



Hands-on identification of vegetable diseases: Cucurbits

Theme: How to diagnose a specific disease from diseases or disorders with similar symptoms.

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Cucurbits

2014, FL (Watermelon)

19,700 acres harvested, #2 in U.S. (109,050 acres in the U.S)
>\$80 million Farm Value, #1 in U.S. (\$431 million in the U.S)
(USDA-NASS, 2015)



Other cucurbits

Cucumbers: 9,400 acres, #1 in U.S.

Squash: 6,800 acres, #1 in U.S

Cucurbits section discussion layout

- Scenario 1: **Spots**
- Scenario 2: **Wilts**
- Scenario 3: **Leaf, fruit distortions**
- Scenario 4: **Fruit damage**
- Scenario 5: **Stunting**

Scenario 1: Matt Orwat during a regular cantaloupe field visit in Washington county finds everything ok. Just a few days later, he gets a call from the same grower saying that there are progressing leaf spots in the field and needs his help in identification. Matt understands the seriousness and gets on his truck to visit the farm again. On the way he thinks about.

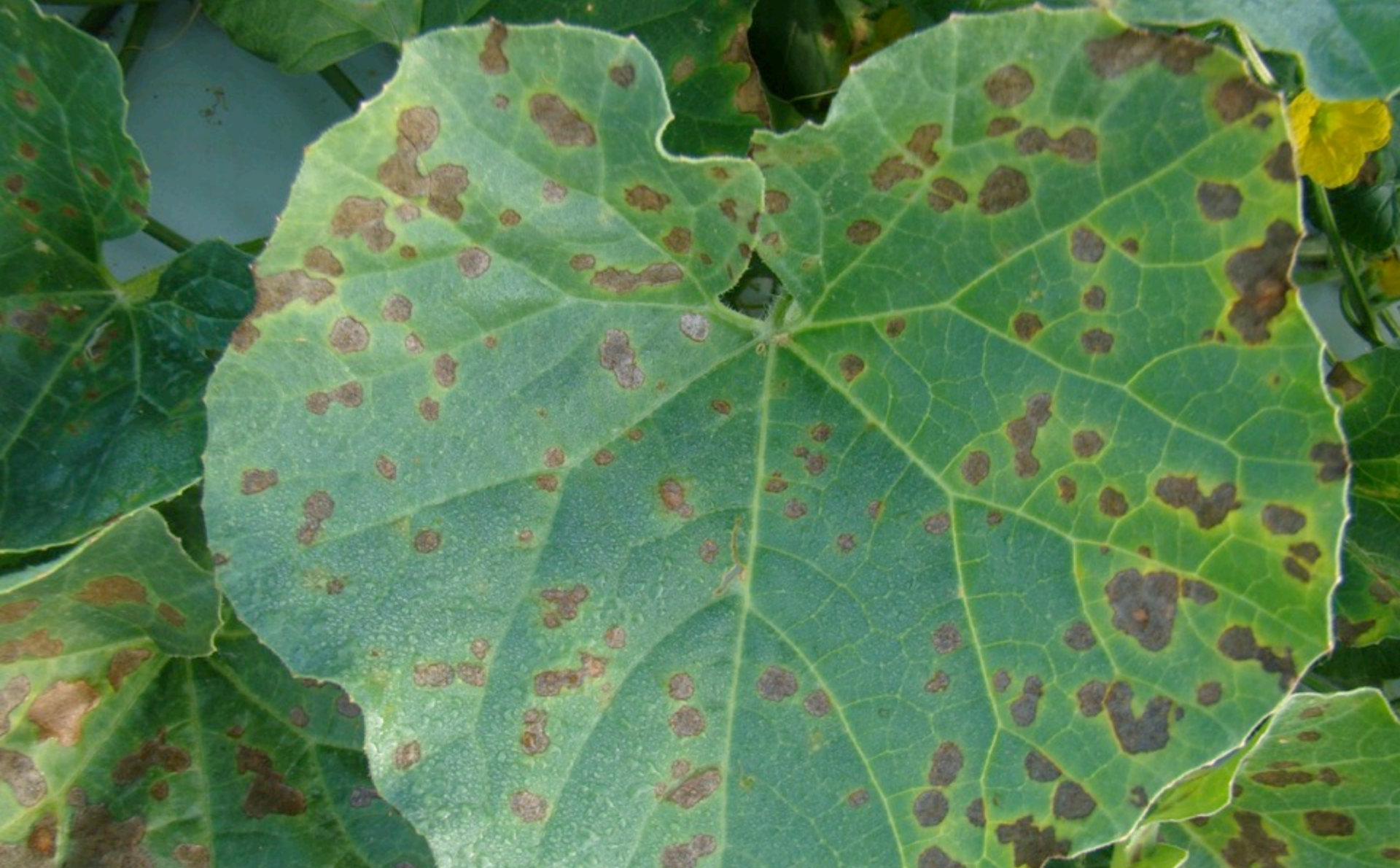


Possible reasons:

1. Downy mildew: **Oomycete (O)**
2. Gummy stem blight: **F**
3. Anthracnose: **F**
4. Cercospora leaf spot: **F**
5. Angular leaf spot: **B**
6. Alternaria leaf spot: **F**
7. Powdery mildew: **F**



Angular, yellow leaf spots is an indication for **Downy mildew** caused by *Pseudoperonospora cubensis*



In another section of the field Matt notices the transition from yellow angular spots to necrotic spots and he is even more positive that the disease is **Downy mildew**

Cluster of spores at the underside of the leaves is a definitive confirmation for **Downy mildew**. Matt checks the growers spray regime and places a recommendation.



