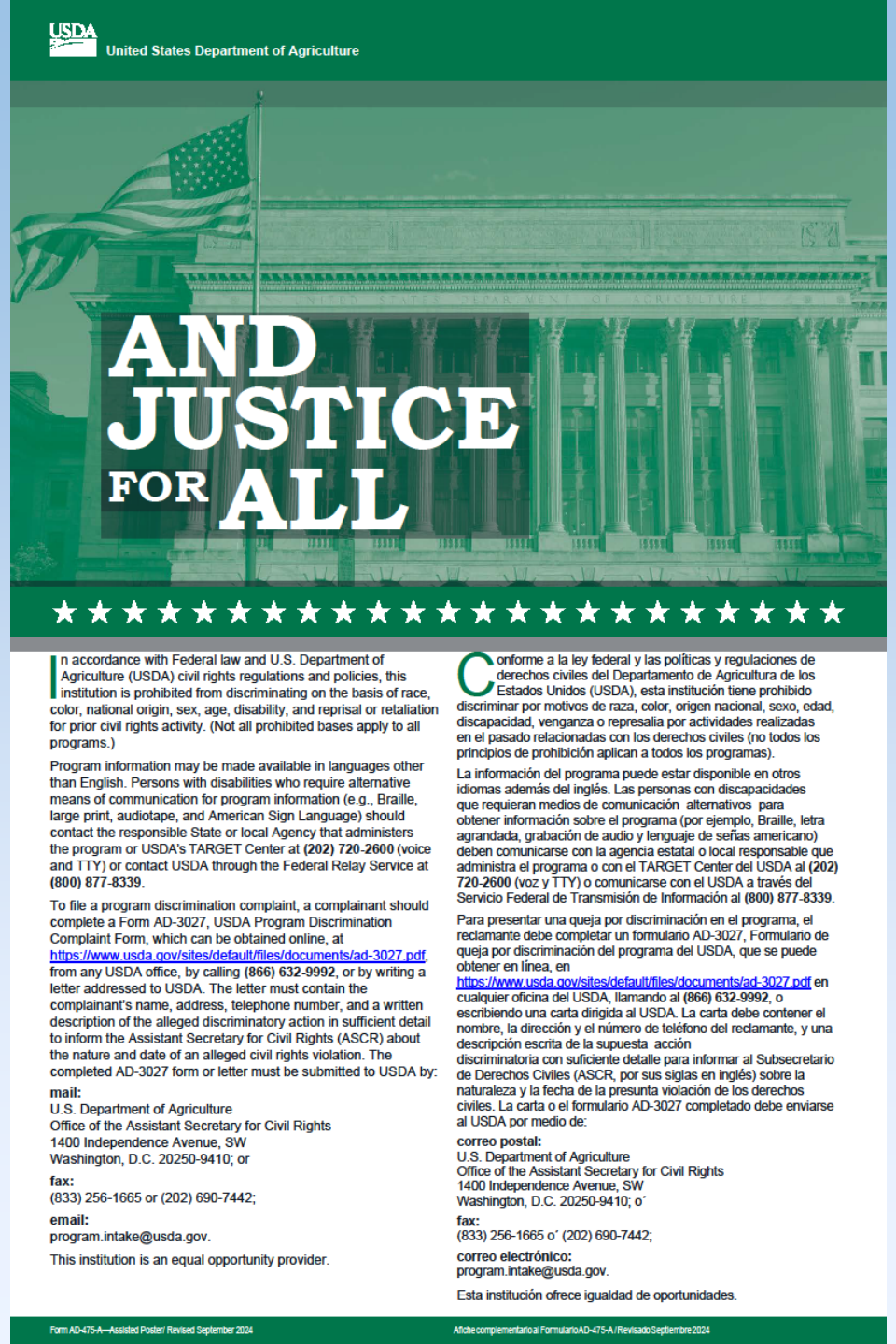
# Vegetable Garden Problems

## Charles County Maryland Master Gardeners

UNIVERSITY OF MARYLAND EXTENSION

GROW IT · EAT IT

A MASTER GARDENER PROGRAM

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MASTER GARDENER

## Charles County Master Gardeners
## GROW IT EAT IT (GIEI) Education Project Team

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# Welcome

- The mission of the University of Maryland Extension Grow It Eat It (GIEI) Program is to promote backyard and community food production.
- Master Gardeners teach classes and workshops, develop demonstration gardens, and educate Marylanders on how to produce their own affordable and healthy food using sustainable gardening practices in their homes, communities, and school gardens.

