





Vegetable Gardening III

Maintaining the Garden

Presented by Harriet Carter, Amye Foelsch, Ellen King, Thomas Bolles

Virginia Cooperative Extension programs and employment are open to all, regardless of age, color, disability, gender, gender identity, gender expression, national origin, political affiliation, race, religion, sexual orientation, genetic information, veteran status, or any other basis protected by law. An equal opportunity/affirmative action employer. Issued in furtherance of Cooperative Extension work, Virginia Polytechnic Institute and State University, Virginia State University, and the U.S. Department of Agriculture cooperating. Edwin J. Jones, Director, Virginia Cooperative Extension, Virginia Tech, Blacksburg; M. Ray McKinnie, Administrator, 1890 Extension Program, Virginia State University, Petersburg.

Housekeeping Recap

- Evaluations
- Situation Analysis



- Presentations & Handouts
 - <u>www.mgpw.org/index.php/gardening-information/sustainable-vegetable-garden-</u> series-class-notes
- Videos
 - www.mgpw.org/index.php/gardening-information/resources
- Companion Planting: Basic Concepts & Resources (ATTRA)
 - attra.ncat.org/attra-pub/summaries/summary.php?pub=72

Questions from Vegetable Gardening II

Any specifics on how to grow dill, kohlrabi and figs

<u>Dill</u>: If you seed it, it will come. Prune frequently to deter flower formation (if that's what you want)

Kohlrabi: Sow 3-4 weeks (c. beginning of April) before average last frost or mid-late summer, 45-60 d maturity, harvest before average daily temps exceed 75 F. Also see extension.umn.edu/vegetables/growing-kohlrabi

www.gardening.cornell.edu/homegardening/scene1357.html

plantvillage.psu.edu/topics/kohlrabi/infos

www.uky.edu/ccd/sites/www.uky.edu.ccd/files/kohlrabi.pdf

Questions from Vegetable Gardening II

 Any specifics on how to grow dill, kohlrabi and figs Figs:

extension.umd.edu/hgic/topics/figs marylandgrows.umd.edu/2017/10/20/the-elusive-fig/ njaes.rutgers.edu/FS1198/ extension.tennessee.edu/publications/Documents/SP307-I.pdf

Questions from Vegetable Gardening II

• If we don't even have beds now, at what point would we want to get out and make beds? As soon as the soil is workable?

Workable = not too much moisture

<u>Sheet mulching</u> – might be later in the spring before the bed is ready

Cover with black plastic - might not kill perennials like turf

<u>Build raised beds</u> – once soil is workable

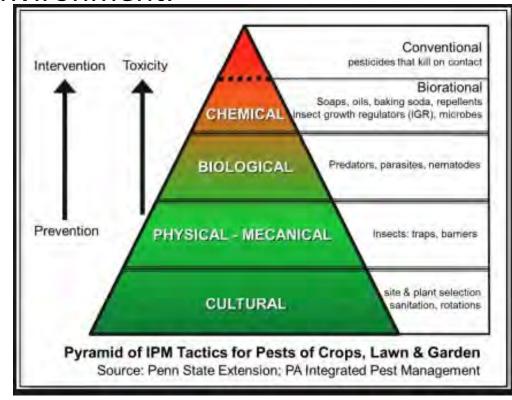
<u>Tillage</u> – once the soil is workable

Containers – may be a good stop-gap while you develop your beds

IPM: Integrated Pest Management

Ecosystem-based strategy that focuses on long-term prevention of pests or their damage and minimizes risks to human health, beneficial and non-target organisms and the environment.

- Use cultural practices that encourage healthy plants
- Monitor for problems
- ID pest/cause
- Determine if treatment is really needed
- Select control strategy starting with controls that minimize health and environmental risks



Managing Insects

Goal: Encourage the good bugs, control the bad ones, without the use of harmful insecticides.

Before planting, gain an understanding of the pest (bad bug), and the beneficial organism (good bug) associated with crop:

- 1. Correctly identify adult pests and beneficial insects
- 2. Correctly identify immature life stages such as eggs, nymphs & larvae
- 3. Learn and look for the signs and symptoms

Remember, pests are more effectively controlled when their numbers are low.

Recognizing Insect Damage

Plants are damaged by insect's mouth parts:

- Chewing mouth part
- Sucking mouth part (beak)

Which leave behind signs & symptoms:

- Chewed leaves
- Discoloration
- Distortion
- Dieback
- Insect products





What insect pests can I expect, based on what crops I'm planting?

What do the offensive bugs look like?

Mature insects?

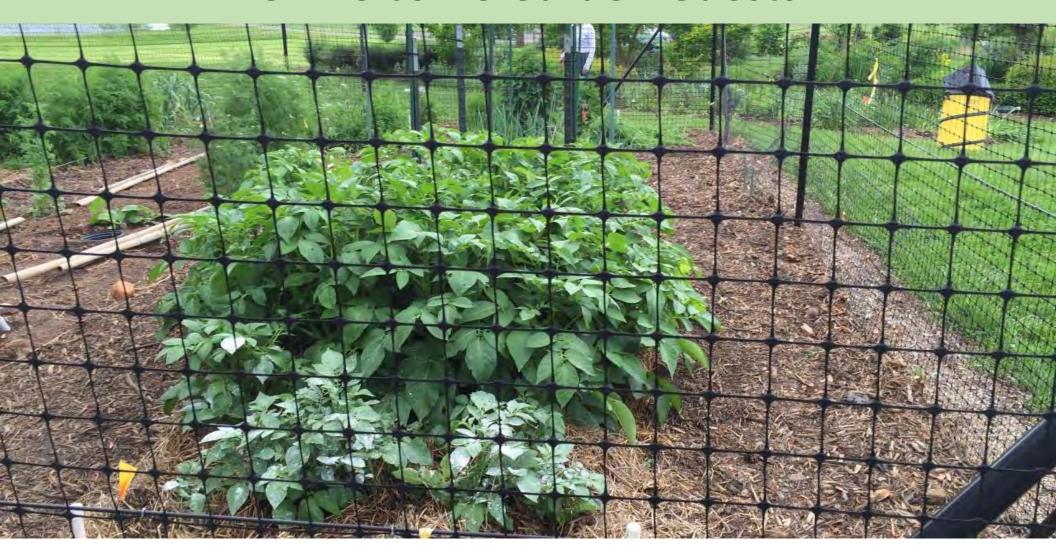
Nymph stage, Larvae?

Eggs?

What does the damage to your plants look like?

What is the least toxic method to deal with the situation?

