size: 0.5 to 0.75 in.



Twospotted spider mite

(*Tetranychus urticae*)

Where it's found:

Tomato
Cucumber
Beans
Eggplant
Various other crops

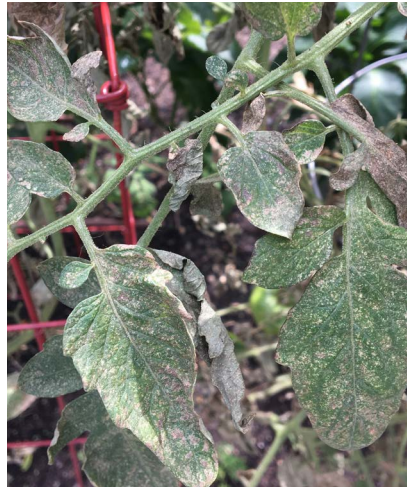
What you'll find:

Damage (piercing/sucking)
Adults
Larvae/nymphs



Left: Twospotted spider mite infestation with webbing on tomato leaf underside.
Right: Twospotted spider mite female. (Photo: Gilles San Martin)

Overview: Mite adults and larvae feed on a wide variety of plants. In NYC, they are likely the most damaging pest of tomatoes, cucumbers, and beans; as generalists, they are also found on a wide variety of other plants. They are also a serious pest of indoor agriculture, from greenhouses to houseplants. Twospotted spider mite reproduces quickly in the absence of predators and in **hot, dry conditions**; in NYC, mite outbreaks occur citywide between July and September.



Above left: “Stippling” on tomato leaf, an early indicator of twospotted spider mite presence.

Above right: Severe twospotted spider mite feeding damage on cucumber leaves, with interveinal yellowing reminiscent of a nutrient deficiency.

Right: Severe feeding damage on tomato. Damage sometimes presents without the usual leaf yellowing, instead appearing gray/brown and “dusty.”

Scouting & damage: Watch for “stippling,” **small light-colored flecks** that show feeding damage on leaves. Then check leaf undersides for tiny mites, usually **yellow and black**; a hand lens is helpful, but if you look closely, you may see them without magnification. Late in the year, some mites will be **orange-red**. Damage progresses into **interveinal leaf yellowing** (where the veins remain green), brown and curled leaf edges, and overall plant decline with an appearance of “drying up.” You may see a “dusty” appearance on leaves, especially tomatoes. Damage may mimic a nutrient deficiency (see cucumber photo above). Mites produce **webbing** which may be visible as populations build. Size: 0.02 in.



Thrips

Onion thrips (*Thrips tabaci*)

Western flower thrips (*Frankliniella occidentalis*)

(And several other less common species)

Where it's found:

Onions, scallions (green onions), **leeks, other alliums**

Brassicacae

Various other crops

What you'll find:

Damage (piercing/sucking)

Larvae/nymphs



Left: Thrips on coreopsis flower. **Right:** Onion thrips larvae on scallion leaf.

Overview: Several species of thrips feed on plants in NYC, but the two most significant vegetable pests are onion thrips, which can decimate onions and scallions; and Western flower thrips, an especially damaging pest of greenhouse crops, feeding on flowers, leaves, and fruit of a wide range of plants, and serving as a vector for tomato spotted wilt virus (TSWV). Onion thrips are very common in NYC, and by July their damage renders many scallions unmarketable and stunts the size of onion bulbs. They are also an occasional pest of brassicas and other crops.

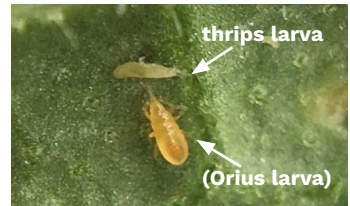


Above left: Thrips larvae feeding on collard leaf, with characteristic silvery blotches (feeding damage).



Above right: Onion thrips damage on onions.

Right: Thrips larva attacked by Orius larva.