https://go.umd.edu/giei

# Tentative Agenda

- 10:00 – 10:10 -- Introductions – Maryland's HGIC and Ask Extension Program
- 10:10 – 10:30 -- General Problems of Vegetable Gardens
- 10:30 -10:55 -- Common Problems of Tomatoes
- 10:55 – 11:05 -- Questions
- 11:05 – 11:15 -- **BREAK**
- 11:15 - 11:25 – Other Vegetable Problems –Pests
- 11:25 - 11:35 – Other Vegetable Problems –Diseases
- 11:35 – 11:45 -- IPM and Resources
- 11:45 – 12:00 – Plant Clinic – What's "bugging" You?

# General Considerations for Vegetable Gardens

- **<u>Strong Plants are less susceptible to diseases and pests! Create a Healthy Plant Environment.</u>**

- Climate – Plant crops in the right season – cool or warm
- Location – Make sure your veggie plants have the right amount of sunlight
- Spacing – allow for proper spacing
- Water – water adequately and correctly (morning and evening are best; avoid overhead watering)

**Soil – Provide good soil with the right nutrients and structure. Get a soil test and follow recommendations.**

# General Garden Considerations, cont'd

Frost damage on tomato plant

**Symptoms affecting more than one plant species may indicate cultural and environmental problems (abiotic-not related to insects or diseases)**

**The majority of plant issues are not caused by diseases or insects. Problems may be caused by non-living (or abiotic) factors:**

- Excessive cold or heat
- Nutrient deficiencies
- Herbicide damage
- Drought or excess moisture
- Wildlife or pets

Herbicide damage on tomato

Phosphorus deficiency on tomato

# General Garden Considerations, cont'd

Tomato Blossoms Dropping
Photo University of MN Extension

**Excessive Heat -- Sustained hot temperatures (more than 85° F in the day and 70° F at night) can cause many vegetable plant problems:**

- Flowers drop before pollination
- Reduced bee activity results in deformed fruits on pollinator-dependent crops
- Leaves curl to retain water
- Green tomatoes don't ripen
- Squash produces more male flowers

Leaves curl on plants to retain water. This usually won't harm to plant

Poor fruit pollination
Photo University of MN Extension

**What to do?**

- Check moisture levels often
- Consider shade cloth over crops
- Be patient – cooler weather will salve most of these problems

Tomato Plants covered with 30% Shade cloth

# General Garden Solutions

- Prevent and manage pests using biological, physical, and cultural methods

  - Select resistant varieties
  - Monitor plants regularly, including leaf undersides, to catch pests and diseases early
    - Signs versus symptoms (e.g., eggs vs. chewed leaves)
  - Remove nearby weeds, mulch, etc. that harbor garden pests
  - Hand-pick pests if possible
  - Prune out diseased portions of plant and dispose of these properly (generally do not compost)

# General Garden solutions - Barriers

Consider barriers such as floating row over, insect netting, and fencing to exclude pests

- **Insect netting-** woven polypropylene
- Protects crops <u>without temperature increase</u>
- Openings should be <1 mm to exclude thrips, aphids, and small flies

**Row Cover -** Spun-bonded polyester material
Secured to ground; floats on crop or over a frame.
Excludes insect pests and wildlife
Increases crop growth in spring and fall

# Biological Control

***The enemy of my enemy is my friend*** – *Ancient proverb*

- **Predators** eat pests; **Parasitoids** lay their eggs on or in pests

Plant a variety of annuals and perennials around vegetable beds to provide nectar and pollen for natural enemies and pollinators

Tachinid fly

**Avoid broad-spectrum pesticides that target a wide range of insects. They can kill beneficial bugs.**

Two-spotted stinkbug spearing a Colorado potato beetle larva

# Common Problems of Tomatoes, Foliar

## Septoria Leaf Spot

- **Symptoms:** small, round gray spots with dark margins develop on the lower leaves, usually when the first fruits begin to form.

- Septoria leaf spot is caused by a fungus, *Septoria lycopersici*. The pathogen is favored by wet weather.

- Fungal lesions gradually enlarge, coalesce, and cause leaves to turn yellow and die.

