# Disease Update from the PDC: Fruit and veg crops

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# Today's topics

- Desktop diagnostics
- Disease detection and management
  - Veg diseases
    - Fungal and bacterial
  - Blueberry and strawberry issues

# “So, what seems to be the problem?”

# Desktop diagnostics: A few reminders

- Disease
  - plant + pathogen + environment + time
- Disorder
  - not a disease (no pathogen)
- Symptom
  - What the plant says (limited vocabulary!)
- Sign
  - what the pathogen says (may be tough to see)

# Desktop Diagnostics

EDIS

- Guidelines for ID and Management of Plant Disease Problems: Diagnosing plant diseases caused by fungi, bacteria, and viruses

# Appropriate disease samples

- Leaf spot/foliar blight
  - ~ a dozen affected leaves or a whole intact stem with leaves
- Wilt diseases
  - Whole plant, nothing dead.  Photos and phone call!
- Turf diseases
  - A 8” X 8” patch of sod from edge of affected area, 3” deep to catch feeder roots
- Virus diseases
  - New symptomatic tissue, note insects present
- Mature trees
  - Photos and a phone call first

- All samples must have clear information on irrigation, age of planting, number affected, when symptoms started, and any pesticides applied.

# What happens to a sample in a diagnostic lab?

# Desktop Diagnostics

## Diagnosis is hard, but it's not rocket science

- Plants only have so many ways to tell us they're sick (symptoms)
- Plants have needs – fulfill the needs and disease will be the exception, not the rule (right plant, right place)
- Plants don't live forever
- Plants are not plastic (they will never do well in median strips, parking lots, planted in fill dirt, etc.)
- Dead plants tell no tales (crispy twigs or turf are never sufficient for diagnosis)
- A photo is worth a thousand dead plant samples (can't get a good sample, at least get a good picture)

# Desktop Diagnostics

- What's the plant? (know what normal looks like, what conditions the plant likes)
- What were the growing conditions? (SSICC: sun, soil, irrigation, chemicals, culture)
- What is the submitter worried about? (symptoms, other?)
- What else does the submitter know? (stealth diagnostics – folks often know a lot more than they'll write on a submission form)
- Watch out for red herrings: "a seemingly plausible, though ultimately irrelevant, diversionary tactic, not necessarily consciously misleading"

# Desktop Diagnostics

## Use your tools

- Them interwebs - Google is great, Bing not so much, for science.  Use trustable sources.  UC Extension – yes. GardenersForAGreenerPlant.com, maybe not
- EDIS: type in the plant, the problem, and the acronym EDIS (e.g. tomato wilt edis)
- Your agent and UF specialists – easiest way to find people working on your particular thing?  Use EDIS again, and check in with the authors of the relevant pubs
- Got a microscope?  Get trained to use it!
- Practice collecting plant samples so you can explain to others

