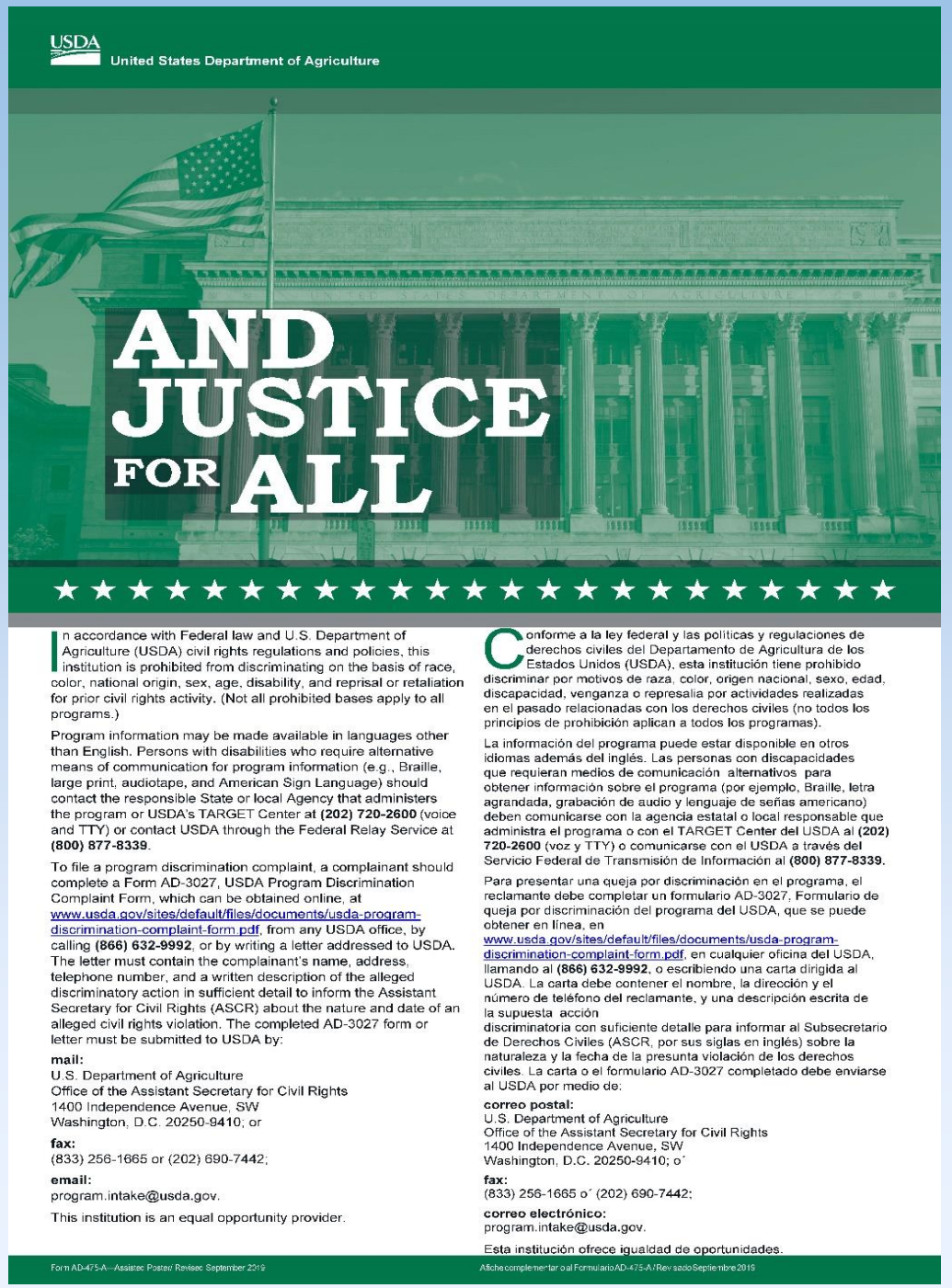
Vegetable Garden Problems

Charles County Maryland Master Gardeners

UNIVERSITY OF MARYLAND EXTENSION

GROW IT · EAT IT

A MASTER GARDENER PROGRAM



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UNIVERSITY OF MARYLAND EXTENSION | MASTER GARDENER

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UNIVERSITY OF MARYLAND EXTENSION

MASTER GARDENER

Charles County Master Gardeners
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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

Agenda

- 9:30 – 9:45 – Introductions – Maryland's HGIC and Ask Extension Program
- 9:45 – 10:00 – General Problems of Vegetable Gardens
- 10-10:20 – Common Problems of Tomatoes
- 10:20 – 10:40 – Questions
- 10:40 – 11: 00 – Common problems of other vegetables
- 11:00 – 11:10 – BREAK
- 11:20 – 11:30 –Questions And Resources Slide
- 11:30 – 12:00 – Plant Clinic – What's "bugging" You?

What are HGIC and Ask Extension?