Tiny black pycnidia (fungal fruiting bodies) can be seen in the lesions

# Common Problems of Tomatoes, Foliar

## Early Blight (Alternaria Leaf Spot)

*A severe early blight infection*

Early blight begins as small brown spots on older leaves that quickly enlarge and coalesce. A yellow halo usually surrounds the lesions.

- The disease can also move to stems and fruits and produce dark lesions. When leaves die, fruits become more vulnerable to sunscald. Infected, dead leaves may stick to fruits.

- The disease can spread during wet or dry weather but is favored by rainfall and heavy dews.

- The disease spores are wind-blown, allowing the disease to spread through a garden or neighborhood.

# Common Problems of Tomatoes, Foliar

## Management of Septoria Leaf Spot and Early Blight

Try planting resistant varieties, and space plants at least 2 ft. apart

Remove lower leaf branches when plants are established

Water at plant base -- avoid overhead watering

Spray with fixed copper fungicide or Bacillus amyloliquefacien; Spray early in the season as soon as first symptoms are seen even preventatively where it is chronic.

Diseased plant parts can be only shredded and composted if "hot composting" techniques are used. Otherwise, bag them and put in the trash.

# Tomato Problems, PESTS

## Hornworms

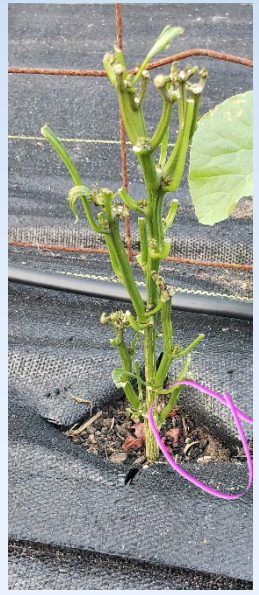
Tobacco Hornworm (red or pink horn) and Tomato hornworm (black horn) behave the same.

The Tobacco hornworm is actually more common on tomatoes in the southeast US.

Host Plants - Solanaceous plants: particularly tomato; less commonly on eggplant, pepper, potato.

Larvae feed voraciously on leaves and sometimes fruit.

Tobacco hornworm



Pepper plant defoliated by a hornworm, Note the characteristic dark frass (circled) – a sign of the pest.

# Tomato Problems, PESTS

- **Hornworms – monitoring and control**

**Green larval color is an effective camouflage, making the caterpillars difficult to detect.**

Feeding ordinarily begins at the TOP of the plant. Hornworms usually consume entire leaves, rather than chewing holes in them, and can rapidly defoliate plants.

Mostly interior leaves are eaten (vs. deer that browse on one side of plant).

Dark, BB-sized, cube shape droppings on leaf surfaces indicate late instar caterpillars feeding above.

Shining a UV light on plants at night can help you find hornworms

# Tomato Problems, PESTS

•Hornworms rarely warrant the use of an insecticide, but BT Bacillus thuringiensis can be effective. Look for the type that targets caterpillars that feed on vegetables, trees, and shrubs,

## HORNWORM CONTROL

Spraying water agitates hornworms and makes them easier to spot.

•Handpick caterpillars and drop them into a container of soapy water.

•Large hornworms are often parasitized by wasps. The cocoons of Braconid wasps look like grains of rice attached to the hornworm's back. Do not kill parasitized hornworms!

• Let the wasps complete their lifecycle so they can multiply. A parasitized hornworm stops eating and eventually dies.

# Tomato Problems, Pests

## Stinkbugs - damage

Many types of Stinkbugs, the ones most common on tomato are Brown Stinkbug, Green stinkbug, and Brown Marmorated Stinkbug

**Adults:** 5/8" shield-shaped bugs

Stinkbug damage on tomato

Piercing and sucking create superficial spots (white on young fruit or yellow on mature fruit) known as "cloudy spot" on tomatoes and other fruits

Cloudy spots in the fruit can be cut out. This does not affect eating quality

Brown Marmorated stinkbug

Green stinkbug

BMSB eggs and nymphs

# Tomato Problems, Pests

## Predatory Stinkbugs – the Good Guys

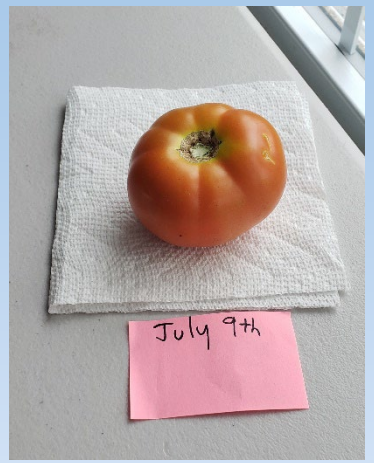
•Unlike other stinkbugs, predatory stinkbugs are a gardener's friend, , feeding on more than 100 species of insect pests

•Predatory stink bugs tend to have a shorter, stouter beak than the long, thin beak of plant-feeding stink bugs

•**Important species in Maryland**: Spined soldier bug, two-spotted stink bug

# Mitigate Pest and disease damage by picking tomatoes early and ripening indoors


Picked Husky Red tomato as color began to show July 7th. Placed indoors.




