Integrated Pest Management (IPM)

**Cultural control:** The best pest management is healthy soil! Crops grown in healthy soil are stronger and more resistant/less attractive to pests. This is sometimes known as ecological pest management or preventative pest management. For healthy soil we rotate crops, plant cover crops, and utilize compost. We also try to keep up on weeding to minimize places for pests to hide, lay eggs, and snack.

**Physical control:** In general, we pick off larger pests by hand. Wear a glove or use a leaf if it makes you more comfortable.

**Biological control:** We occasionally spray natural fungicides or insecticides on plants, such as soaps and oils. We NEVER use toxic pesticides that make plants unsafe for human consumption.

When watering, weeding, or harvesting, you should also be on the lookout for evidence of pests. When infestations occur, the faster we react the better off the crop will be.

Not sure if the insect is a friend or a foe? Ask for a second opinion or look online. Sometimes what looks like pest damage is a disease or nutrient deficiency, so it is good practice to research any observations.

**Common Pests at the Teaching Garden**

**Cabbage Worms / Cabbage Loopers**

Cabbage worms and cabbage loopers are two different pests, but they behave similarly. Both are **small green caterpillars** though they move differently – the looper inches like an inchworm while the worm is slightly wider and does not lift its middle to move. Cabbage worms become ‘cabbage moths’ (actually butterflies) which are the small white
butterflies with black spots that are seen fluttering around the garden. Cabbage loopers become brown nocturnal moths.

Cabbage moths do not damage crops, they lay eggs which hatch into insects that do damage crops. **Eggs are white or yellow oblong dots on the undersides of leaves.** **These eggs look like ladybug eggs (a beneficial insect) so be careful. You can tell the difference because ladybugs lay eggs in clusters while cabbage moth eggs are more sporadic/solo.**

Crops affected: All brassicas (cabbage, kale, collards, broccoli, mustard greens, cauliflower).

We use floating row covers to disrupt the life cycle of the moths and prevent them from laying eggs on small seedlings.

Cabbage moths are territorial and are not likely to lay eggs where they see another cabbage moth. Some gardeners place decoy moths in their garden beds.

When there is an infestation we can hand pick and squish, put in soapy water, or feed to chickens. Make sure to check the undersides of leaves, inside tight new growth, and along stems/veins.

Damage is only detrimental to small seedlings if too much leaf material is consumed. For larger plants, damage is only cosmetic. Leaves with holes/damage are still safe to eat!

Fun fact: Cabbage worms are less likely to eat purple/red varieties! One theory is because they are more easily spotted they are not able to hide from predators, another is that anthocyanin (a flavonoid in red/purple veggies) is mildly toxic to caterpillars.

**Aphids**

Aphids will feed on almost any plant in the garden, with preference to leafy greens like kale, collards, cabbage, bok choi, spinach, lettuce, and milkweed.

Aphids suck on leaves which can cause stunting and will damage leaves. A large infestation, particularly on a young or small plant, can cause death. Aphids also spread disease from plant to plant.
Aphids can be many colors including green, white, black, and orange. They produce a sticky residue that attracts ants, so you may see aphids and ants colonizing together. Look for **curled or crumpled leaves**. Squish by hand or blast off with water.

Soap spray for large infestations: 1 TBSP peppermint castile soap in 1 quart of water. Or purchased insecticidal soap spray, properly diluted. Apply soap later in the day if possible, to avoid sunburn on leaves and to avoid harming beneficial insects. Be sure to spray ALL surfaces of the plant – both sides of leaves, in buds and shoots.

Lacewings and ladybugs eat aphids.

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**Cucumber Beetles (Striped and spotted)**

True to their name, cucumber beetles live on cucurbits including cucumbers, melons, summer and winter squashes. Cucumber beetles quickly transmit diseases such as bacterial wilt and mosaic virus between plants. (See disease management section for more information on these).

Cucumber beetles lay their eggs in the soil around the base of cucurbit plants, larvae feed on roots and stems of plants before pupating in the soil. Adults emerge, feed on leaves and flowers, and continue the cycle.

Look for cucumber beetles on both sides of leaves, inside flowers, and in the soil around the base of the plants (particularly in the heat of the day).

To prevent cucumber beetles from colonizing on young plants, always use row cover on cucurbits until the plants begin to bud and flower.

To manage a cucumber beetle infestation, hand pick into soapy water.

Tansy is said to repel cucumber beetles.
**Squash Bugs**

Squash bugs may be found on pumpkins, winter squash, and zucchini. Pupae are small and gray and can be found in clusters on the undersides of leaves. Also look for yellow or bronze eggs on the undersides of leaves.

Squash bugs suck the sap from leaves, causing wilting and black crisp areas. They may also feed directly on fruits.

Cover all cucurbit transplants to attempt to disrupt the lifecycle. Uncover when plants are flowering to allow for pollination.

If there is an infestation, hand pick and remove adults, nymphs, and eggs. If there is a large infestation, we may spray neem oil to disrupt squash beetle feeding.

**Squash Vine Borer**

Vine borer only affects summer and winter squash and pumpkins. This moth lays tiny rust colored eggs near the base of a plant, and the larvae burrows into the vine causing wilt.

Use row cover until plants are budding/flowering. After uncovering plants, some gardeners wrap tin foil or florist tape around the base of the plant slightly below the soil line.
to prevent the female from laying eggs on this main stem.

Look for wilted areas of the plant. If you see sawdust-like frass near a stem, slice the stem open until you find the larvae – remove and destroy the larvae and then bury the slit in the stem.

Vine borer may be deterred by companion planting with plants with strong smells like tansy, marigold, or some herbs.

**Stink Bugs**

Stink bugs eat from tomato fruits, resulting in cloudy spots of discoloration. However, they may also be considered beneficial since they also eat other pests such as caterpillars.
**Flea Beetle**

Flea beetles are not picky and will munch on most any crop in the garden. We commonly see damage on brassicas like radish tops and kale, as well as potato leaves. The damage itself is usually not detrimental to plants, but flea beetles may transmit bacterial wilt or leaf blight. Look for small irregular holes in leaves.

Flea beetles are deterred by many pungent herbs including dill, parsley, and mint.

Leaving clean soil with no debris at the end of the season is the most effective way to prevent the first flush of flea beetles.

**Whiteflies**

Whiteflies are soft-bodied, winged insects related to aphids. We often see whitefly infestations on kale in the warmer months, but they may be found on many plants throughout the garden. Whiteflies suck on leaves of a plant, which may only cause cosmetic damage on larger plants. Leaves may turn yellow or pale and wilted.

Look on the undersides of leaves for all stages of the whitefly life cycle. Freshly hatched eggs immediately begin to feed on leaves – look for pale yellow or brown eggs and small white ovals (newly hatched) in cluster patterns. If adult whiteflies are feeding, simply touching leaves of an infested plant will cause them to fly away.

Similar to aphids, whiteflies can be sprayed off with water or insecticidal soaps. Make sure you completely coat both sides of the leaves with soaps, preferably later in the day when temperatures are cooler to avoid burning plants.
Beneficial insects

**Lacewings** eat aphids and other soft bodied insects. Eggs are on small 'stalks' hanging from leaves.

![Lacewing](image)

**Ladybugs** eat aphids and other soft bodied insects. Eggs are yellow and laid in tight upright clusters.

![Ladybugs](image)

Other beneficial insects include spiders, parasitic wasps, hover flies, and dragonflies.