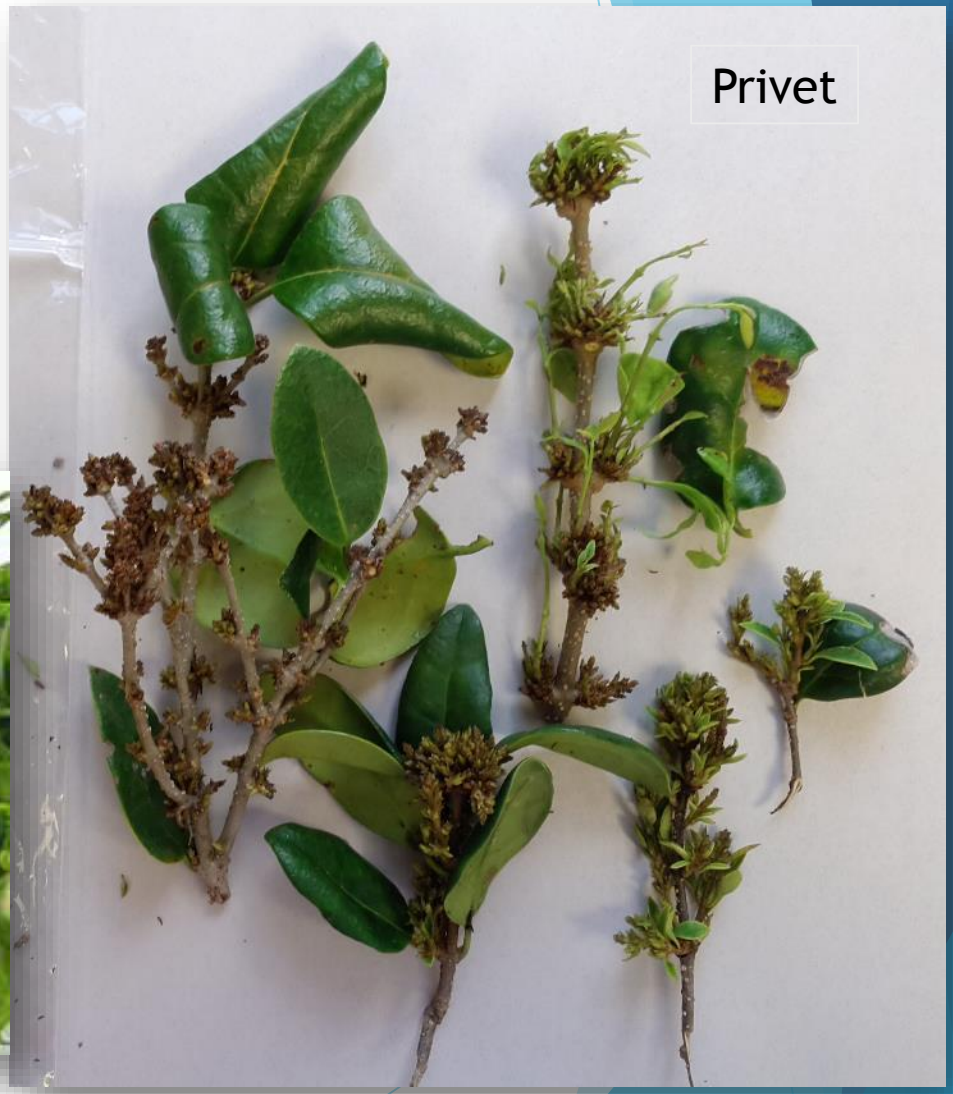
# herbaceous plants

- Symptoms
  - Cupping
  - Parallel veination
  - Tip dieback
  - Bud necrosis

- Mechanism
  - Volatilization
  - Drift
  - Root uptake

# plants

- Symptoms
  - Shortened internodes
  - Bud proliferation
  - Tip dieback
  - Bud necrosis




Hibiscus (Rose of Sharon)

Look for mites, thrips, and ask about lawn weed and feed products

# plants

- Symptoms
  - Shortened internodes
  - Cupped leaves
  - Tip dieback
  - Bud necrosis

Citrus

# plants

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## Effects of Metsulfuron-Methyl-Containing Herbicides on Ornamentals[1]

Chris Marble, Jason Smith, Timothy K. Broschat, Adam Black, Ed Gilman, and Celeste White[2]

### Introduction

Over the past few years, there have been num
ries regarding damage to ornamental plants g
turfgrass areas that have been treated with me
methyl-containing herbicides. Most of the inc
in regards to stem die-back, brown "fried" or
foliage, delayed leaf appearance, and patches
(dead tissues) in the phloem (plant's vascular
(Figure 1). Injury symptoms are typically repo
four weeks following applications made durin
weather (although not exclusively).

Metsulfuron-methyl, also known as MSM, is

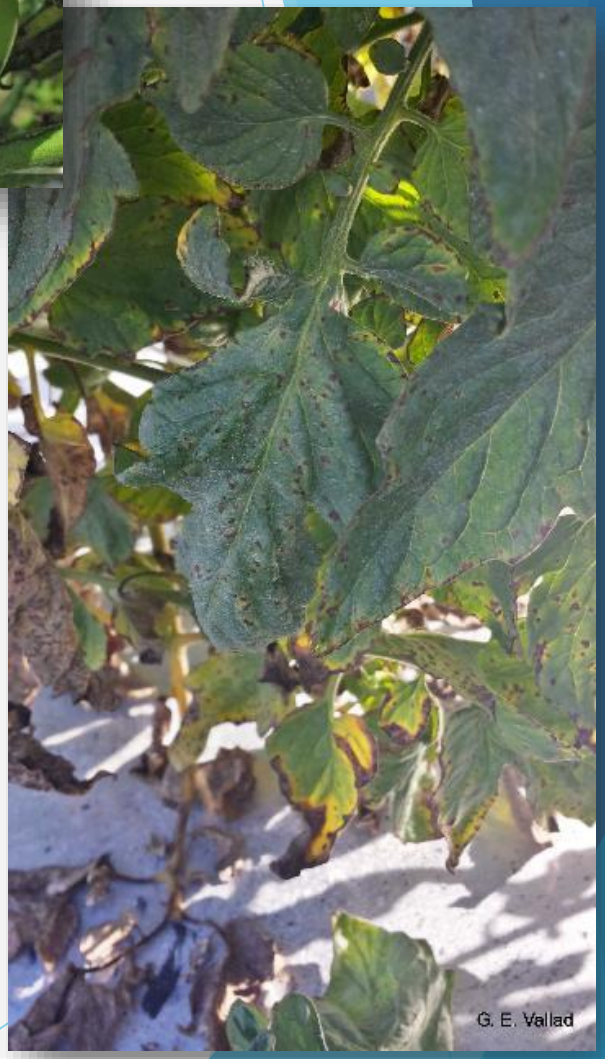
ranging from 0.25 to 1 ounce of formulated product per