The University of Maryland Extension Home and Garden Information Center (HGIC) includes:

- Gardening & IPM pages
- Maryland Grows blog (also Extensión en Español)
- HGIC YouTube channel UMDHGIC - YouTube
- HGIC Quarterly Newsletter – Subscribe!
- Social Media pages
- Ask Extension- answers to garden and pest questions

HGIC Ask Extension -- How Does It Work?

Maryland residents can submit questions and photos and receive email answers.

Follow "tips for submitting photos" link on Ask Extension

Provide context for your question -- information beyond "what is this?" and your photos

Questions can be private, or they can become a part of the Ask Extension Knowledgebase, where you can search answered questions

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 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

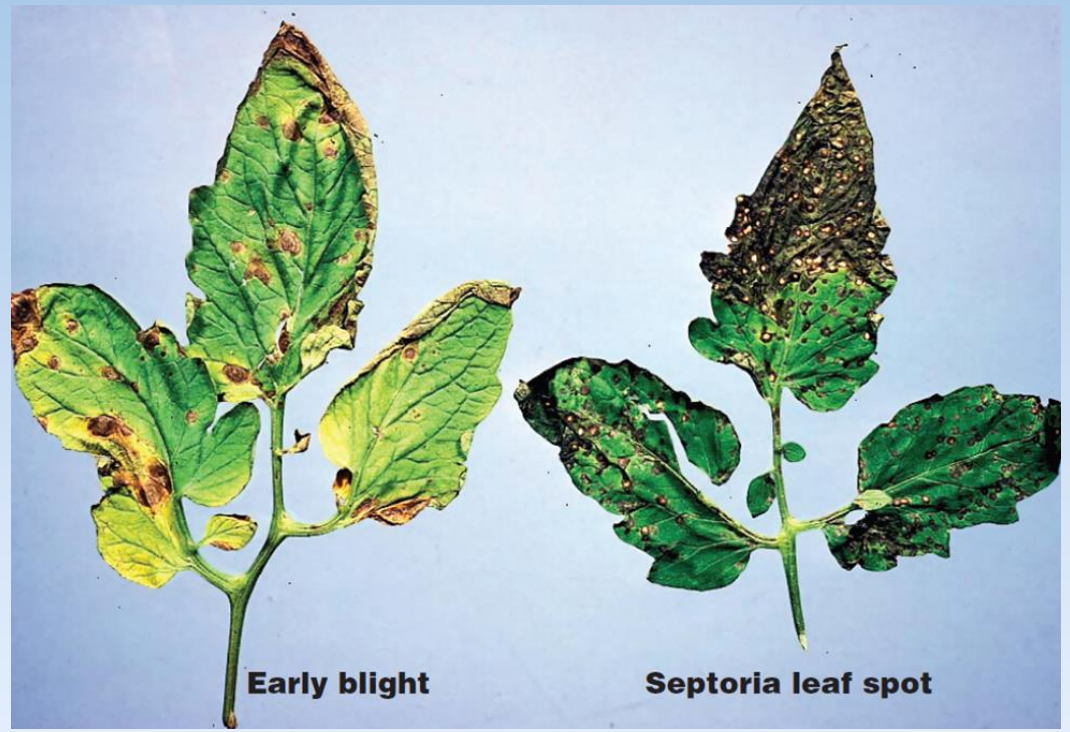
Plant a variety of annuals and perennials around vegetable beds to provide nectar and pollen for natural enemies and pollinators

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



Early Blight and Septoria Leaf Spot

Early Blight and Septoria Leaf Spot often co-occur and are generally managed in the same way.

Photo credit University of Wisconsin Cooperative Extension

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 co

Common Problems of Tomatoes, Foliar

Early Blight (Alternaria Leaf Spot)

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

A severe early blight infection

•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; other organic sprays have not proven effective. 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.

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.

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.

Hornworms

Joyce Browning Horticulturist, Master Gardener Coordinator
https://youtu.be/q9mz-wKfylI

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

Other Tomato Problems
Fusarium Wilt

Symptoms:

- Leaves turn yellow and then brown. Usually on one side of plant at first. Leaf and stem wilting with recovery at night. Eventual death of whole plant.
- Caused by a soilborne fungus, *Fusarium oxysporum* sp. *lycopersici*.
- When the outside of an infected stem is scraped there is browning of the vascular tissue underneath.
- This is the most common wilt disease of garden tomatoes in Maryland.

Other Tomato Problems
Fusarium Wilt

Management

- Grow Fusarium resistant varieties.
- Under severe disease pressure, even plants with resistance may exhibit symptoms.
- No treatment available to stop this disease.
- Rotate tomato plants to another part of the garden or grow plants in containers with sterile potting mix. Grafted plants are also an option.
- Pull up and discard infected plants. Sterilize all plant growing equipment and supplies with a 10% chlorine bleach solution.

QUESTIONS?

COMMON PROBLEMS OF OTHER VEGETABLES

Other Vegetable Problems - Pests

Root Knot Nematodes

Symptoms:

- Stunting and yellowing of plants. Wilting and death of plants can occur.
- Nematodes live in the soil, enter plant roots as tiny larvae, and cause swellings (root knots) that can be easily seen. They prefer sandy soils.
- Each female can produce one egg mass containing from 300 to 500 eggs.