After two days
July 9th


After five days
July 12th


After eight days
July 15th – fully ripe

Volunteer tasters on July 15th agreed that it tasted the same as Husky Red tomato that was vine ripened

QUESTIONS?

BREAK

# COMMON PROBLEMS OF OTHER VEGETABLES

# Other Vegetable Problems - Pests

## Squash Bugs- Damage

Adult squash bug

***Host Plants*** - All cucurbits, especially squash and pumpkin. Also cantaloupe, cucumber, gourds, watermelon.

Squash bug feeding occurs primarily on leaves and stems but may also occur on fruit.

Adults and nymphs suck leaf sap leaving numerous small white dots, known as stipple

Large numbers of squash bugs will cause leaves to yellow and die


Stippling on leaves


Squash bug eggs and newly hatched nymph

# Other Vegetable Problems - Pests

## Squash Bugs - Management

Duct tape can be used to remove eggs and small nymphs Repeat frequently to stay ahead of hatching

- Cover plants to prevent egg-laying – must be removed for pollination in most cultivars

- Egg clusters are difficult to hand crush, so tear out that portion of leaf and destroy. Nymphs can be hand-crushed or drowned in soapy water.

- Neem, horticultural oil, and insecticidal soap are effective when sprayed directly on nymphs. Adults are very difficult to kill with the insecticides available to home gardeners.

- Trap adults and nymphs by placing boards near host plants under which they will hide. Lift boards and destroy bugs in the morning

# Other Vegetable Problems - Pests

**Squash Vine Borer**

***Host Plants*** - Summer and winter squash and pumpkin. Very rarely in cucumber, gourd, and melon

Photo credit E.C.Burkness Univ of MN

Tunneling larvae push greenish white sawdust-like frass (excrement) out the entrance hole.

The stem area near the entrance hole(s) will feel mushy.

Plant's runner or entire vine wilts quickly from larval feeding within stem.

Adult Squash Vine Borer

# Other Vegetable Problems - Pests

## Squash Vine Borer – Management

- To prevent egg-laying, wrap a collar of aluminum foil around lower stems

- Cover plants with floating row cover or insect netting until flowering.

- For active borers, make a vertical slit upward from where frass is observed. Cut half-way through the stem. Remove and kill borer. Mound soil over the wound to induce supplemental rooting.

Photo credit J. Hahn Univ of MN

Photo Credit D. Emelio

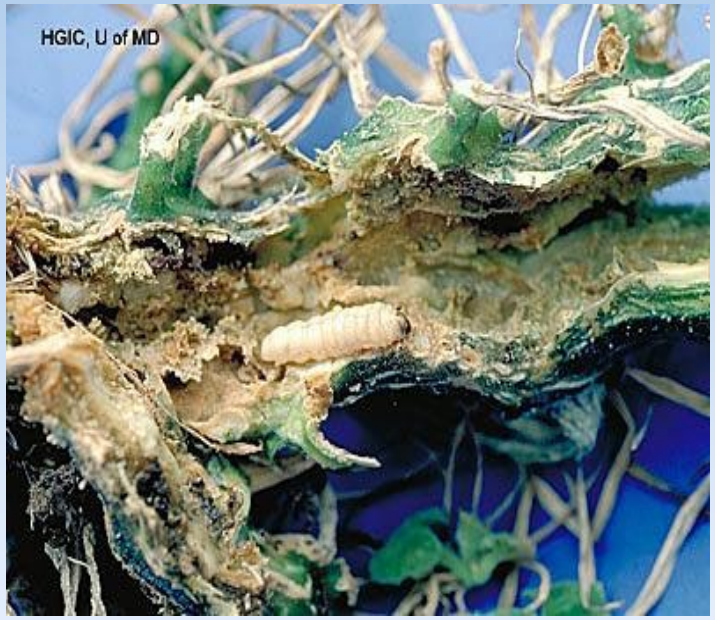
# Other Vegetable Problems - Pests

**Squash Vine Borer – Management**

Spray lower plants stems and base of plant with pyrethrins when adults are flying (mid-late May), or sprinkle diatomaceous earth on lower stems.