Unwelcome Garden Guests

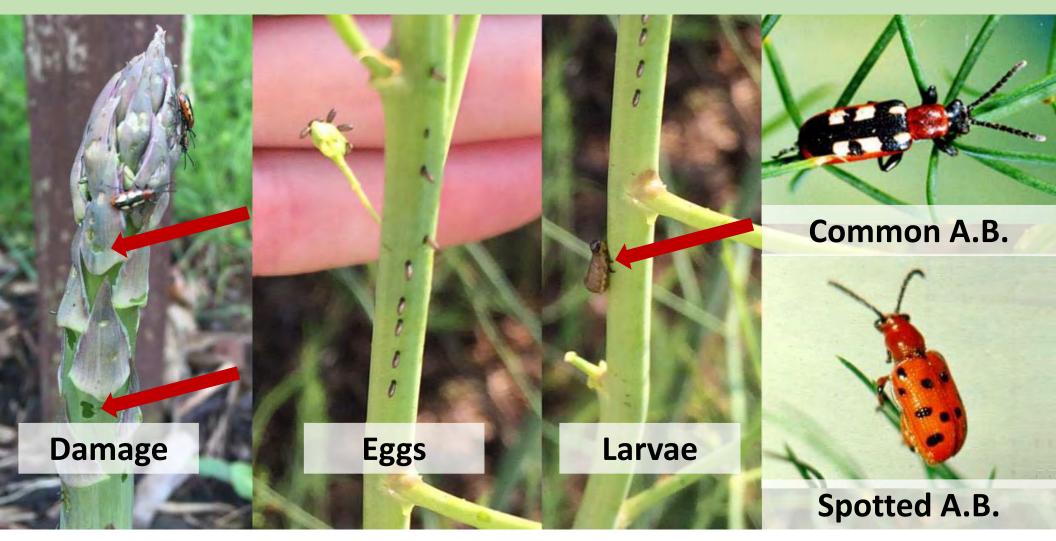




Bad Bug Swimming Pool



Asparagus Beetle







Top Slug Predators









Rove beetles - think earwig w/o the pincers

Harvestman (Daddy Longlegs)

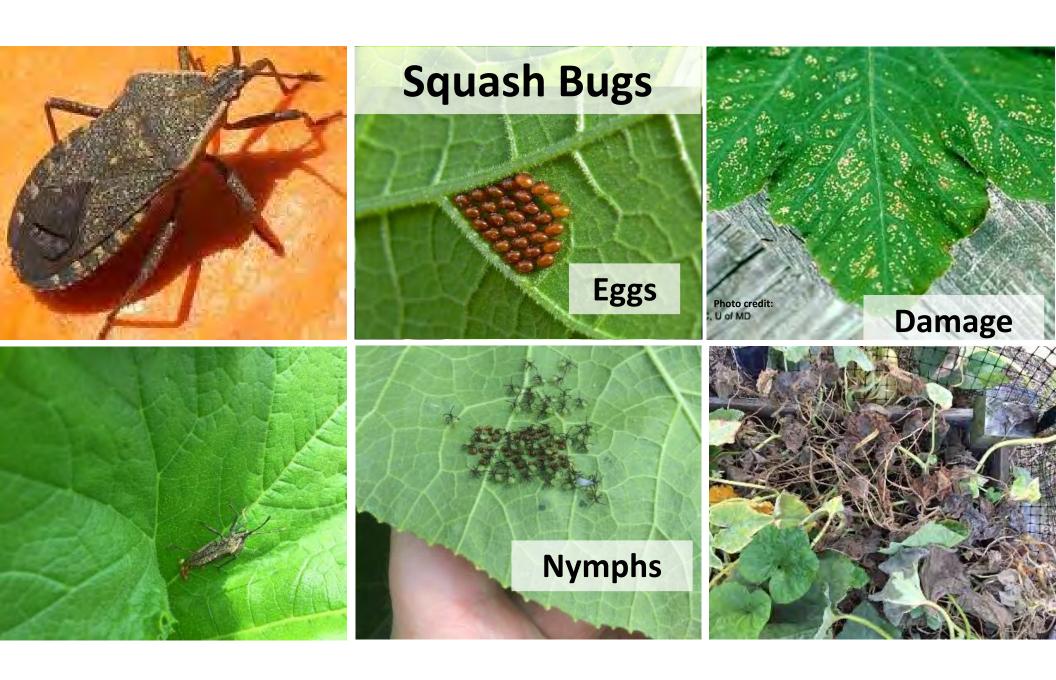
Wolf spiders



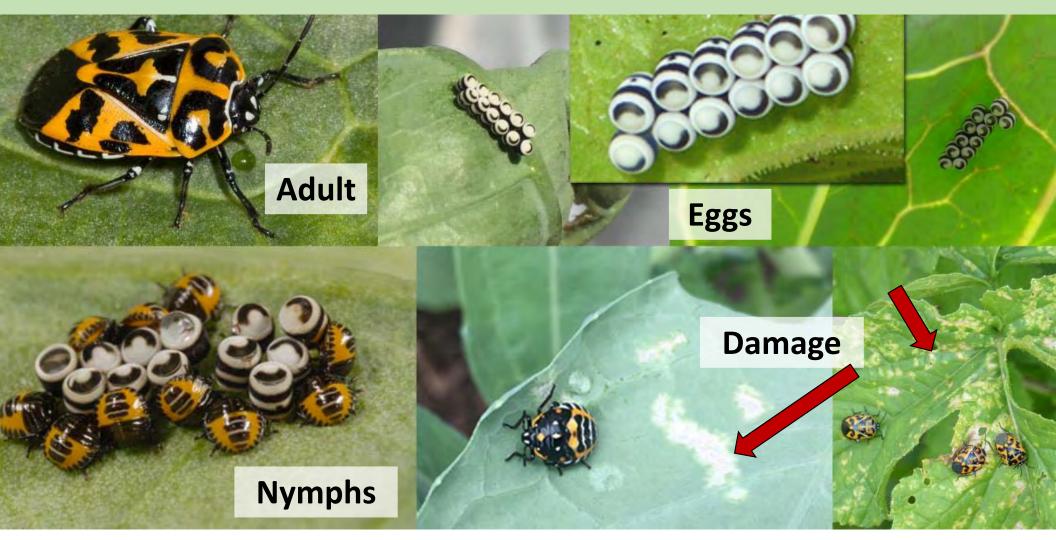
Black ground beetle

Firefly larvae (multiple species)



