

Vegetable “CSI”

Getting to the
Root of the Problem



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The First Step in Diagnosing Plant Problems is to Ask Questions.

- What is the plant?
- Is it newly planted or established?
- Was it planted correctly?
- The right plant in the right place.
- Know current and past weather conditions.
- Know what the plant looks like when healthy.
- Know what it should look like at the current time.
- What are the signs and symptoms?

“Disease Symptoms”

What happens to the injured plant.

- Leaf spots, necrosis, cankers, galls, and rotted roots.



“Insect Symptoms”

What happens to the injured plant.

- Sooty mold, frass, leaf mines, egg laying injury, and feeding injury.



“Disease Signs”

Where the pathogen is visible.

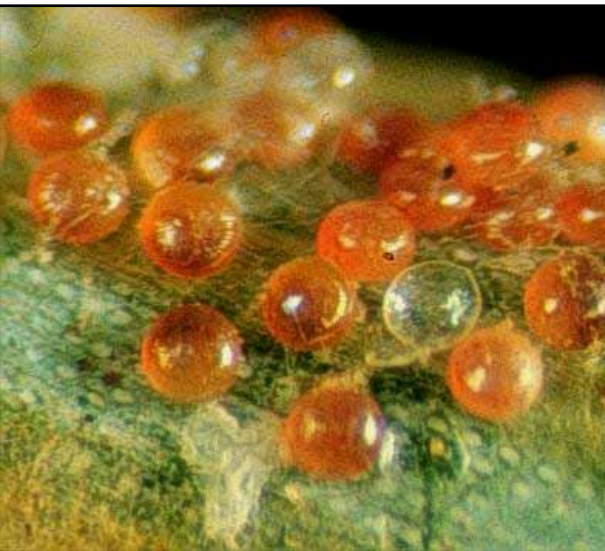
- Spore masses, mycelium, mushrooms, and conks.



“Insect Signs”

Where the pest is visible.

- Cast skins, active pests, pupa cases, and eggs.



Vegetable Feeding Injury Symptoms from Chewing Pests



Feeding Injury Symptoms from Sucking Insects

(Aphids, plant bugs, stink bugs
scale insects, and whiteflies)



True bugs have
beak-type
mouthparts.



Predaceous stink bug feeding on a caterpillar.

Spined Soldier Bug

UGA1410052

Insect Egg Identification

- What is the plant?
- On what part of the plant were the eggs found?
- What color are the eggs?
- How are the eggs arranged?







Harlequin Bug



Squash Bug



Spined Soldier Bug



Preying Mantis



Green Lacewing



Preying Mantis



Colorado Potato
Beetle



Leaffooted Bug



Lady Beetle

- **Symptoms:** Holes in leaves and fruit.
- The frass on the leaf is a good clue to the culprit!
- Is this damage caused by:
Colorado Potato Beetle or **Variegated Cutworm?**