Figure 2. Live oak injury following a metsulfuron application to the root zone at a 1 oz. per acre rate.
Credits: Jason Smith, UF/IFAS

Figure 1. Phloem necrosis shown as streaking brown sections of wood exposed by peeling the bark back in a live oak (*Quercus virginiana*) branch affected by metsulfuron-methyl.
Credits: Jason Smith, UF/IFAS

Look for (dicot) weed-free lawns around dicot ornamentals

# Veg diseases: tomatoes



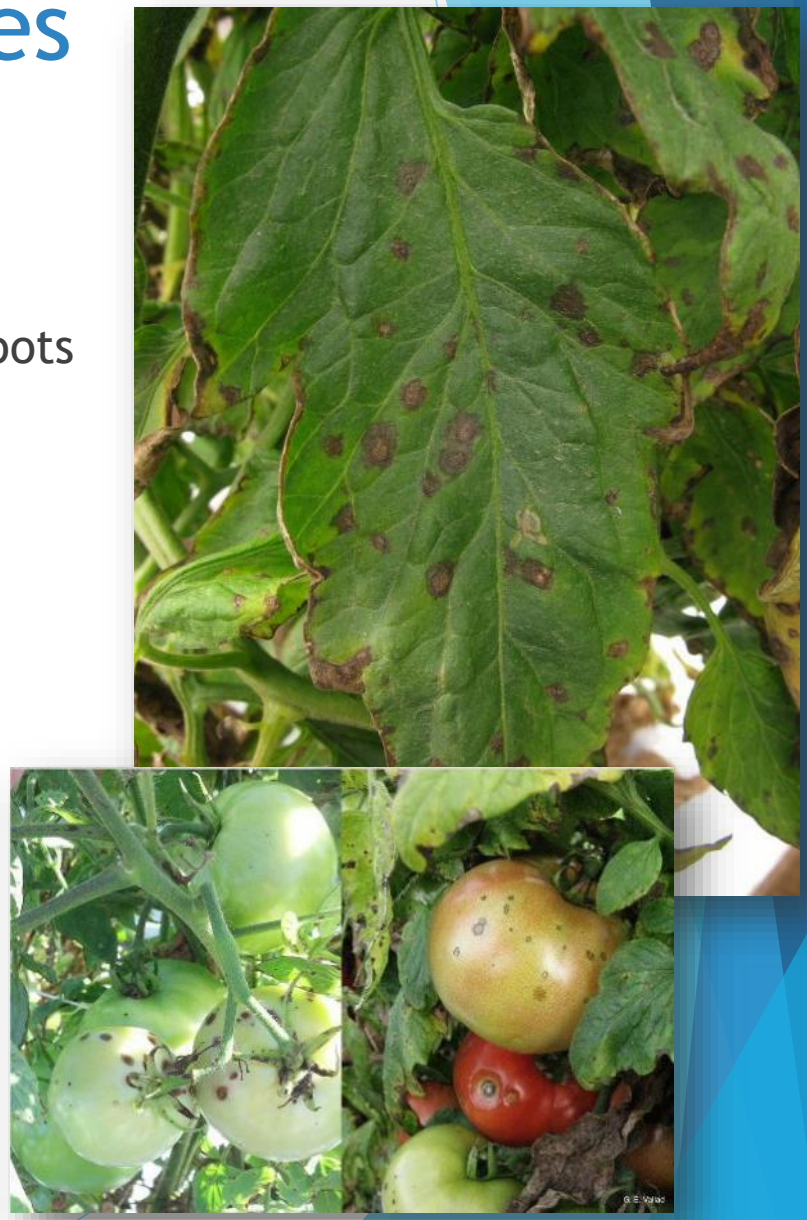

- Bacterial leaf/fruit spot
  - Warm, wet weather
  - +/- haloes
  - Leaf blight, defoliation

  - Inspect plants, pass on unhealthy ones
  - Avoid overhead watering
  - Avoid working plants when wet
  - Copper products (protectant!), but watch out for phytotox when warm!
  - Remove spent foliage/plants