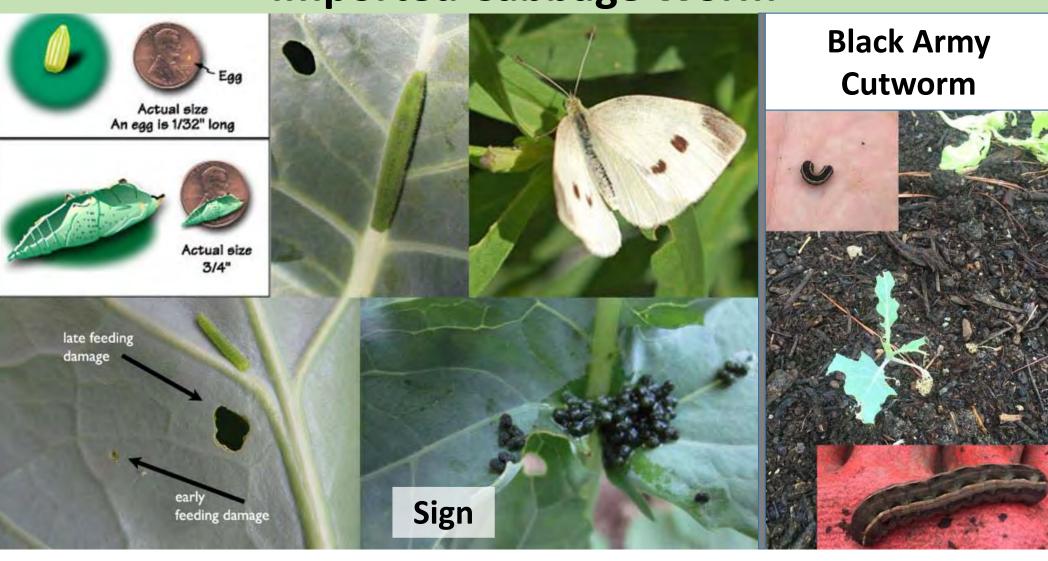


Harlequin Bug

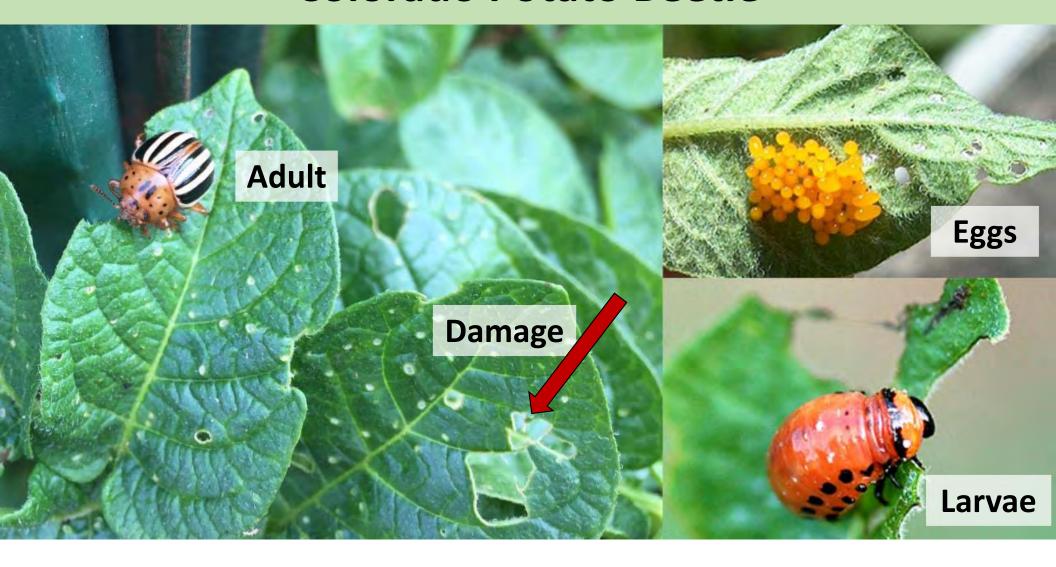




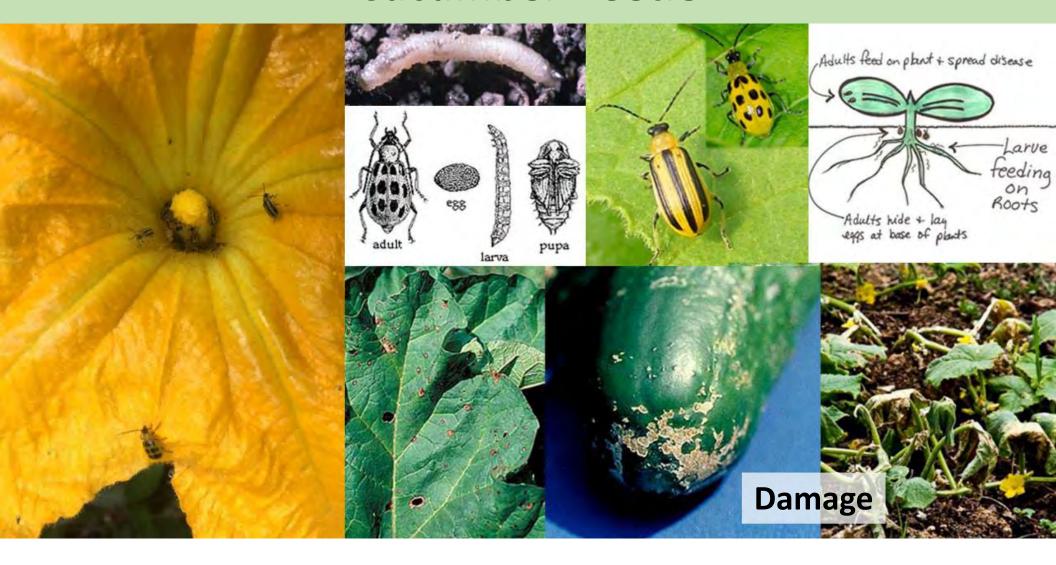
Imported Cabbage Worm



Colorado Potato Beetle



Cucumber Beetle





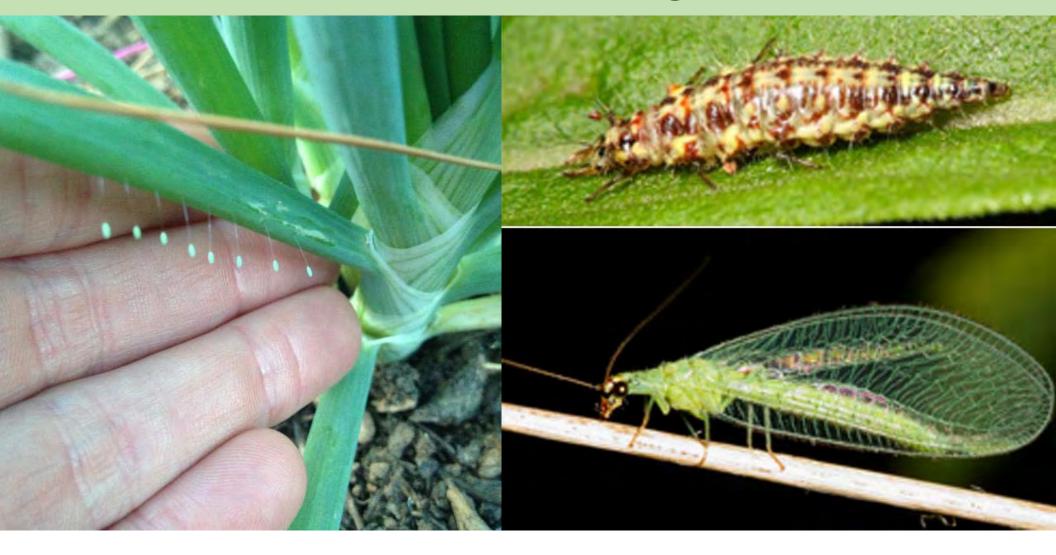
It's just as important to know what to leave alone in your vegetable garden.

Encourage beneficial predators who hunt, attack, and kill the bad bugs. This means less bad bugs for you to deal with!

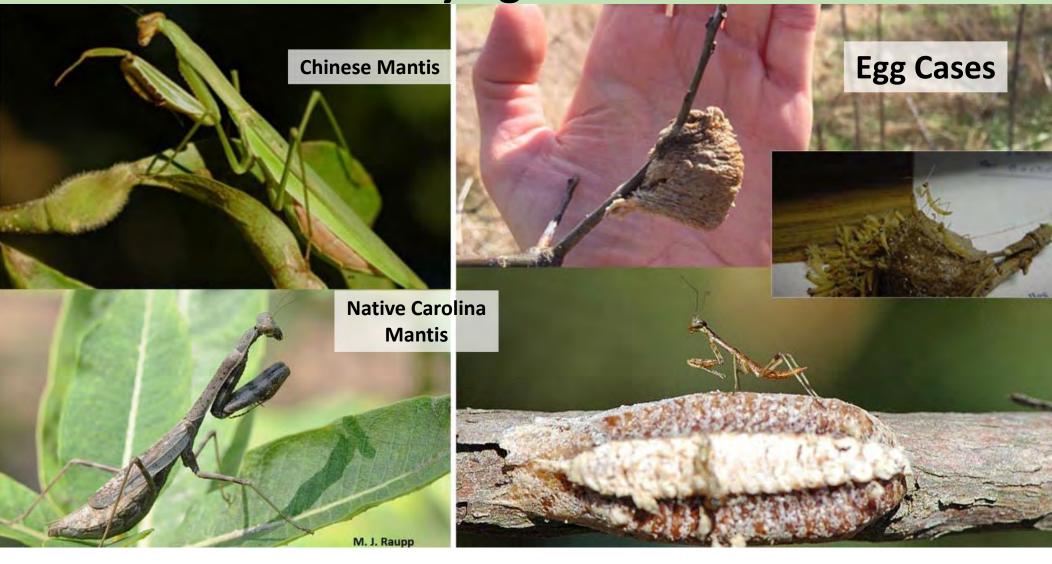