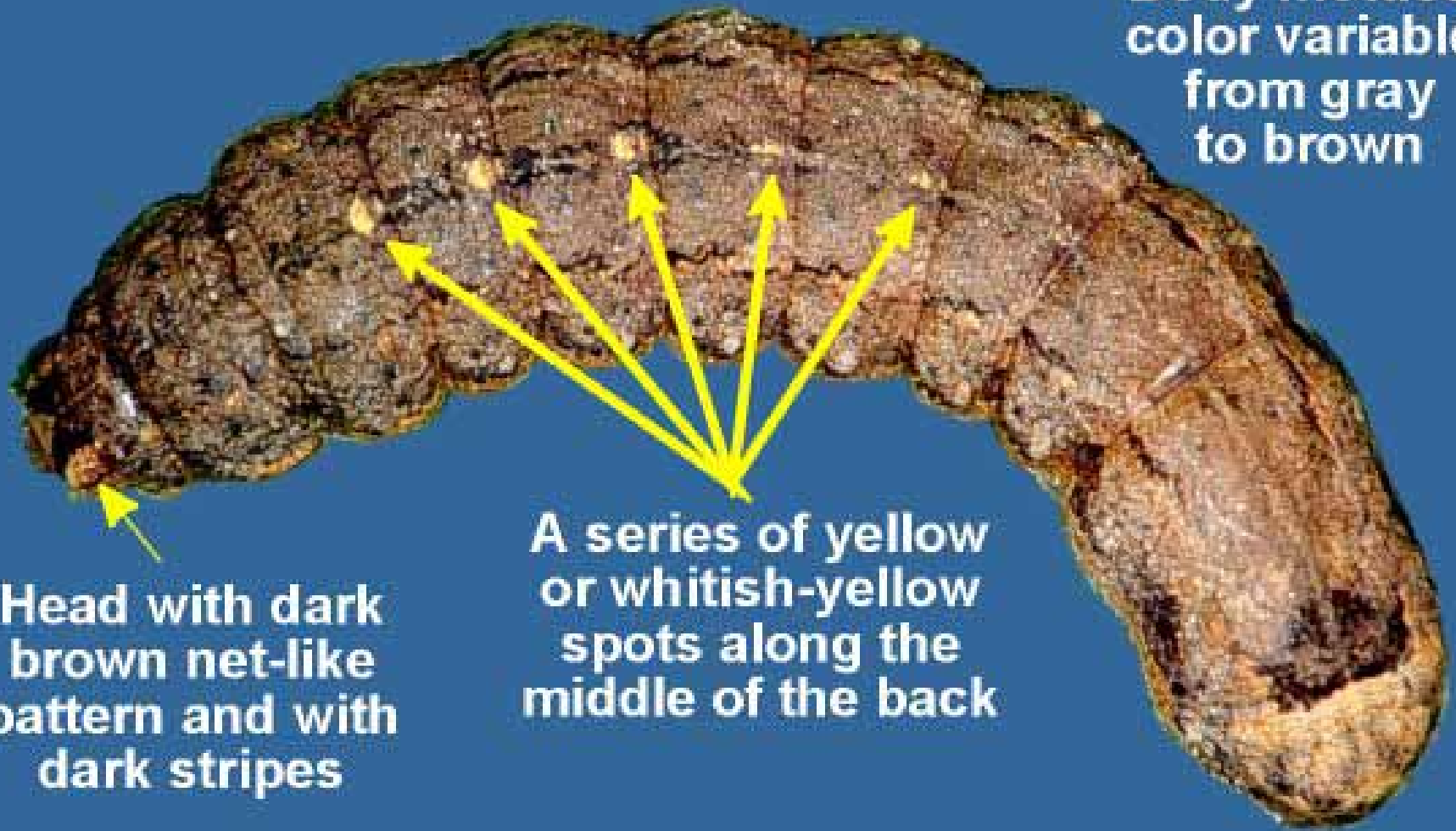
Variegated Cutworm

Variegated Cutworm Fruit Damage



Variegated Cutworm Identification

Body mottled;
color variable,
from gray
to brown



Head with dark
brown net-like
pattern and with
dark stripes

A series of yellow
or whitish-yellow
spots along the
middle of the back

On Site Plant Diagnosis

- **Problem:**
- 10% of lettuce is wilting. Outer leaves are ragged.





1st Step: Look for signs and symptoms

- **Symptoms:**
- Wilted Leaves,
No signs or symptoms of insects.
- **Roots:**
- White,
No Root Rot.

Below Ground Feeding Injury Observed



**Larva of White Fringed Beetle
found inside of stem.**



A close-up photograph of a white fringed beetle larva's head, showing its chewing mouthparts. The mouthparts are dark, sclerotized structures, including the mandibles and maxillae, which are positioned centrally on the head. The surrounding tissue is a pale, yellowish-orange color, and the entire head is covered with fine, hair-like bristles. The background is a soft, out-of-focus orange-brown.

**Close up of chewing mouthparts
of white fringed beetle larva.**

Whitefringed Beetle

- All adults are females and are incapable of flight.
- Eggs are laid in masses on stems and in cracks in the soil.
- Locating larvae consist of recognizing plants that are not dead, but are just beginning to show signs of wilting, and digging around the roots for the larva.