Scouting & damage: Thrips are tiny, and you will generally see the damage before you see the insects. Onion thrips damage begins as **small light-colored flecks** on leaves, progressing into **whitish or silvery blotches**, until the leaves begin yellowing and wilting. Most onions and scallions in NYC will have at least some onion thrips **by July**; also watch leeks, garlic, and other alliums, and occasionally brassicas. Look closely for skinny yellow thrips larvae scurrying on the leaves. For both types of thrips, watch for small black spots (“fecal” spots) among the feeding damage to confirm thrips’ presence. Western flower thrips damage may also show as silvery flecks on leaves, but they often live in **flowers**, which can be damaged in heavy infestations. Their worst damage is from spreading TSWV and other important viruses of tomatoes, lettuce, peppers, and numerous other crops; they thrive in **greenhouses**, but appear outdoors as well. **Size: 0.05 in.**



Squash bug

(*Anasa tristis*)

Where it's found:

Summer squash & zucchini
Pumpkins

Winter squash

What you'll find:

Adults

Nymphs

Damage (piercing/sucking)

Eggs



Left: Squash bug adult. (Photo: Utah State University Extension) **Middle:** Squash bug nymphs on green pumpkin. **Right:** Squash bug eggs and newly hatched nymphs. (Photo: Ward Upham, Kansas State University)

Overview: Squash bug is an occasionally damaging pest of yellow summer squash, zucchini, and pumpkins in NYC. By sucking plant sap, they cause **wilting** of stems and leaves. They can also transmit **cucurbit yellow vine decline**, a bacterial disease. The damage may be difficult to recognize, but the bug is easier: **Eggs** are yellow or copper colored, neatly arranged on leaf undersides; **nymphs** are shaped somewhat like larger, quicker aphids with gray bodies, long black legs and antennae. Younger nymphs are small and light green. **Adults** are winged and dark brown, a bit like an elongated stink bug, with orange stripes along their abdomen. All life stages are often found in groups. **Size:** 0.2 to 0.6 in.



Potato leafhopper

(*Empoasca fabae*)

Where it's found:

Potatoes

Beans

Various other crops

What you'll find:

Damage (piercing/sucking)

Adults

Nymphs



Left: Potato leafhopper adult (top) and nymph (bottom). (Photos: University of Nebraska-Lincoln Entomology) **Right:** “Hopperburn” damage on potatoes.

Overview: Many species of leafhopper are present in NYC, but potato leafhopper is the only one we’ve seen cause significant problems for vegetables here. When feeding, they inject enzymes into the leaf, which for some plants—especially beans and potatoes—causes damage known as “**hopperburn.**” Watch for yellowing and **dry, brown leaf edges.** Potato leaves may start **curling**, and plants may produce fewer and smaller tubers. Potato leafhoppers migrate here from the south each spring, usually appearing by early June. Adults are green, wedge-shaped, and “hop” away when disturbed; nymphs look like smaller, wingless versions of the adults, usually on leaf undersides. **Size: 0.1 in.**



Spotted lanternfly

(*Lycorma delicatula*)

Where it's found:

Various crops

What you'll find:

Adults

Nymphs

Eggs

Damage (piercing/sucking)



Left: Spotted lanternfly nymphs on cucumber stem. (Photo: Ezra Pasackow) **Right:** Spotted lanternfly adult on Ailanthus tree.

Overview: The infamous planthopper that you've seen on the news. We are still figuring out what threat it poses to vegetables, but the nymphs have been seen feeding on **cucumbers and okra**. Often, its feeding damage appears to weaken but not kill plants; **grapes** are an exception and are very susceptible to spotted lanternfly damage, and one of their favorite targets. The winged adults of late summer are drawn to woody plants, especially **tree of heaven** (*Ailanthus altissima*). The wingless nymphs are highly mobile generalist feeders, and between May and August they may be found in large numbers on the stems of many different plants.



Above left: Late instar nymph.
(Photo: Jody Gangloff-Kaufmann,
NYSIPM)

Above right: Egg masses on tree trunk.



Bottom right: Early instar nymph. (Yep, they can walk upside-down.)



Bottom left: Adult, smashed on sidewalk.