Welcome Garden Guests



Green Lacewing



Praying Mantid



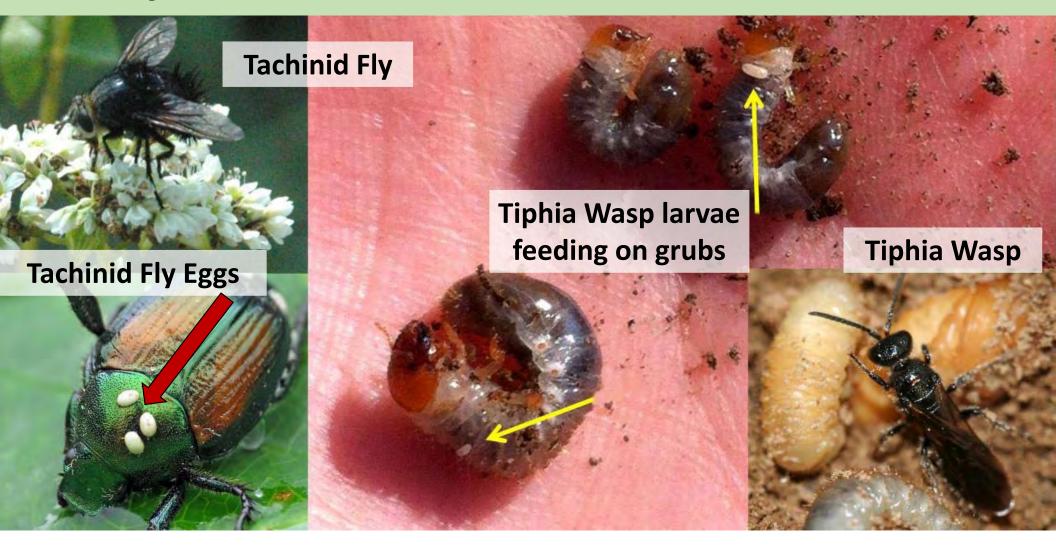
A Reason to Welcome Both the Bad & the Good



Braconid Wasp vs. Hornworm



Why We Don't Use Insecticides in the Garden



Practice Beneficial Insect Gardening



Resources That Can Help



https://rockingham.ext.vt.edu/content/dam/rockingham http://www.ipm.ucdavis.edu/FAQ/natural-enemies-poster.pdf ext vt edu/files/horticulture/ipminsectguide.pdf