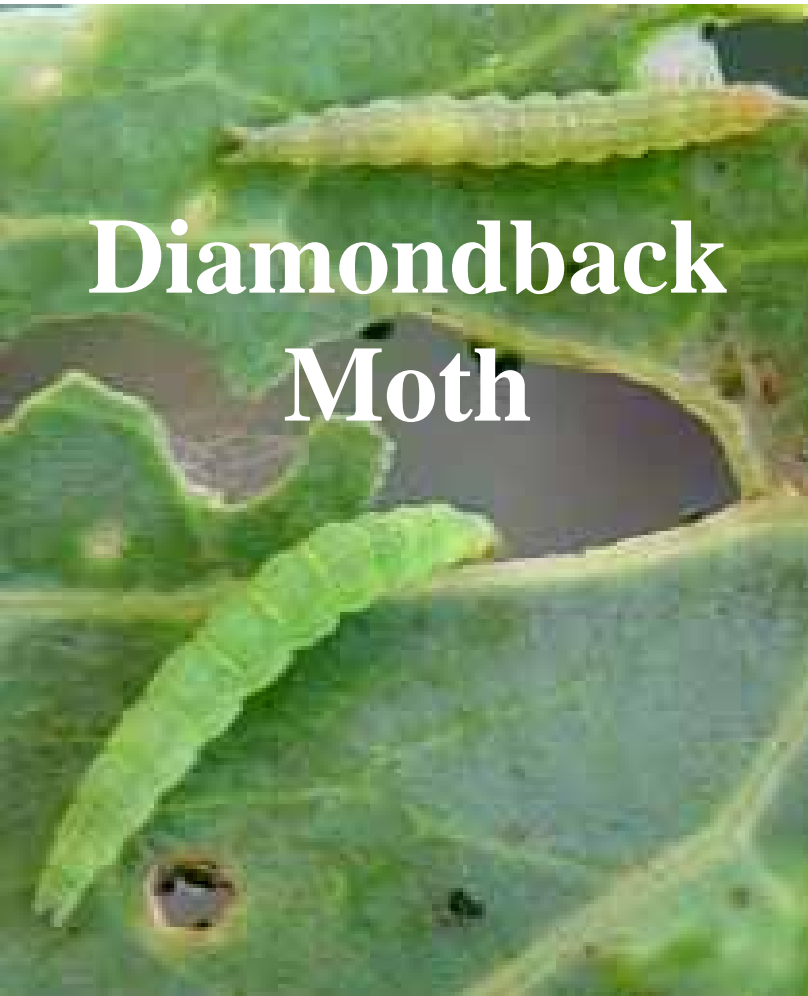
What insect causes this type of feeding injury on cruciferous crops?



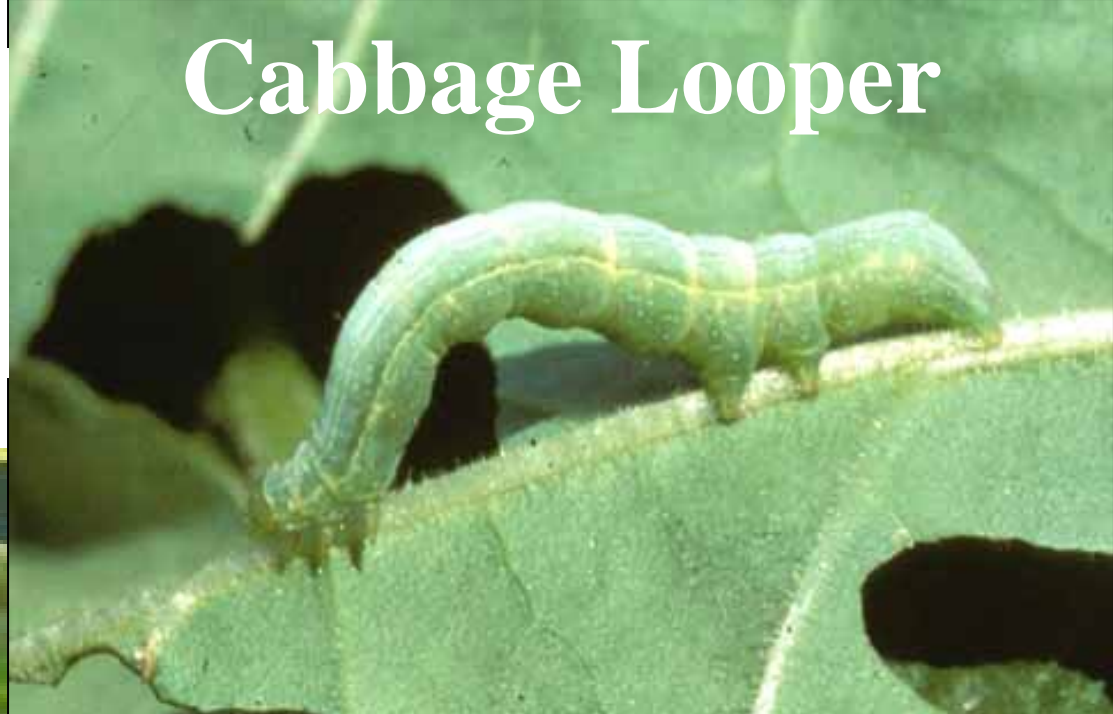
**Flea
Beetles**



Feeding injury is often confused with these caterpillars.



Diamondback Moth



Cabbage Looper



Imported Cabbageworm



Eggs



Diamondback Moth - Imported Cabbageworm - Cabbage Looper



Flea Beetles

- Adults chew tiny holes in leaves.
Larvae feed on roots of host plants.
- Can transmit viral and bacterial diseases.
- Eggs are laid in cracks in the soil at the base of the plant.
- **Adults overwinter in garden weeds, grass, and leaf litter.**



What insect causes this type of feeding injury on cucumbers, squashes, melons, and pumpkins?



