

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



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

plants

▶ Symptoms

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

Citrus



Effects of Metsulfuron-Methyl-Containing Herbicides on Ornamentals¹

Chris Marble, Jason Smith, Timothy K. Broschat, Adam Black, Ed Gilman, and Celeste White²

Introduction

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

Metsulfuron-methyl, also known as MSM, is a

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



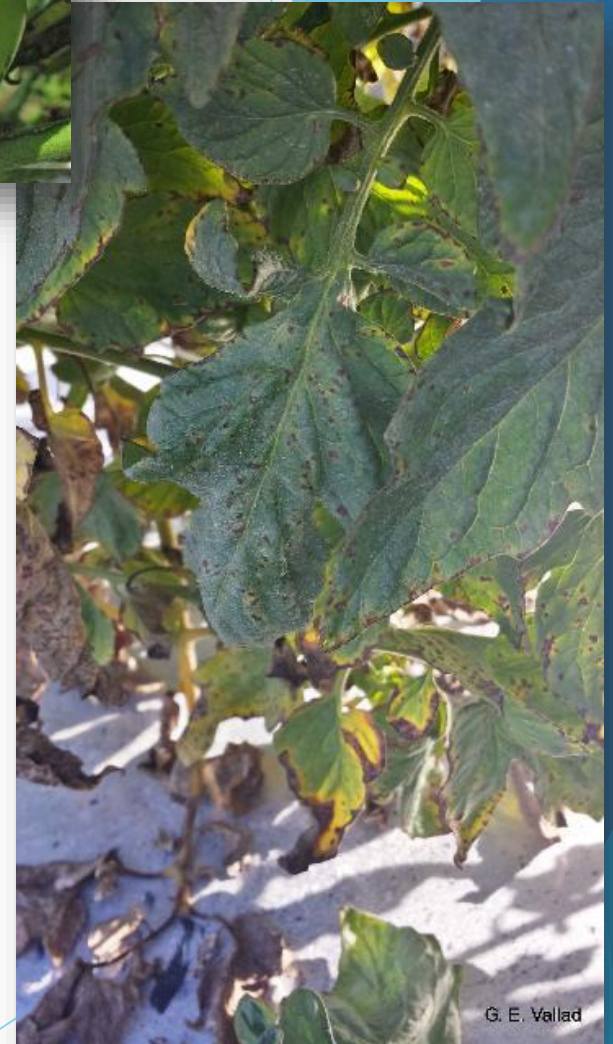
Figure 1. Phloem necrosis shown as streaking brown sections of wood exposed by peeling the bark back in a live oak (*Quercus virginiana*) branch affected by metsulfuron-methyl.
Credits: Jason Smith, UF/IFAS

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)



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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