Key Takeaways

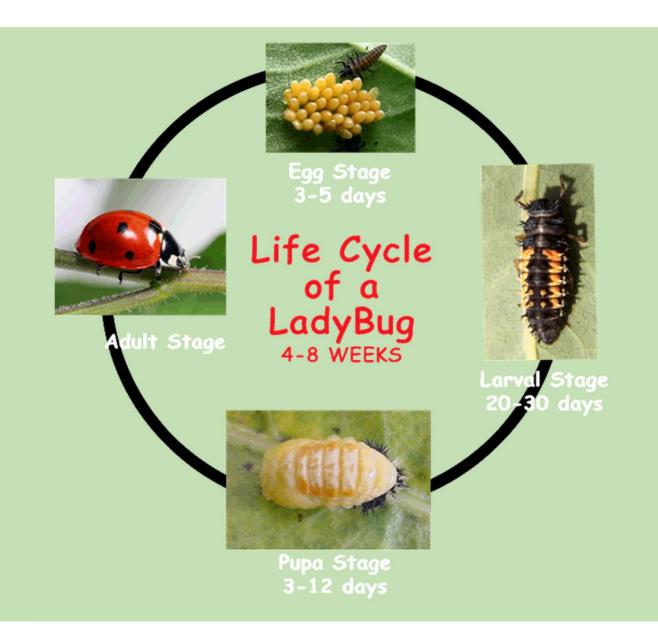
An observant gardener is the best deterrent

- Walk the garden everyday
- Take a close look for damaged leaves, egg masses, frass and bugs
- Research a bug's life cycle
- Remember pesticides do not discriminate and will kill the good bugs too
- Understand that no matter what there will be some damage... and that is okay!

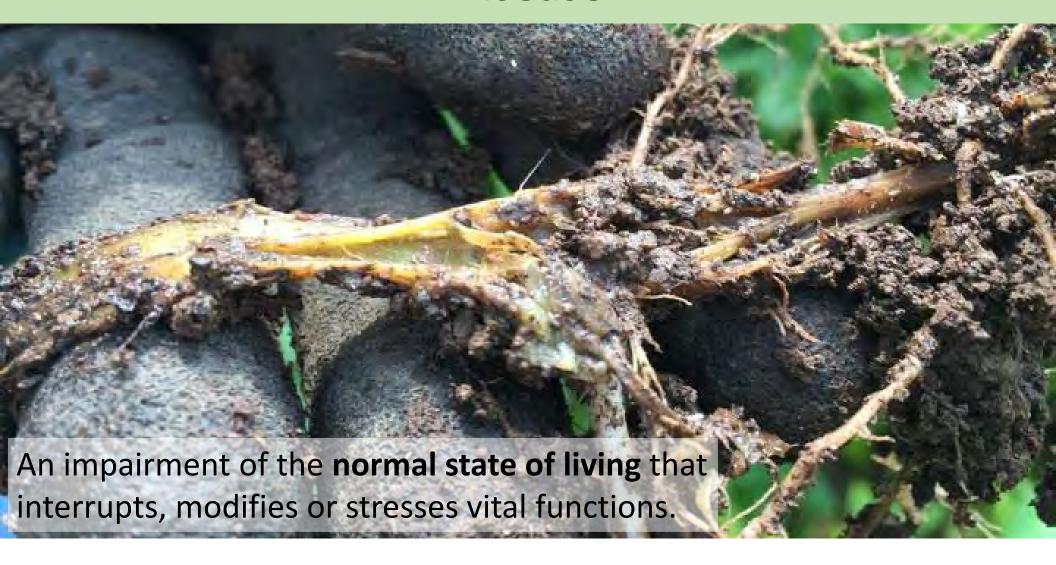


The Importance of Learning a Bug's Life Cycle





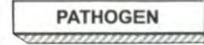
Disease

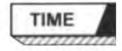


Components for Disease Development





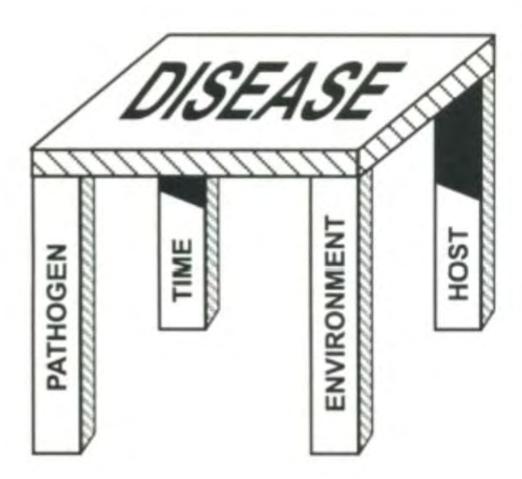






Credit: Fla. Dept. Agric. & Consumer Services/ Division of Plant Industry

How to Build a Sturdy Table for Disease



Credit: Fla. Dept. Agric. & Consumer Services/ Division of Plant Industry

Defense Against Disease



Good observational and detective skills

Location

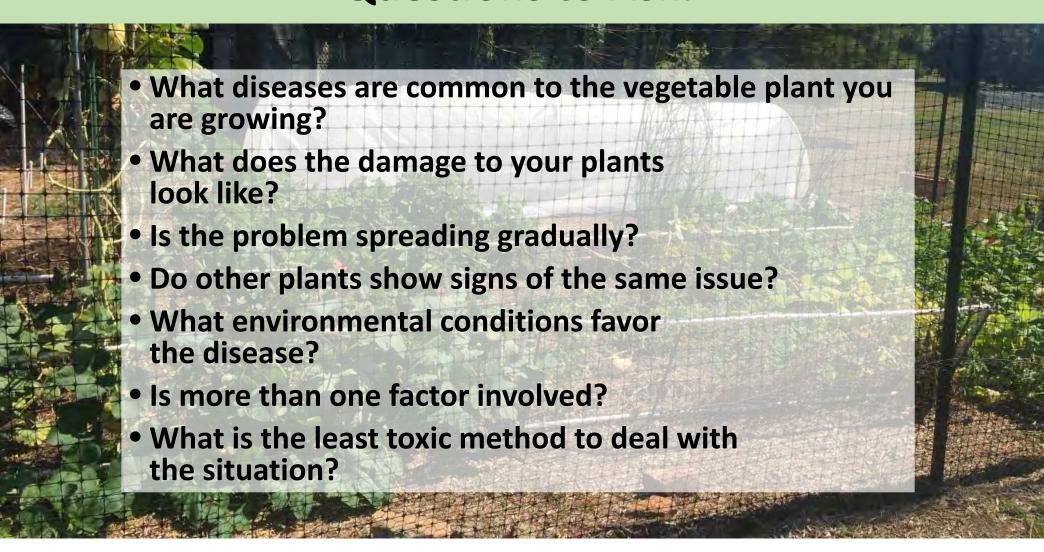
Grow the soil

Choose resistant or tolerant plant varieties

Good cultural practices

"An ounce of prevention is worth a pound of cure."