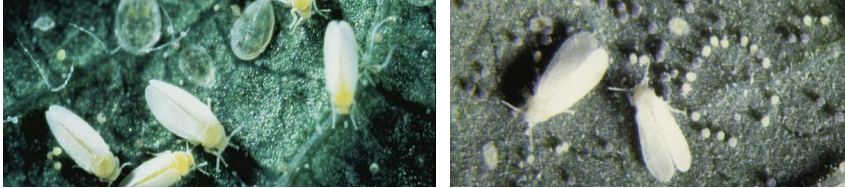


Scouting & damage: Spotted lanternfly survives the winter as eggs, in **flat gray masses** attached to **tree trunks** (especially tree of heaven, perhaps certain fruit trees) and various other objects. Egg masses are often clustered together on the same tree or in the same area; look **near grapevines**. Nymphs mostly hatch in May and begin walking in search of new plant hosts. All nymph stages are wingless and move laterally (and quite quickly). Early stages (May-July) are **black with white spots**, up to $\frac{1}{4}$ inch long; later nymphs (July-Sept) are up to $\frac{1}{2}$ inch long and **bright red-orange with black and white marks**; adults, appearing from July until winter, are big, winged, **pink-purple with black spots**. They reveal **bright red underwings** in flight (or squished). Damage from feeding on plant sap is much less obvious than the creatures themselves; plants may be stunted or wilting, and grapes may fail to produce fruit. Also watch for **black sooty mold** that grows on the honeydew they excrete. **Size:** 0.25 to 1 inch



Greenhouse whiteflies

(*Trialeurodes vaporariorum* and *Bemisia tabaci*)



Left: Sweetpotato/silverleaf whitefly adults and nymphs. **Right:** Greenhouse whitefly adults and eggs. (Photos: John Sanderson)

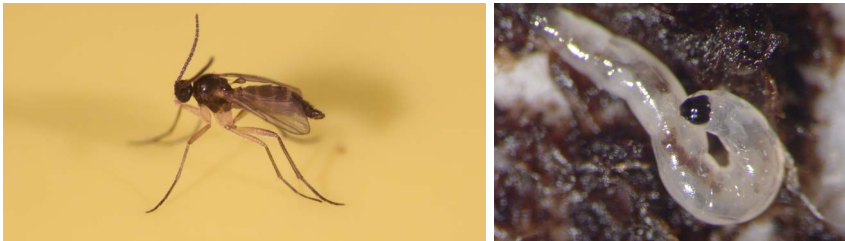
Crops: Various

Overview: These two species are mostly limited to greenhouses and other indoor growing environments, where they are common pests of tomatoes and many other plants. Entire life cycle is on the plant; you might first see the adults fluttering like tiny white moths. **Size:** 0.06 to 0.1 in.



Fungus gnats

(*Orfelia* sp., *Bradysia* sp.)



Left: Fungus gnat adult. **Right:** Fungus gnat larva. (Photos: John Sanderson)

Crops: Various

Overview: Common greenhouse resident. Adults are tiny, short-lived flies. Larvae live in moist soils and soilless media and feed on organic matter, including roots; in large enough numbers they can stunt seedlings. **Size:** 0.06 to 0.1 in.



Broad-headed bug

(*Alydus eurinus*, possibly others)



Left: Broad-headed bug adult on pigeon pea pod. **Right:** Broad-headed bug adult on leaf.

Crops: Pigeon peas, soybeans, possibly other legumes

Overview: Feeds on young seeds; watch for **pods with missing seeds**, usually with a hole in that section of the pod. Maybe our only significant pest of pigeon peas. Size: 0.4 to 0.5 in.



Tarnished plant bug

(*Lygus lineolaris*)



Left: Feeding damage on lettuce. **Middle:** Feeding damage on celery. (Photos: Shimat Villanassery Joseph, UCANR) **Right:** Tarnished plant bug adult.

Crops: Celery, lettuce, strawberry, various others

Overview: Adults feed on new growth and buds, with damage appearing later as **scarred or malformed fruit**, especially strawberries. Can cause flowers to drop from tomato, pepper, and eggplant; brown blotches on the midrib of lettuce leaves; yellowing leaves and brown stem lesions on celery. Size: 0.3 in.