# Veg diseases: tomatoes

- Target spot (*Corynespora* fungus)
  - Warm, wet weather
  - Looks like bacterial spot, other fungal spots
  - Leaf blight, defoliation; fruit spots/rot

  - Inspect plants, pass on unhealthy ones
  - Avoid overhead watering/wounding
  - Avoid working plants when wet
  - Fungicide products (protectant!) during wet weather
  - Remove spent foliage/plants



# Veg diseases: tomatoes

- Early blight (*Alternaria* fungus)
  - Warm, wet weather
  - Looks like other fungal spots, dark brown, fuzzy
  - Leaf blight, defoliation; fruit spots/rot
  - Inspect plants, pass on unhealthy ones
  - Avoid overhead watering/wounding
  - Avoid working plants when wet
  - Fungicide products (protectant!)
  - Remove spent foliage/plants (don't compost)

# Veg diseases: cole crops

- *Xanthomonas* leaf spot/black rot
  - Warm, wet weather
  - Dark, wet or light papery spots that coalesce, may have a halo (“spot”)
  - V-shaped blight at leaf margins, black veins (“black rot”)
  - Collards, kale, cabbage, mustards, radish




  - Inspect plants, pass on unhealthy ones
  - Buy certified seed
  - Avoid overhead watering/wounding
  - Avoid working plants when wet
  - Copper products (protectant!) – watch for phytotox
  - Remove spent foliage/plants (don’t compost)

# Veg diseases: cole crops

- *Alternaria* leaf spot
  - Wet weather (range of temps: 60-90)
  - Gray, concentric spots
  - Papery spots, shothole
  - Older leaves first
  - Collards, kale, cabbage, mustards, radish

- Inspect plants, pass on unhealthy ones
- Avoid overhead watering/wounding
- Avoid working plants when wet
- Fungicide products (protectant!)
- Remove spent foliage/plants (don't compost)

# Veg diseases: *Rhizoctonia*

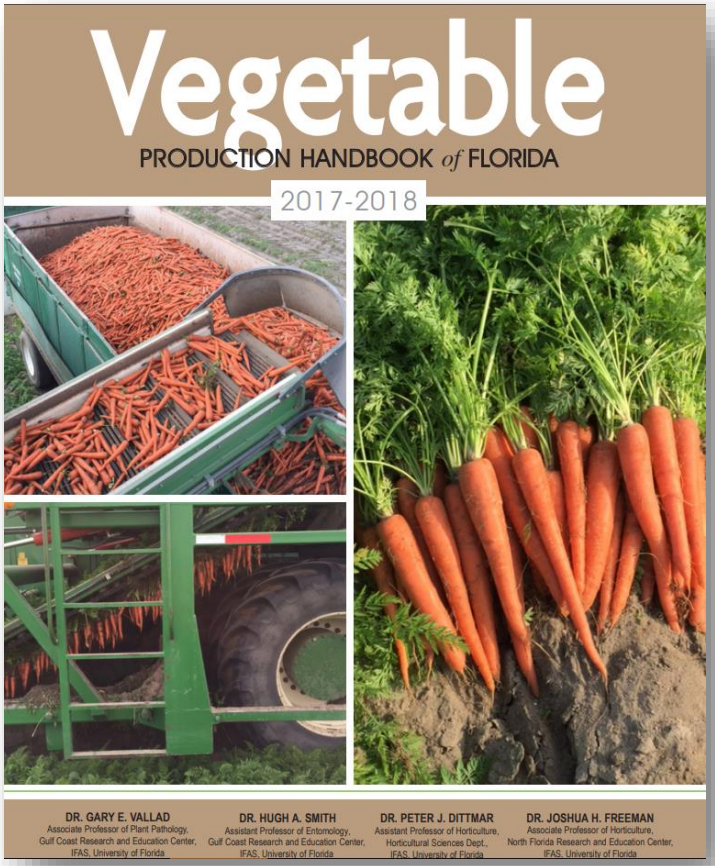
- Many hosts!
- Range of temps
- Worst with slow emergence from soil or windy weather
- Look at the soil line
  - Constriction/rot
  - Brittle, reddish-brown stem
  - Damping off
- Start seeds in clean, warm potting media
- Use certified seed
- Avoid sickly seedlings/liners at the store
- Fungicides won't be much help


# Veg diseases: *Sclerotinia*

- Many hosts!
- Cooler temps + wet weather/watering
- Sclerotia remain in soil for years
- Symptoms/signs
  - Wilt
  - White mycelial mat
  - Rotted, watery stem tissue
  - Pale, brittle, hollow stems with sclerotia
  - Seedling damping off
- Start seeds in clean, warm potting media
- Rotate to an area that has been in grass
- Avoid sickly seedlings/liners at the store
- Fungicides prior to infection might help
- Increase air movement, use of mulch
- Try raised beds

# Management in commercial operations

http://edis.ifas.ufl.edu/cv292






## Crop Index



What do beer and bleach have in common?