Bt (*Bacillus thuringiensis*) or beneficial nematode (*Stinernema carpocapsae)* can be injected into wound to kill borers.

Seal up infested vines in plastic bag before larvae pupate (break life cycle.)



# Other Vegetable Problems - Pests

## Cucumber Beetles

Spotted Cucumber beetle

- Major pest of all cucurbits. Spreads bacterial wilt disease to cucumber and muskmelon and, to a lesser extent, summer squash.
- Adults survive the winter in weeds and plant residues. ; 2-3 generations per year
- Feed on all plant parts
- Attracted to bitter compounds, cucurbitacins, which they absorb
- Orange-yellow eggs laid at base of host plants or under soil

Striped Cucumber beetle

# Other Vegetable Problems - Pests

## Cucumber Beetles Control

- Prevention and early control are essential. In fall, remove garden debris (overwintering sites). In fall or spring, it can be helpful to lightly till soil to kill eggs and larvae.
- Use row covers over susceptible plants until they bloom.
- Spray with pyrethrum or neem products when seedlings emerge or transplants are planted.
- Avoid this pest by planting susceptible crops around June 15, after overwintering adults have emerged and dispersed elsewhere.

# Other Vegetable Problems - Pests

## Flea Beetles

Host Plants -Eggplant, corn, and cabbage family (i.e. cabbage, broccoli, and cauliflower) are very susceptible, but flea beetles feed on almost every other vegetable to some degree

- Adult feeding riddles leaves with small feeding holes that create a shot-hole effect.
- When foliage is disturbed, tiny beetles jump off in all directions.
- Larvae feeding on roots can lower yields. Adults can transmit viral or bacterial diseases.

# Common Vegetable Problems, Diseases

## Blossom End Rot

NC Extension

**Symptoms:**

- dark, leathery, sunken areas on the blossom end of the vegetable, most prevalent on enlarging fruit.
- Caused by a lack of calcium in cell walls due to environmental stress such as inconsistent or shallow watering and drought conditions.

# Common Vegetable Problems, Diseases

## Blossom End Rot

**Management:**

- Remove and discard affected fruit.
- Keep plants well-watered and mulched.
- Add Dolomitic Lime or Gypsum (depending on your Garden pH) to help plants take up Calcium.

# Cucumber Problems

## Downy Mildew

UMD HGIC

**Symptoms:**

- Yellow angular spots between the leaf veins. Undersides of the leaves have fuzzy gray spots.
- Moisture, high humidity and cool temperatures (60F) favor development of this disease.
- Spray a fungicide as soon as symptoms are spotted.
- Remove infected plants and place in trash.

# Home Remedies versus labelled Products

Many online sources suggest "home remedies" using household products to help with garden pests and diseases

In some cases, there is scientific evidence to support these recommendations, but often there is not

Always use EDU and GOV sources to verify information about managing garden problems.

it is illegal to use EPA-registered pesticides contrary to their label. However, it is not illegal to use non-registered products for pest management.


*Photo Univ of Utah Extension*

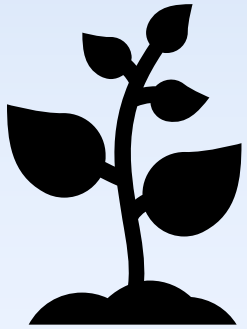
**REMEMBER –**
**The Label is the Law**

It is illegal to use EPA-registered pesticides contrary to their label. However, it is not illegal to use non-registered products for pest management.