Cabbageworms

Imported cabbageworm (*Pieris rapae*)

Diamondback moth (*Plutella xylostella*)

Cabbage looper (*Trichoplusia ni*)

Cross-striped cabbageworm (*Evergestis rimosalis*)

Where it's found:

Brassicas (esp. kale, collards, broccoli, cabbage)

What you'll find:

Damage (chewing)

Larvae

Adults



Left: Diamondback moth larva. (Photo: Jensen Njagi) **Right:** Imported cabbageworm larva, early stage.

Overview: “Cabbageworm” can refer to several species of caterpillar that feed on brassicas. When you see large holes in kale or collard leaves in NYC, the culprit is usually **imported cabbageworm** or **diamondback moth**, both very common across the city; **cabbage looper** appears infrequently. Most species lay a few eggs on each plant, so damage may be spread throughout a planting. The less common **cross-striped cabbageworm** is an exception; many of these black-and-white striped caterpillars may be found on a single plant.



Above left: Imported cabbageworm on kale leaf, later stage, with feeding damage.

Above right: Cabbageworm feeding damage on collards.

Bottom right: Imported cabbageworm egg.

Bottom left: Imported cabbageworm adult, aka “cabbage white.” (Photo: S. Bright, Alabama Butterfly Atlas)



Scouting & damage: Most cabbageworm larvae are small, green, and well camouflaged on leaf undersides. Feeding damage is more obvious, showing up as **smooth-edged, irregularly shaped holes** in leaves. (Compare with flea beetle damage, where the holes are small and round; or slug damage, where the holes have rougher edges.) Imported cabbageworm eggs are yellow and oblong, often laid singly on leaves; other cabbageworm eggs are tiny and harder to find. For most cabbageworms, the adults are small brown moths which are rarely seen; imported cabbageworm’s adult form is a very common butterfly called the “cabbage white,” small and white with black wingtips and one or more black spots on each wing. Of the green caterpillars, imported cabbageworms look slightly “fuzzy,” while diamondback moth larvae have a more segmented appearance; cabbage loopers arch their body as they move. Cross-striped cabbageworms are black and white striped with yellow sides. *Size: up to 1 in.*



Tomato hornworm

Tobacco hornworm (*Manduca sexta*)

Tomato hornworm (*Manduca quinquemaculata*)

Where it's found:

Tomatoes

Tomatillos & husk cherries

Other nightshades

What you'll find:

Damage (chewing)

Larvae

Frass (droppings)

Pupa



Left: Tomato hornworms on tomato leaves. **Right:** Hornworm larva with braconid wasp cocoons.

Overview: Tomato and tobacco hornworms are hard to spot, even as they grow into large, monstrous, juicy green caterpillars. When you do see them, their **horn** (and juiciness) is unmistakable. Their damage shows as **large irregular holes** and entire leaves vanishing, and they'll also nibble on fruit. Also watch for **dark, round frass** (droppings) on leaves. You might occasionally see their **large, brown pupae** in the soil, where they overwinter. (See yellow-striped armyworm pupa.) The adults are large grayish moths, not often seen since they fly at night. If you see a hornworm covered in **white oblong cocoons**, leave that one alone: those are the resting life stage of braconid wasps, which feed on hornworms. **Size:** up to 4 in.



Yellow-striped armyworm

(*Spodoptera ornithogalli*)

Where it's found:

Various crops

What you'll find:

Damage (chewing)

Larvae

Frass (droppings)

Pupa



Left: Yellow-striped armyworm larva. **Top right:** Armyworm larva on tomato leaf, with damage and frass (dark spots). **Bottom right:** Armyworm pupa. (Photo by Ted Kropiewnicki, NC State)

Overview: A generalist, feeding on everything from basil to tomatoes. Grayish, with **two long yellow stripes**, sometimes a reddish head and/or a black spot on either side of its body; they grow to be larger than cabbageworms, smaller than tomato hornworms. Damage: **smooth-edged holes in leaves**, may **feed on fruit surface** or bore into fruit; watch for their **dark frass** (droppings) on leaves. Adults are small brown moths, not often seen. **Pupae** are in the soil, where some will overwinter. Not broadly common in NYC, but can be locally very abundant some years. Size: up to 1.75 in.