Mary Boone Snipes, ©2015, Clemson Extension

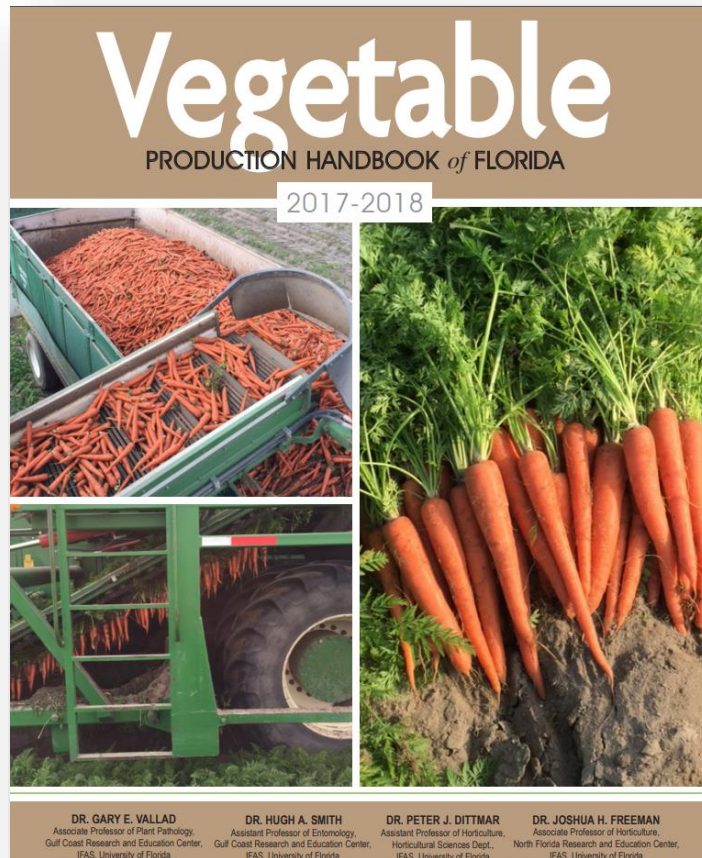
Veg diseases: *Sclerotinia*

- ▶ 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>



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CHAPTER 2. FERTILIZER MANAGEMENT FOR VEGETABLE PRODUCTION IN FLORIDA	3
Guodong Liu, Eric H. Simonne, Kelly T. Morgan, George J. Hochmuth, Monica Ozores-Hampton, and Shinsuke Agehara	
CHAPTER 3. PRINCIPLES AND PRACTICES OF IRRIGATION MANAGEMENT FOR VEGETABLES	11
Lincoln Zotarelli, Michael D. Dukes, Guodong Liu, Eric H. Simonne, and Shinsuke Agehara	
CHAPTER 4. INTEGRATED PEST MANAGEMENT	19
Peter J. Dittmar, Nicholas S. Dufault, Joseph W. Noling, Philip Stansly, Nathan S. Boyd, Matthews L. Paret, and Susan E. Webb	
CHAPTER 5. ASIAN VEGETABLE PRODUCTION	31
Guodong Liu, Christian F. Miller, Bonnie Wells, Yuncong Li, and Qingren Wang	
CHAPTER 6. COLE CROP PRODUCTION	33
Lincoln Zotarelli, Peter J. Dittmar, Monica Ozores-Hampton, Nicholas S. Dufault, Bonnie Wells, Joseph W. Noling, Eugene J. McAvoy, Qingren Wang, and Christian F. Miller	
CHAPTER 7. CUCURBIT PRODUCTION	53
Josh H. Freeman, Eugene J. McAvoy, Nathan S. Boyd, Monica Ozores-Hampton, Mathews Paret, Qingren Wang, Christian F. Miller, Joseph W. Noling, and Xavier Martini	
CHAPTER 8. EGGPLANT PRODUCTION	79
Eugene J. McAvoy, Nathan S. Boyd, Monica Ozores-Hampton, Pamela D. Roberts, Joseph W. Noling, and Hugh A. Smith	
CHAPTER 9. LEAFY VEGETABLE PRODUCTION	107
Monica Ozores-Hampton, Ramdas Kinessary, Richard N. Raid, Joseph W. Noling, Julien Beuzelin, and Christian F. Miller	
CHAPTER 10. MINOR VEGETABLE CROP PRODUCTION	135
Christian F. Miller, Qingren Wang, Ramdas Kinessary, Eugene J. McAvoy, Monica Ozores-Hampton, Richard N. Raid, Crystal A. Snodgrass, Julien Beuzelin, Dakshina R. Seal, Alicia J. Whidden, and Shouan Zhang	
CHAPTER 11. LEGUME PRODUCTION	167
Monica Ozores-Hampton, Peter J. Dittmar, Eugene J. McAvoy, Dakshina R. Seal, Shouan Zhang, Josh H. Freeman, and Qingren Wang	
CHAPTER 12. ONION, LEEK, AND CHIVE PRODUCTION IN FLORIDA	189
Peter J. Dittmar, Eugene J. McAvoy, Monica Ozores-Hampton, Richard N. Raid, Pamela Roberts, Hugh A. Smith, Xavier Martini, Joseph W. Noling, Shouan Zhang, and Lincoln Zotarelli	
CHAPTER 13. PEPPER PRODUCTION	207
Monica Ozores-Hampton, Nathan S. Boyd, Eugene J. McAvoy, Christian F. Miller, Joseph W. Noling, and Gary E. Vallad	
CHAPTER 14. POTATO PRODUCTION	239
Lincoln Zotarelli, Peter J. Dittmar, Pamela D. Roberts, Joseph W. Noling, and Bonnie Wells	
CHAPTER 15. ROOT CROP PRODUCTION IN FLORIDA	261
Peter J. Dittmar, Eugene J. McAvoy, Monica Ozores-Hampton, Richard N. Raid, Hugh A. Smith, Bonnie Wells, Julien Beuzelin, Joseph W. Noling, Lincoln Zotarelli, Shouan Zhang, Christian F. Miller, and Qingren Wang	
CHAPTER 16. STRAWBERRY PRODUCTION	293
Vance M. Whitaker, Nathan S. Boyd, Natalia A. Peres, Joseph W. Noling, and Justin Renkema	
CHAPTER 17. SWEET CORN PRODUCTION	313
Monica Ozores-Hampton, Ramdas Kinessary, Eugene J. McAvoy, Richard N. Raid, and Julien Beuzelin	
CHAPTER 18. TOMATO PRODUCTION	329
Josh H. Freeman, Eugene J. McAvoy, Nathan S. Boyd, Ramdas Kinessary, Monica Ozores-Hampton, Hugh A. Smith, Joseph W. Noling, and Gary E. Vallad	
CHAPTER 19. BIOPESTICIDES AND ALTERNATIVE DISEASE AND PEST MANAGEMENT PRODUCTS	373
Hugh A. Smith, and Gary E. Vallad	