Questions to Ask:



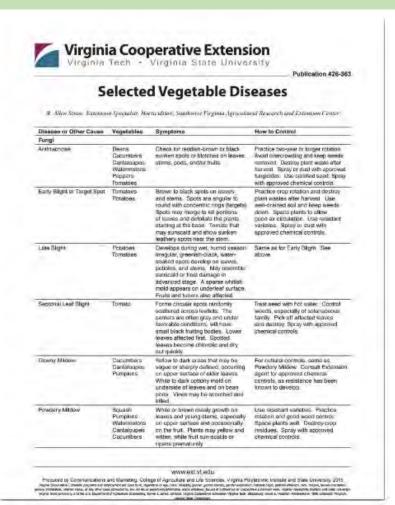
Early Blight

Checklist approach:

- □Close inspection of plant & surrounding area
 - Look for more than one factor
- ☐ Take pictures
- ☐Research online:
 - Google "Common diseases on ____ plant:.edu"
- ☐ Make a match
- ☐ Learn & Compare:
 - Environmental conditions disease favors
 - How it spreads
 - Least toxic method to handle situation
- ☐ Take action, remain vigilant & observant



Resource That Can Help



https://pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/426/4 26-363/426-363_pdf.pdf

Provide a Sample

How to collect and provide a sample:

- Call the office ahead of time
 (Monday and Tuesday's are the best days to bring in a sample, Hours 8 am – 5 pm)
- Obtain a fresh sample in the morning (Include disease area, but also the margin between healthy tissues and diseased tissue)
- Include as much of the plant as practical
- Place in a clean paper bag, left open, and bring to office ASAP (protect from crushing, freezing or heat)
- Label
 (Date of collection, variety, statement of problem, your name and contact information)

Providing your observations, background information on management practices, environmental conditions, and rate of disease development is a beneficial!



Key Takeaways

An observant gardener is the best defense

- Know the normal growth pattern of the plant
- Practice prevention
- Ask questions & document
 - Living factors: start in one area, progress over time, random, one plant species
 - Non-living factors: appear suddenly, no progression, different plant species
- Look for more than one cause
- Turn to resources that can help



Managing Wildlife Damage

How to Control Unwanted Critters





IPM for Wildlife

- Identify species before you choose a control, look for signs
- Don't treat wild animals as pets or entertainment
- Keep wild animals wild, don't feed them around your home
- Make your property less hospitable to the offenders
- Use the least toxic or hazardous approach



The Worst Offenders

- Rabbits
- Deer
- Groundhogs
- Squirrels
- Moles/Voles

















Controlling Wildlife

Habitat Modification

Mow tall grass and remove brush piles

Repellents

- Combination provides most effective solution
- Most are sprayed on plants. Some sprays can't be used on edible crops or vegetable gardens. Read and follow all label restrictions.

Exclusion

- Fencing deer fencing, chicken wire, mesh
- Netting
- Cages for gardens or plants



Nuisance Wildlife

- Under state law, nuisance species can be killed at anytime and in any manner that is legal under state and local laws
- It is NOT legal to trap live wildlife and move it to another location.
- Permit or hunting license is required to use lethal methods on other wildlife that becomes a nuisance.

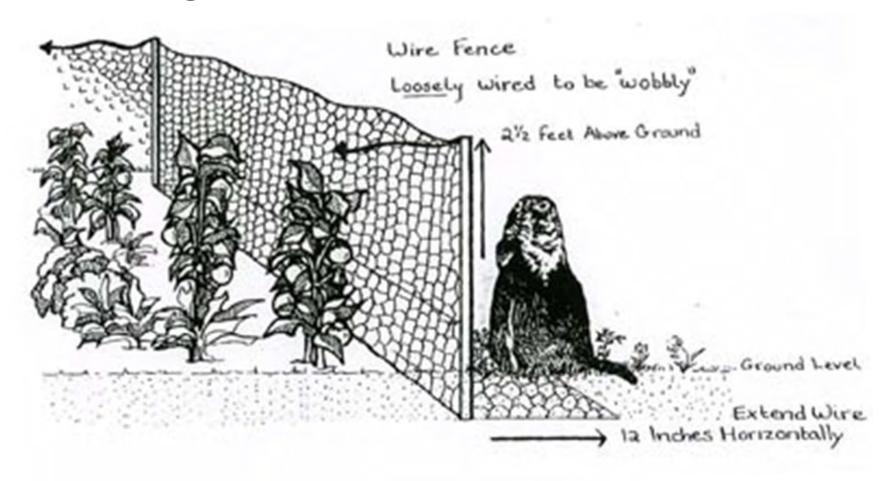


Groundhogs

- Nuisance species...
- Favorite Hobbies
 - Digging many, many holes
 - Climbing *sturdy* fences
 - Eating Vegetables
 - Building a home under yours
- How to prevent damage?
 - Human activity is a deterrent
 - Groundhog fence



Groundhog Fence



Floppy Top to Deter Climbers



Groundhog Hotel



Sweet Potato Protection







Examples of Exclusion







A few words about snakes (Reptiles)





Juvenile Rat Snake







Adult Black Rat Snake

Eastern Copperhead (venomous snake)





Eastern Copperheads

Don't Confuse Juvenile Eastern Rat Snakes with Copperheads





Juvenile Eastern Rat Snake vs. Eastern Copperhead

Close-up of a Dekay's Brown Snake (Non-venomous)





Facts about Snakes in Virginia

- Snakes are generally shy
- They are beneficial because they eat mice, slugs, grubs, and insects.
- Given an opportunity they will go after baby birds or eggs
- They are food for other wildlife such as hawks.
- Most species are harmless, however there are few venomous species that can be harmful to people and pets.
- It is illegal to kill snakes in Virginia



- Virginia Wildlife information
 http://www.dgif.virginia.gov/wildlife/
- Nuisance Wildlife Control Operators—Virginia www.dgif.virginia.gov/wildlife/nuisance/trappers
- Wildlife Rehabilitators (injured)
 www.dgif.virginia.gov/wildlife/injured/rehabilitators
- State Endangered Species issues www.dgif.state.va.us.wildlife

Additional Resources

 Prevention and Control of Wildlife Damage Online handbook details ID, control and management of over 90 species of wildlife

http://www.icwdm.org/handbook/index.asp

- Federal Endangered Species issues www.fws.gov/endangered
- Animal tracks and profiles <u>www.enature.com</u>



Vegetable Spotlights

- Next slides highlight "most commonly" grown plants
- Amended soil
- Typically full sun
- Water source and water dependent on plant requirements
- Wind protection
- Newer gardeners consider buying plants rather than starting seeds indoors
 - (See planting calendar)
 - Mulch to control weeds and disease, soil temp, water retention