Flea beetles

Striped flea beetle (*Phyllotreta striolata*)

Crucifer flea beetle (*Phyllotreta cruciferae*)

Eggplant flea beetle (*Epitrix fuscula*)

Where it's found:

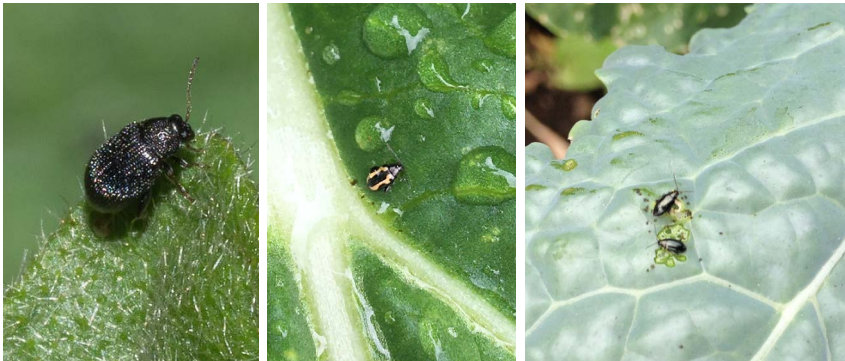
Brassicas (esp. mustards, turnips, radishes)

Eggplant

What you'll find:

Damage (chewing)

Adults



Left: Eggplant flea beetle. (Photo: Jim Moore, Maryland Biodiversity Project) **Middle:** Striped flea beetle on bok choy. **Right:** Crucifer flea beetles feeding on kale leaf.

Overview: These tiny beetles are known by the many small holes they chew in brassica and eggplant leaves, giving a “shot-hole” appearance. These three species look similar, but have different host plants: **Crucifer** and **striped flea beetles** are a spring brassica pest for many NYC farms and gardens; **eggplant flea beetle** is probably our most damaging pest of eggplant. Adult flea beetles overwinter in sheltered places and get an early start in spring, commonly appearing on crops by mid-May. Only the adults feed on leaves; eggs and larvae are in the soil. There are likely three generations each year in NYC; after the annual May-June onslaught, there may be a pause before the next generation emerges.



Above left: Crucifer flea beetle on kale, with damage.

Above right: Flea beetle damage on eggplant leaves.

Right: Flea beetle feeding damage on purple mustard.

Below: Flea beetles and damage on tatsoi seedlings. (Photo: University of Maryland Extension)



Scouting & damage: On both brassicas and eggplant, feeding damage shows up as **many small holes** in the leaf surface. Many plants will grow through the damage, but marketability of greens is affected. **Seedlings** can be significantly stunted, and some especially vulnerable crops (e.g. many mustards, bok choy, radishes, and arugula) can be stunted at any stage. Cabbage-type brassicas (such as kale, collards, and broccoli) become somewhat less-preferred hosts as the plants mature. Adults are very small, black, shiny, oval-shaped beetles that **jump or fly away when disturbed**. If you get a close look, you may see striped flea beetles' two yellowish-white stripes. Egg and larval stages take place underground and are rarely seen. Size: 0.1 to 0.15 in.



Pigweed flea beetle

(*Disonycha glabrata*)

Where it's found:

Callaloo (amaranth)

Lagos spinach (celosia)

Swiss chard, beets, spinach

What you'll find:

Damage (chewing)

Adults

Larvae

Frass (droppings)



Left: Pigweed flea beetle adult. (Photo: Judy Gallagher) **Middle:** Adult with minor feeding damage and frass on callaloo (amaranth.) **Right:** Larva with feeding damage.