Crop Index

Crop	Pages	Crop	Pages	Crop	Pages	Crop	Pages
Asian vegetables	31	Tropical root crops	266	Lima bean	167 - 187	Southerpea	167 - 187
Bean	167 - 187	Chive	189 - 207	Mustard	33 - 51	Spinach	107 - 134
Beet	261 - 291	Collards	33 - 51	Okra	135 - 166	Squash	53 - 79
Broccoli	33 - 51	Cucumber	53 - 79	Onion	189 - 207	Strawberry	293 - 312
Cabbage	33 - 51	Eggplant	79 - 105	Parsley	137 - 168	Sweet corn	313 - 327
Cantaloupe	53 - 79	Endive, Escarole	107 - 134	Pepper	207 - 237	Sweet potato	265 - 295
Carrot	261 - 291	Kale	33 - 51	Potato	239 - 259	Tomato	329 - 372
Cauliflower	33 - 51	Leek	189 - 207	Radish	261 - 291	Turnip	33 - 51
Celery	135 - 166	Lettuce	107 - 134	Snowpea	169 - 189	Watermelon	53 - 79

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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PP332

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

Philip F. Harmon, Carrie Harmon, and Dave Norman²

Symptoms

Bacterial wilt is a newly discovered disease in Florida. Symptoms of the disease caused by *Xylella* and bacterial wilt will show signs of water stress, marginal leaf burn (Figures 1 and 2), and may also be prone to developing other stress diseases, such as stem blight and thus may show symptoms of bacterial wilt. Symptoms of bacterial wilt on blueberry plants with bacterial wilt include discoloration or light brown to tan, ill-defined borders (Figure 3). This is different from that which occurs with stem blight discoloration is typically well-defined and brown in color. Additionally, we have observed bacterial ooze from the crowns of plants with bacterial wilt (Figure 4). Stem blight does not.

Unlike *Xylella*, which causes bacterial wilt, *Ralstonia* can be spread easily in infected plant material. Plants showing symptoms. *Ralstonia* spreads slowly spreading down and creating large circular patches of dead plants (Figures 5 and 6). These symptoms are similar to those of Phytophthora root rot-affected plants. Bacterial wilt occurs only in low-lying and poorly



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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PP-20

Anthracnose Fruit Rot of Strawberry¹

James C. Mertely, Bruna B. Forcelini, and Natalia A. Peres²

Anthracnose fruit rot, caused by the fungus *Colletotrichum acutatum*, is an important disease for strawberry. Thus, if strawberry is planted on old plastic, other species of *Colletotrichum*, such as *C. gloeosporioides*, are less frequent. Thus, weeds in and around production fields may also be sources of inoculum. Although fruit are most frequently affected by *C. acutatum* from strawberry, other organs of the plant, including crowns, leaves, petioles, and roots, are also affected.

Pathogens and Symptoms

Anthracnose fruit rot lesions appear as dark brown or black sunken spots on infected fruit (Figure 1). On green fruit, lesions are small (1/16–1/8 inch across), hard, sunken, and tan-to-dark brown. Lesions on ripening fruit (1/8–1/2 inch), hard, sunken, and tan-to-dark brown. In wet weather, the lesions become covered with an orange ooze composed of millions of spores in a mucilaginous matrix (Figure 2). When the fruit is dry, the ooze dries and is favorable for infection, multiple lesions may develop on the fruit, and lesions may appear on petioles and leaves. Strawberry flowers are highly susceptible to anthracnose and remain attached to the plant when infected. Flowers affected by the gray mold fungus, *Botrytis cinerea*, may show similar symptoms. Small black button-sized fruit may also develop from infected flowers (Figure 5).

...ation were believed to eliminate inoculum carryover from Florida production fields. However, *C. acutatum* has been recovered from dead plants left on old plastic during strawberry production. Thus, if strawberry is planted on old plastic, other species of *Colletotrichum*, such as *C. gloeosporioides*, are less frequent. Thus, weeds in and around production fields may also be sources of inoculum. Although fruit are most frequently affected by *C. acutatum* from strawberry, other organs of the plant, including crowns, leaves, petioles, and roots, are also affected.

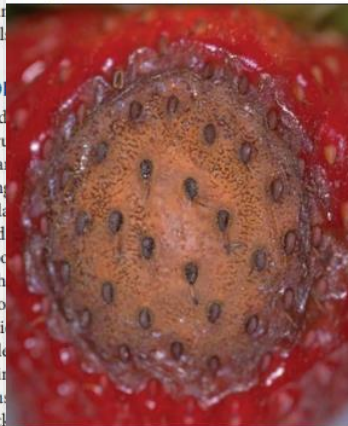


Figure 2. Spore mass of *C. acutatum* on anthracnose lesion on strawberry fruit. Credits: UF/IFAS GREC



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



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



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

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

Thank you

▶ Carrie Lapaire Harmon

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