Other Vegetable Problems - Pests

Root Knot Nematodes

Management

- Plant only resistant varieties of susceptible plants.
- No chemical treatments are available to home gardeners. Pull up and remove infested plants and put in trash.
- Other plants (such as marigolds)when used as a cover crop produce compounds that suppress root-knot nematodes.

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.

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.

Stippling on leaves

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

Squash bug eggs and newly hatched nymph

Other Vegetable Problems - Pests

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

Squash Bugs - Management

•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 Bugs - stages

Bug of the Week, Dr. Mike Raupp, University of MD

https://youtu.be/WC3A4WsN8og

Other Vegetable Problems - Pests

Squash Vine Borer

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

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.

Photo credit E.C.Burkness Univ of MN

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

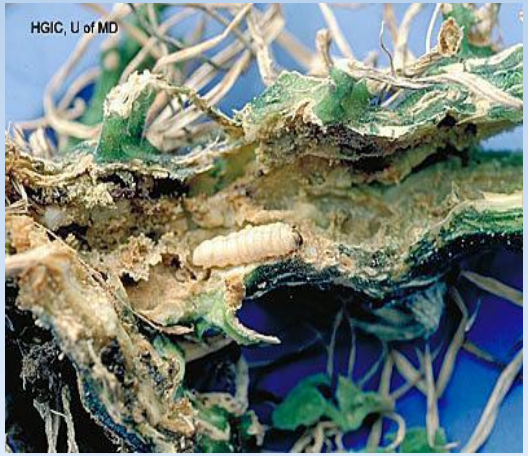
Other Vegetable Problems - Pests

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

Spotted Cucumber beetle

Cucumber Beetles

- 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.

Other Vegetable Problems - Pests

Flea Beetles

https://youtu.be/n3aExBoMYyY?si=jy2AGZWK8dzO6G5j

Common Vegetable Problems, Diseases
Blossom End Rot

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.

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:

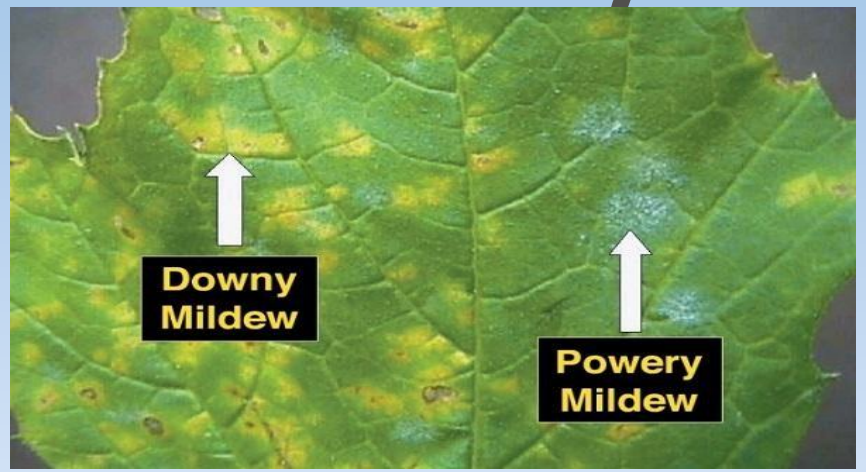
- Add a layer of mulch under plants to stop soil splashing on plants.
- Avoid overhead watering during humid, cloudy weather.
- Use a fungicide spray.
- Remove all plant residue at the end of the growing season.

Cucumber Problems
Downy Mildew

Symptoms:

- Yellow or tan angular spots between the leaf veins are visible on upper surface of older leaves in early-late summer.
- The undersides of the leaves have fuzzy gray spots.
- Downy mildew is caused by water mold (fungus-like) pathogen.
- Moisture, high humidity and cool temperatures (60F) favor development of this disease.

Cucumber Problems
Downy Mildew on Cucumbers



Management

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

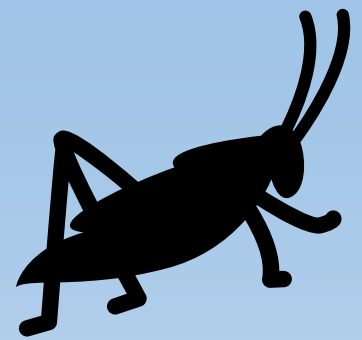
BREAK

10 minutes

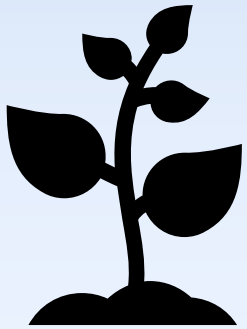
An Overall Strategy – IPM
Integrated Pest Management

https://youtu.be/s420Grv88UA

What's Bugging You?



Plant Clinic Segment -
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
- Yard and Garden Resources | University of Maryland Extension (umd.edu)
- 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)

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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

Good Resource - National Pesticide Information Center - www.npic.orst.edu

UME Resources

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go.umd.edu/hgic

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Charles County

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