Overview: Our primary pest of callaloo is a flea beetle that looks more like a lightning bug. Pigweed flea beetle is larger than the brassica and eggplant flea beetles, with black and yellow stripes; unlike them, **both adults and larvae** feed on leaves. Larvae resemble **white grubs**, usually found on leaf undersides. Adults **jump away when disturbed**. Eggs are tiny, yellow/orange, in clusters; pupae are in the soil beneath the plant. Damage will be the most obvious sign: **irregular, smooth-edged holes** in leaves, often many holes of different sizes. You might also see its frass, **small dark spots** on leaves. Pigweed flea beetle seems to prefer green callaloo, but will also feed on red varieties and other amaranths. Size: 0.25 in.



Japanese beetle

(*Popillia japonica*)

Where it's found:

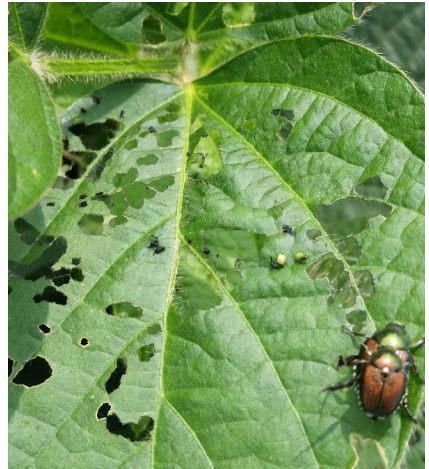
Various crops

What you'll find:

Damage (chewing)

Adults

Larvae



Left: Japanese beetle adults on flower. **Right:** Japanese beetle adults with damage on bean leaf. (Photo: Jaime Cummings, NYSIPM)

Overview: This common beetle is a generalist; the adults feed on leaves of many different plants, and sometimes on soft fruits and flowers. Their larvae are large white grubs that live in the soil and feed on roots, especially grasses, making them pests of lawns. Farms and gardens are more concerned with the adults, smallish brown and green scarab beetles which are easily noticed on plants, often clustered together. Feeding damage on leaves appears as **ragged-edged holes**, progressing to “**skeletonization**,” leaving behind just the veins of the leaf, often starting near the top of the plant. Size: 0.5 in.



Cucumber beetles

Striped cucumber beetle (*Acalymma vittatum*)

Spotted cucumber beetle (*Diabrotica undecimpunctata*)

Where it's found:

Cucumbers

Melons

Squash

Various other crops

What you'll find:

Adults

Damage (chewing)

Damage (bacterial wilt)



Left: Striped cucumber beetle with damage on cucumber seedling. (Photo: UMass Vegetable Program) **Right:** Spotted cucumber beetle on cucumber leaf.

Overview: Two species of cucumber beetle are common in New York City: **striped** and **spotted**. The adults of both species feed on leaves, stems, and flowers of plants in the cucurbit family, but may impact other plant families as well (the spotted species especially). Striped cucumber beetles can also spread **bacterial wilt**, a disease which causes entire cucumber and melon plants to rapidly wilt and die. Striped cucumber beetles overwinter here as adults, whereas many spotted cucumber beetles migrate to New York from the south each year (though some probably survive our winters).



Above: Striped cucumber beetle feeding on cucumber leaf.

Right: Bacterial wilt in winter squash. The disease is spread by striped cucumber beetle. (Photo: G. Higgins, UMass Vegetable Program)



Scouting & damage: Striped and spotted cucumber beetles are small but conspicuous, **bright yellow with black stripes or spots**. The adults gather to feed on leaves and stems of cucurbit plants, and as the season progresses you might see them gathering on flowers too. The larvae of both species live mostly underground and feed on roots. We likely see only one generation of both species each year; spotted might increase in numbers over the spring and summer as more of them arrive from the south. Damage from the beetles' chewing mouthparts appears as **many small, irregular holes**, often with light brown edges (on leaves). This can badly stunt seedlings, or kill them by girdling the stem. In NYC we see cucumber beetles **most often on cucumbers**, but they also attack melons and squash. *Size: 0.2 to 0.3 in.*



Spinach leafminer

Spinach leafminer (*Pegomya hyoscyami*)

Beet leafminer (*Pegomya betae*)

Where it's found:

Spinach

Swiss chard

Beets

Other chenopods (e.g. lamb's quarters, quinoa)

What you'll find:

Damage (chewing/
tunneling)

Eggs



Left: Spinach leafminer damage on beet leaves. **Middle:** Damage on spinach leaf. **Right:** Spinach leafminer larva. (Photo: UMass Vegetable Program)

Overview: Common pest of the goosefoot family (Chenopodiaceae), especially early in the season. Overwinters in soil as pupae; adults emerge in April and May, lay eggs on their host plants, and larvae hatch in 3-6 days. Larvae burrow into the leaf and feed between the leaf's layers, leaving behind their characteristic tunneling damage. After 7-12 days, most larvae will drop out of the leaf and into the soil, where they pupate and emerge as adults 10-12 days later to start the cycle again.



Above left: Severe leafminer damage on spinach leaf.



Above right: Leafminer adult. (Photo: Whitney Cranshaw, Colorado State University, Bugwood.org)



Middle right: Leafminer damage on Swiss chard.

Bottom right: Row of leafminer eggs on spinach leaf.



Scouting & damage: You are most likely to see the damage first: **wandering, light-colored trails** and **patches** on leaves. If you catch it early—before the larvae has dropped into the soil to pupate—you may be able to find the larvae itself, a tiny white maggot burrowing between leaf layers. Adults are small, nondescript flies, rarely seen, but you might see the eggs if you check leaf undersides: **white, oblong, in tidy little rows** or clusters. Although there will be several generations each year, in NYC we've seen that leafminer damage is often most significant in May and June. *Size: up to 0.25 in.*



Squash vine borer

(*Melittia cucurbitae*)

Where it's found:

Summer squash

Pumpkins

Winter squash

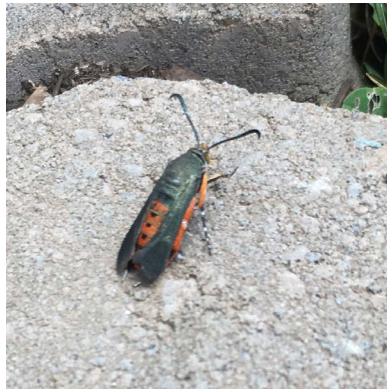
What you'll find:

Damage (chewing/
tunneling) & **frass**

Larvae

Adult

Eggs



Left: Squash vine borer larva and damage. (Photo: Dan Egel, Purdue University)

Right: Squash vine borer adult

Overview: This day-flying moth is the reason many NYC gardeners have given up on squash. Squash vine borer has one generation per year, but it is a sneaky and damaging one. After overwintering in the soil as pupae or larvae, adult moths emerge in June and lay eggs on squash stems. Larvae hatch and burrow into the stem, where they live and feed in relative safety while the plant wilts. A single larvae may kill an entire plant. Especially damaging to hollow-stemmed cucurbits like zucchini, yellow summer squash, and pumpkin.



Above left: Squash plant wilting as a result of squash vine borer damage. (Photo: Dan Egel, Purdue University)



Above right: Damage on squash stem, with frass.

Bottom right: Squash vine borer egg on squash stem. (Photo: Michael J. Raupp)



Scouting & damage: The adults are remarkable: large, orange and black clear-winged moths that fly in the daytime, yet usually pass through gardens unnoticed. They lay eggs singly (not in clusters), moving from plant to plant. If you have time on your hands in June and early July, check the stems of your squash plants, near the base, for **small, single, brownish eggs**. Still, you are most likely to notice the damage first, probably in July; an **entire stem** or section of a plant, or the whole plant, will begin to **wilt**, especially in the morning. Check the base of the stem for evidence of holes and mounds of light-colored **frass** (caterpillar poop). Larvae are **chunky white caterpillars** that look more like grubs, though you may have to cut the stem open to see one. *Size: up to 1.5 in.*



Slugs and snails

Gray garden slug (*Deroceras reticulatum*)
... and numerous other species

Where it's found:

Various crops

What you'll find:

Damage (chewing/rasping)

Adults

Larvae



Left: Gray garden slug. **Right:** Slug damage on a seedling. (Photo: Iowa State University Extension)