# An Overall Strategy – IPM
# Integrated Pest Management

# What's Bugging You?

Your questions and Specimens



# Resources

- Charles County Master Gardener's Grow It Eat It webpage.
- Home and Garden Information Center | University of Maryland Extension (umd.edu)
- Ask Extension | University of Maryland Extension (umd.edu)
- Extensión en Español – Blogs de Extensión de la Universidad de Maryland (umd.edu)
- Key to Common Problems of Tomatoes | University of Maryland Extension
- Nutrient Deficiency of Vegetable Plants | University of Maryland Extension (umd.edu)
- https://youtu.be/q9mz-wKfylI
- Disease Resistant Vegetable Varieties | Cornell Vegetables
- UMDHGIC – YouTube
- National Pesticide Information Center - Home Page (orst.edu)
- Heat-tolerant vegetable crops and cultivars for the changing climate – Maryland Grows (umd.edu)
- Heatwave makes vegetables misbehave | UMN Extension
- The Value of Bacillus amyloliquefaciens for Crop Production
- Garden Home Remedies - Fact or Fiction? - UF/IFAS Extension Orange County

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# Some effective organic insecticides

- Pyrethrins- controls or suppresses a wide range of insects
- Neem extract – suppresses beetles and caterpillars
- Neem oil- insecticide and preventative fungicide
- Spinosad- controls beetles, caterpillars, flies, thrips
- Bacillus thuringiensis (Bt)- controls young caterpillars; suppresses large caterpillars
- Horticultural oil- controls aphids, mites, soft-bodied immatures
- Insecticidal soap- suppresses aphids, mites, soft-bodied immatures
- Surround (kaolin clay)- suppresses and deters insect pests

# UME Resources

UNIVERSITY OF MARYLAND EXTENSION | HOME & GARDEN INFORMATION CENTER

go.umd.edu/hgic

ASK EXTENSION
SEND YOUR GARDENING QUESTIONS

go.umd.edu/askextension

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# Other Vegetable Problems - Pests

## Colorado Potato Beetle - Damage

HOST PLANTS - Eggplant is a favorite. Also eats potato, pepper, tomato, and other solanaceous plants

Adults and larvae chew holes in leaves, terminals, and fruit. Most damaging when plants are young.

After defoliation is complete, stems and even potato tubers may be gnawed

- Watch for clusters of small orange eggs laid on leaf undersides. Feeding damage will be quickly evident.
- Slow-moving adults and congregating larvae are easily spotted.

*(Photo credit: J. Obermeyer Purdue University Extension)*

# Other Vegetable Problems - Pests

**Colorado Potato Beetle - Management**

Locate and crush eggs, larvae, and adults often and early in season to effectively prevent later generations. Slow-moving adults do not disperse far.

Use floating row covers or insect netting to exclude the beetles.

Spinosad and neem products are effective organic insecticides for controlling larval stages. Diatomaceous earth can also help.

# Common Vegetable Problems, Diseases

## Anthracnose

Symptoms:

- Sunken, dark spots caused by fungal disease.
- Affected crops include pepper, bean, tomato, eggplant, cucumber, watermelon, pumpkin, spinach, and peas.
- The fungus overwinters in seeds, soil, and plant residue.

# Common Vegetable Problems, Diseases

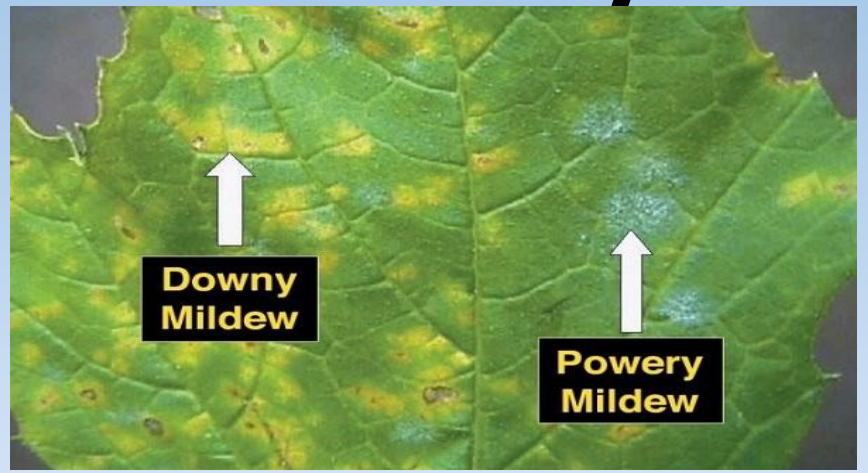
## Anthracnose

**Management:**

- Add a layer of mulch under plants to stop soil splashing on plants.
- Avoid overhead watering during humid, cloudy weather.
- Use a fungicide spray.
- Remove all plant residue at the end of the growing season.

# Cucumber Problems

## Downy Mildew on Cucumbers




**Management**

- Spray a fungicide as soon as symptoms are spotted.
- Remove infected plants and place in trash.

# Other Vegetable Problems - Pests

## Flea Beetles