Cucumber Beetle Feeding Injury



Cucumber Beetles

- Adult beetles feed on young seedlings, leaves, flower petals, and fruit; larvae feed on roots and stems.
- Eggs are laid in the soil near the base of the plant.
- Adult beetles can transmit bacterial wilt and squash mosaic virus. **Overwinter as adults.**

Striped Cucumber Beetle



Spotted Cucumber Beetle



What insect causes this type of feeding injury on potato, tomato, eggplant, and pepper?



Colorado Potato Beetle

- Adults and larvae feed on leaves of potato, tomato, eggplant, and pepper.
- Has developed resistance to insecticides that are used repeatedly for control.
- **Overwinters as adult.**



What insect causes this type of feeding injury on various vegetables?



Garden Fleahopper

- Found on various vegetables, weeds, and ornamental plants.
- Are plant bugs that feed by piercing the leaves with their sucking mouthparts to extract plant sap.
- Nymphs emerge in the spring from the overwintering eggs.



What insect causes this type of feeding injury?



Stink Bugs

- Feed on over 52 plants, including native and ornamental trees, shrubs, vines, weeds, and many cultivated crops.
- Nymphs and adults pierce plants with their needlelike mouthparts and suck sap from pods, buds, blossoms, and seeds.
- Stink bugs overwinter as adults

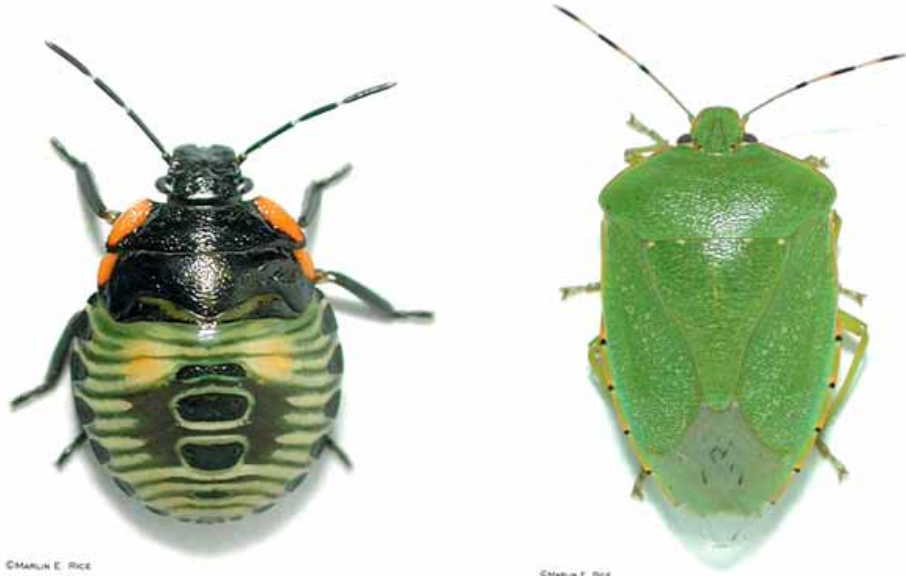




Nymphs to Know



Green Stink Bug



Brown Stink Bug



Southern Green Stink Bug



Harlequin Bug



J. K. Barnes

“Good
Versu
S
Evil”

**Predaceous bug
attacking stink
bug nymph.**



Predaceous stink
bug larva feeding
on lady beetle larva.



Aphids

- Soft-bodied insects that use their piercing, sucking mouthparts to feed on plant sap.
- Feeding often causes leaves to curl and become deformed.
- Some aphids are very important vectors of plant viruses.



Healthy Aphid



Parasitized Aphid

Spider Mites

- Feed on the foliage of nearly all vegetables, flowers, trees and shrubs.
- Their piercing-sucking mouthparts puncture plant tissue and remove liquids within the cells.
- Feeding injury is referred to as stippling.



Hornworms

- Hornworm adults are moths.
- They overwinter in the soil as a pupae.
- Preferred plants are tomato, egg plant, and pepper.

Tomato Hornworm

Tobacco Hornworm



Parasitized Hornworm

Braconid Wasp Cocoon



Photo by David Cook

Parasitized Hornworm

Adult Wasp



Emerging Larva



Photo by David Cook

Cocoons



Photo by David Cook

Summary

- Diagnosing plant problems is a learnable skill that gets easier with experience.
- Knowing the host plant and the type of damage is the first step in determining the cause of the problem.

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