Overview: These non-arthropods get an honorary inclusion in our guide. Slugs (and snails, to a lesser extent) are common early-season pests of NYC farms and gardens, but may go undetected because they tend to feed at night, then retreat to their daytime hiding places nearby. As mollusks, they need to avoid drying out, so we see them mostly in **cool, wet weather** and shaded areas. Typical damage: irregular holes with **ragged edges** (compare with caterpillars' smooth-edged holes), with a preference for **seedlings** and other new or tender growth near the ground. Sometimes they'll leave behind a visible **silvery trail** of slime. **Size:** up to 2 in.



Pillbug (Roly-poly)

(*Armadillidium vulgare*)



Left, Middle: Pillbug feeding damage on radishes. **Right:** Pillbug adult. (Photo: Joseph Berger, Bugwood.org)

Crops: Radishes, turnips

Overview: This crustacean usually leaves our plants alone, but during damp spring weather, especially in soils with high organic matter and high pH, they often nibble on radishes and turnips, reducing their marketability. **Size:** up to 0.5 in.



Colorado potato beetle

(*Leptinotarsa decemlineata*)



Left: Colorado potato beetle adult and eggs on potato leaf. (Photo: Nault Lab, Cornell University) **Right:** Larvae with fecal pellets. (Photo: University of Maryland Extension)

Crops: Potatoes, eggplant

Overview: Common pest in our region, though less common in NYC. Striped adults and plump larvae are slow-moving but feed aggressively, chewing ragged holes. Watch also for orange egg clusters on leaf undersides. **Size:** up to 0.4 in.



Swede midge

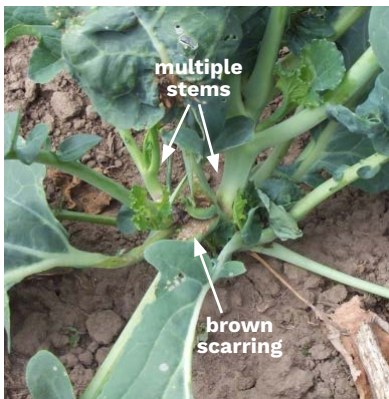
(*Contarinia nasturtii*)

Where it's found:

Brassics (esp. collards, kale, broccoli, kohlrabi, cabbage)

What you'll find:

Damage (chewing)
Larvae



Left: Swede midge damage. (Photo: Julie Kikkert, Cornell Cooperative Extension)

Right: Swede midge larvae on red cabbage. (Photo: Hannah Fraser, OMAFRA)

Overview: In some places, including many urban farms in Buffalo and Rochester, this is the most serious pest of brassicas. We haven't confirmed it yet in NYC, but we suspect it's only a matter of time ... or that it's already here. Larvae feed on brassicas' **growing tips**; watch for **malformed or missing heads** (broccoli, cabbage), **distorted young leaves** and **scarring** around the middle of the plant. Look very closely for squirming larvae: **tiny, translucent or yellowish**, usually hidden within the plant's growing point. After 1-3 weeks, larvae drop to the soil to pupate; this is how they overwinter, with adults emerging in May and laying eggs soon after. You aren't likely to see the adults, very small midges, unless monitoring for them with traps. Size: up to 0.15 in.

More Information

NYC Market Growers Update is an email publication for urban farmers, including timely NYC-specific pest updates and alerts, compiled by CCE Harvest New York urban agriculture specialists.

<https://rb.gy/wxbwja>



For more information on integrated pest management for vegetables and other crops, visit the **New York State Integrated Pest Management** webpage.

nysipm.cornell.edu



The Cornell Vegetables page includes a list of pest management resources for commercial vegetable growers.

www.vegetables.cornell.edu/pest-management/



See this guide's companion: **Beneficial Insects on NYC Farms**, available in both English and Spanish.

<https://rb.gy/ena4n>



Rear cover: Can you spot a pigweed flea beetle (*Disonycha glabrata*) that's been eating this callaloo? Also watch for its frass, little dark droppings on the leaves.



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April 2023