- Family Solanaceous
- Warm season crop (generally around Mothers' day)
- Planting Methods:
 - Indoor
 - Start 6-8 weeks before planting date
 - Harden off
 - Transplant outside
 - Outdoor
 - Plant in full sun (8+ hours)
 - Plant deeply to encourage strong roots
 - Trim off bottom leaves
 - Mulch to control weeds and disease, soil temp, water retention
 - Plant near a convenient water source and water regularly
 - Keep them at the limit of water/drought stress to enhance flavor

Space 18-36 inches by 36 inches if staked or caged Can be grown in containers

Tomatoes





Growth Habits

- Vine vs. bush
- Cage
- Determinate vs. Indeterminate
- Heirlooms vs. hybrids
- Choose the variety best suited to your area

Common Pests

- Hornworm
- Stink bugs
- Japanese beetles

Harvesting

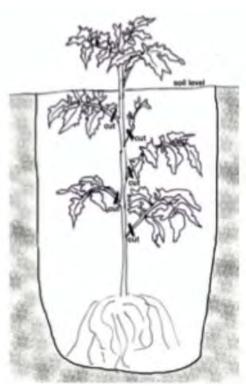
- First ready in approximately 60 days, variety dependent, up to 105 days
- Continue picking until frost
- Harvest mature green tomatoes fall before killing frost is expected

Companions

 Onions, asparagus, carrot, cucumber, marigolds, basil, parsley, garlic



Tomatoes



- Family Solanaceous
- Warm season crop
- Planting Methods:
 - Indoor
 - Start 6-8 weeks before planting date
 - Harden off
 - Transplant outside
 - Outdoor
 - Plant in full sun
 - Space 18-24 inches apart in rows 30-26 inches apart
 - Mulch to control weeds, soil temp, water retention
 - Water regularly
 - Can be grown in containers
- Growth Habits
 - Typically grow upright use cages
 - Hot and banana are better performers in our area than sweet peppers



Peppers



Common Pests

- Colorado potato beetles
- Flea beetles
- Leaf hoppers
- Note: these are more common to other plants

Harvesting

- 100-120 days from seed
 - Peppers start green and turn color
- 70-85 days from transplants
- Harvest sweet peppers when they reach desired size

Companions

 Asparagus, basil, garlic, marigolds, parsley

Peppers



- Family Cucurbit
- Warm season crop
- Planting Methods:
 - Indoor
 - Start 3-4 weeks before planting date
 - Harden off
 - Transplant outside
 - Outdoor
 - Plant in full sun
 - Heavy feeders
 - Need well amended soil and significant watering
 - Space 12-18 inches by 48-72 inches in rows, 24-36 inches by 48-72 inches in hills; closer if trellised
- Growth Habits
 - Generally vines, but some bush
 - Ideally trellised



Cucumbers





- Common Pests
 - Cucumber beetles
 - Aphids
- Harvesting
 - 50-70 days
 - After at least 2 inches in length
 - Know mature length for variety
 - Before turning yellow
 - Yellow varieties pick before fruit turns gold
- Companions
 - Beans, cabbage family, corn, peas, radishes, sunflowers, nasturtiums, marigolds

Cucumbers







- Family Convolvulaceae
- Warm Season Crop
- Planting Methods
 - Indoor
 - Plants can be started from tuber
 - 4 weeks before planting date
 - Harden off
 - Outdoor
 - Plant slips in full sun 8+ hours/day
 - Slightly acidic soil (6.0-6.5 ph)
 - Prefers loamy or sandy soil
 - Space 3 feet apart

Sweet Potatoes



- Growth Habits
 - Tubers grow below soil level
 - Leaves spread profusely above ground
- Common Pests
 - Wireworm and root-knot nematodes
- Harvesting
 - About 90-120 days after planting
 - Tops begin to die back as it gets close to harvest time
 - Should be harvested before the first frost
 - Air dry then move to storage
- Companions
 - Okra, peppers, sunflowers

Sweet Potatoes





- Family Composite
- Cool season crop

Lettuce

- Planting Methods:
 - Lettuce seeds should be chilled in refrigerator for two weeks before planting
 - Indoor
 - Start 3 weeks before planting date
 - Harden off
 - Transplant outside
 - Outdoor
 - Sow seeds in early spring as soon as soil can be worked and in late summer
 - Plant in sun in cooler weather; shade in hot weather
 - Does not enjoy "full sun"
 - Space leaf lettuce 2-4 inches in rows 12-18 inches apart
 - Space Romaine or Butterhead: 4-10 inches in rows at least 12 inches apart; Crisphead:12-15 inches apart in rows at least 18 inches apart
 - Can be grown in containers





Growth Habits

- Head or leaf lettuce available
 - Leaf lettuce is easier to grow
- Cut and come again
- Bolts
- Common Pests
 - Slugs
 - Aphids



Lettuce



Harvesting

- 40-80 days
- As soon as plants are 5-6 inches tall
- Harvest every other "head" of the largest plants to thin
- Companions
 - Carrots, cucumbers, onions, radishes, strawberries, garlic, chives



Lettuce



- Includes: Brussel sprouts, radish, broccoli, cabbage, kale, rutabagas, bok choy, turnips
- Cool season crops
- Planting Methods:
 - Indoor
 - Start 4-6 weeks before planting date
 - Harden off
 - Transplant outside
 - Outdoor
 - Best grown under row covers for insect protection
 - Most can be grown in both spring and fall
 - Brussel sprouts and turnips better suited to fall
 - Spacing varies among this group
 - Some can be grown in containers

Crucifer Family





- Growth Habits Vary
- Common Pests
 - Harlequin bugs
 - Cabbage worms
 - Cutworms
- Harvesting
 - Leaves can be harvested separately prior to fruit
 - Radishes, turnips, broccoli
- Companions
 - Beets, celery, corn, dill, nasturtiums, onions, sage, sunflowers









Vegetable Visuals and Food Safety

Grocery Store Veg is Not Home Grown Veg

Can be picked before ripe

 Can be bred for ease of harvest, uniformity, harvest time, color, disease resistance, storage life, etc. [Usually at the expense of taste]

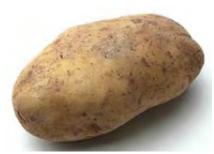
- Sorted by size, color and quality
- Less than perfect specimens are discarded or used in processed products