# Fruit diseases: *Ralstonia* in blueberry

- Wilt, leaf reddening, leaf drop, discolored vasculature, death
- Wet areas, flooded fields
- Try phosphite injections via irrigation or drenches

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## Bacterial Wilt of Southern Highbush Blueberry Caused by *Ralstonia solanacearum*[1]

Philip F. Harmon, Carrie Harmon, and Dave Norman[2]

### Symptoms

Bacterial wilt is a newly discove
in Florida. Symptoms of the dis
caused by *Xylella* and bacterial
wilt will show signs of water str
ginal leaf burn (Figures 1 and 2
may also be prone to developin
stress diseases, such as stem bli
and thus may show symptoms
of blueberry plants with bacteri
discoloration or light brown to
ill-defined borders (Figure 3). T
from that which occurs with ste
blight discoloration is typically
brown in color. Additionally, w
from the crowns of plants with
bacterial ooze (Figure 4). Stem
do not.

Unlike *Xylella*, which causes ba
*Ralstonia* can be spread easily i
infected plant material. Plants c
showing symptoms. *Ralstonia* c
slowly spreading down and acr
ing large circular patches of dea
5 and 6). These symptoms are si
Phytophthora root rot-affected
occur only in low-lying and poo

Figure 2. Brown leaf margins in an oak-leaf pattern are early symptoms of bacterial wilt infection on the blueberry variety 'Arcadia'.
Credits: Philip Harmon, UF/IFAS

Figure 3. Discoloration of a blueberry crown infected with *Ralstonia solanacearum*.
Credits: Philip Harmon, UF/IFAS

Figure 4. Cloudy bacterial ooze streaming from a wood chip taken from the crown of a blueberry plant with bacterial wilt disease.
Credits: Philip Harmon, UF/IFAS

# Fruit diseases: Anthracnose in strawberry

- Fruit rots, petiole and leaf lesions, crown rot
- Wet areas, injury during handling
- Keep it out of the field, remove diseased plants from the field, plant any UF newer cultivars except 'Strawberry Festival', use protectant fungicides according to the Strawberry Advisory System

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## Anthracnose Fruit Rot of Strawberry[1]

James C. Mertely, Bruna B. Forcelini, and Natalia. A. Peres[2]

...ation were believed to eliminate inoculum carryover Florida production fields. However, *C. acutatum* has recovered from dead plants left on old plastic during ummer. Thus, if strawberry is planted on old plastic, noculum from the old plants could affect the new crop. us weeds in and around production fields may also be ized by *C. acutatum* from strawberry.

Anthracnose fruit rot, caused by the fun *acutatum*, is an important disease for str wide. Other species of *Colletotrichum*, s and *C. gloeosporioides*, are less frequentl fruit rot. Although fruit are most freque *C. acutatum*, other organs of the plant, i crowns, leaves, petioles, and roots, are al

### Pathogens and Sympto

Anthracnose fruit rot lesions appear as d on infected fruit (Figure 1). On green fr lesions are small (1⁄16–⅛ inch across), ha dark brown or black. Lesions on ripenin (⅛–½ inch), hard, sunken, and tan-to-d wet weather, the lesions become covered orange ooze composed of millions of sp in a mucilaginous matrix (Figure 2). Wh are favorable for infection, multiple lesio the fruit, and lesions may appear on peti Strawberry flowers are highly susceptibl and remain attached to the plant when i Flowers affected by the gray mold fungu may show similar symptoms. Small black button-sized fruit may also develop from (Figure 5).

2. Spore mass of *C. acutatum* on anthracnose lesion
s: UF/IFAS GCREC

Figure 4. Anthracnose flower blight
Credits: UF/IFAS GCREC

Figure 5. Anthracnose lesion on green fruit
Credits: UF/IFAS GCREC

*C. acutatum* appears to spread first on the foliage, often without causing visible symptoms. A few conidia (asexua spores) are formed on green leaves and petioles, and mor are produced as the tissue ages and dies. Conidia are mov from the foliage to the flowers and fruit primarily by spla ing water. They then germinate and infect. Developing

http://agroclimate.org/tools/sas/

# Thank you

- Carrie Lapaire Harmon

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