Veg Isn't Always Pretty















Can You Still Eat These? Yes











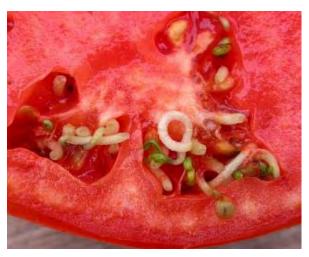






Can You Still Eat These? Maybe









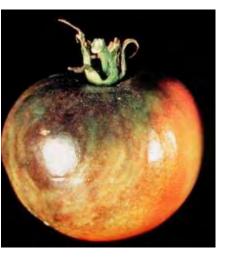


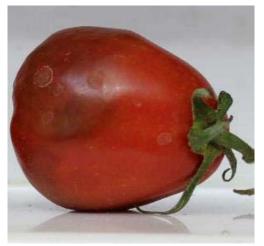






Can You Still Eat These? Maybe

















Wait Times

- If you use **manure** in your garden, FSMA and GAP guidelines recommend
 - crops that contact the soil, like leafy greens, the minimum waiting period between manure application and harvest is 120 days
 - crops that do not contact the soil the minimum waiting period between manure application and harvest is 90 days
- If you use **pesticides** <u>even organic ones</u> read the label carefully and follow the wait times on the label.

Safe Handling of Fresh Produce

- Microorganisms are difficult to completely wash off produce
 - Keep pets/wildlife out of the garden
 - Minimize the risk of contamination by using clean equipment
 - Be careful to avoid damaging produce
 - Keep out of direct sunlight
 - Get produce to their storage temperature as soon as possible
 - Discard produce that has not been refrigerated within 4 hours of being cut, peeled or cooked
- If using damaged produce, cut out damage
 - Cut at least 1 inch away from damaged area
 - Clean knife after each cut

Cleaning Fresh Produce

- Wait until you are going to use or process before rinsing
 - Excessive moisture during storage can increase microbial growth
- Use a clean brush to scrub the exterior of produce with hard/firm rinds
 - If there are pathogens on the exterior of a vegetable, your knife will pick that up when you cut into it
- Rinse with clean <u>running</u> water
 - Don't soak in water as it can cause cross contamination
 - Pat dry with paper towels
- Don't use soaps or other chemicals to wash produce
 - Produce can absorb these and give off flavors and smells
- CSU Extension's Washing Fresh Produce Videos
 - http://farmtotable.colostate.edu/videos.php

Short Term Storage of Fresh Produce

Table Source:

pubs.ext.vt.edu/FST/FST-234/FST-234.html

Many fruits and vegetables that can be held at room temperature while whole, should be refrigerated once cut.

Table 1. Recommended storage temperature and shelf life of common produce items. The storage times listed in this chart are helpful guidelines, not set rules.

| Storage location | Fruits | Shelf life | Vegetables, herbs, spices | Shelf life | Vegetables, herbs, spices | Shelf life |
|--|---------------|------------|------------------------------|------------|------------------------------|------------|
| Store in refrigerator (set at 41 F or lower) | Apples | >7 days | Artichokes | 1-2 weeks | Green onions | 1-2 weeks |
| | Apricots | 2-3 days | Asparagus | 3-4 days | Herbs | 1 week |
| | Blackberries | 1-2 days | Beets | 7-10 days | Leeks | 1-2 weeks |
| | Blueberries | 1-2 days | Broccoli | 3-5 days | Lettuce | 1 week |
| | Cherries | 1-2 days | Cabbage | 1-2 weeks | Lima beans | 3-5 days |
| | Citrus fruits | 1-2 weeks | Carrots | 3 weeks | Mushrooms | 2 days |
| | Cut fruits | 2-4 days | Cauliflower | 3-5 days | Peas | 3-5 days |
| | Grapes | 3-4 days | Celery | 1-2 weeks | Peppers | 4-5 days |
| | Mango | 1 week | Cucumbers | 4-5 days | Radishes | 10-14 days |
| | Raspberries | 1-2 days | Eggplant | 3-4 days | Spinach | 3-7 days |
| | Strawberries | 1-2 days | Ginger | 1-2 weeks | Summer squash | 4-5 days |
| | | | Green beans | 1 week | Sweet corn | 1-2 days |
| Ripen, then store in refrigerator | Avocados | 3-5 days | | | | |
| | Kiwifruit | 3-4 days | | | | |
| | Nectarines | 3-4 days | | | | |
| | Peaches | 3-4 days | | | | |
| | Pears | 3-4 days | | | | |
| | Plums | 3-4 days | | | | |
| Store out of direct sunlight and at room temperature | Apples | <7 days | Basil | 1 week | Sweet potatoes | 2-3 weeks |
| | Bananas | Until ripe | Dry onions* | 2-4 weeks | Winter squash | 1 week |
| | Citrus fruit | 10 days | Garlic* | 1 month | | |
| | Mangoes | 3-5 days | Potatoes | 1-2 months | | |
| | Melons | 1-2 days | Pumpkins | 2-3 months | | |
| | Pineapple | 5-7 days | Tomatoes | Until ripe | | |

Sources: Kader et al. (2012); McCurdy, Peutz, and Wittman (2009).

^{*}Potatoes, onions, and garlic should be stored in a cool, well-ventilated location, such as a pantry.

Long Term Food Storage

• <u>Use Modern Recipes From Reputable Sources</u>

- Extension web sites
- Current Ball and Kerr publications
- National Center for Food Preservation (<u>nchfp.uga.edu</u>)

Some helpful resources

- USDA Complete Guide to Home Canning, 2015 revision nchfp.uga.edu/publications/publications usda.html
- Can It Safely pubs.ext.vt.edu/FST/FST-114/FST-114.html
- Pressure Canning pubs.ext.vt.edu/348/348-585/348-585.html
- Boiling Water Bath Canning <u>pubs.ext.vt.edu/348/348-594/348-594.html</u>

Freezing Fruits and Vegetables pubs.ext.vt.edu/348/348-596/348-596.html



Saturday in the Garden Topics @ The Teaching 9 am-12 noon, set up 8 am

| April 25 | What is a Weed, Springtime Weed Management and in Small Spaces |
|-----------|--|
| May 16 | Permaculture and Yoga in the Garden + Plant Sale |
| June 20 | Composting |
| July 25 | The Cut Flower Garden |
| August 15 | Growing Mushrooms + Cover Crops |
| Cont 10 | New Routines to Protect the Ecosystem for Fall Lands |

Management + Plant Sale

Sept 19



VCE Teaching Garden 9535 Linton Hall Road Bristow, VA 20136

2019 Saturday in the Garden

9am-noon 25 April 16 May

20 June

25 July

15 August

19 September17 October

Garden Workdays
Tuesdays 9am-noon
starting in April