If the symptoms look different than the ones for Downy mildew, Matt checks whether it is **Gummy stem blight** caused by *Didymella bryoniae*



Lesions on the margin of the leaves is a very distinct one of **Gummy stem blight**



Severe infection of Gummy stem blight on leaves

Cracking of the stem with gummy ooze on an infected vine



Not definitive symptoms for Gummy stem blight

Gummy ooze from an infected vine



Not a definitive symptom. There can be other reasons for ooze

Water soaking on an infected leaf and small black fruiting bodies embedded on the tissue





Numerous tiny black fruiting bodies on an infected vine

Fruiting bodies on an infected leaf



If it is not gummy stem blight, this may be **Anthracnose** caused by *Colletotrichum orbiculare*. The unique symptom is irregular shaped spots scattered on the leaves.



Comparison of lesions of **Anthracnose** vs. **Gummy stem blight**



Characteristic cracking in the lesions caused by **Anthracnose**





If it is not Anthracnose, this may be [Cercospora leaf spot](#) caused by [Cercospora cucumerina](#). The unique symptom is circular black spots scattered on the leaves.



At later stages, the center of the lesions becomes white



Cercospora leaf spot can cause severe leaf yellowing

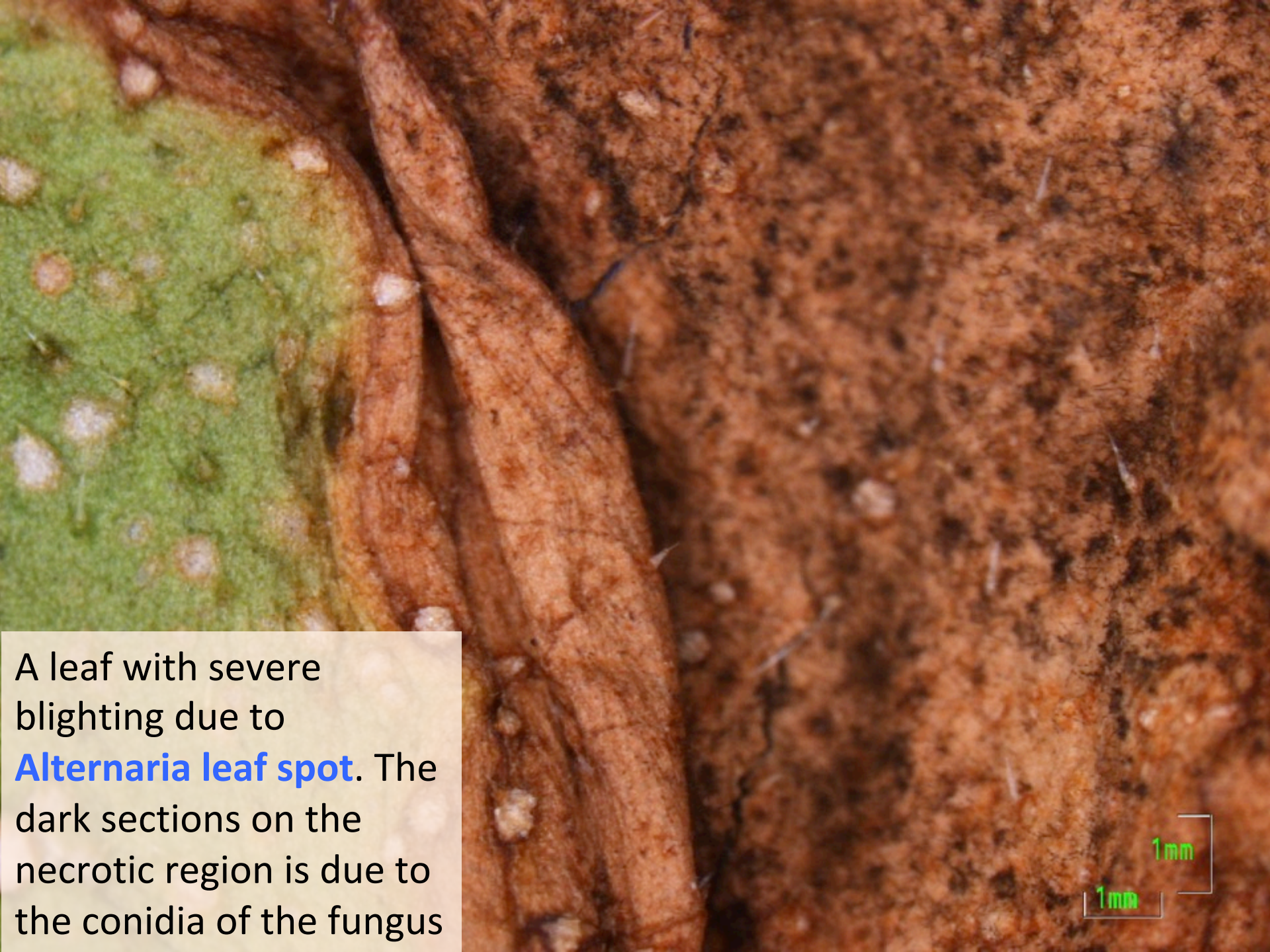
Angular leaf spot is a bacterial disease caused by *Pseudomonas syringae* pv. *lachrymans* or related species. **How can you confirm it?**



Alternaria leaf spot caused by *Alternaria cucumerina* can also cause similar kind of symptoms as Angular leaf spot.

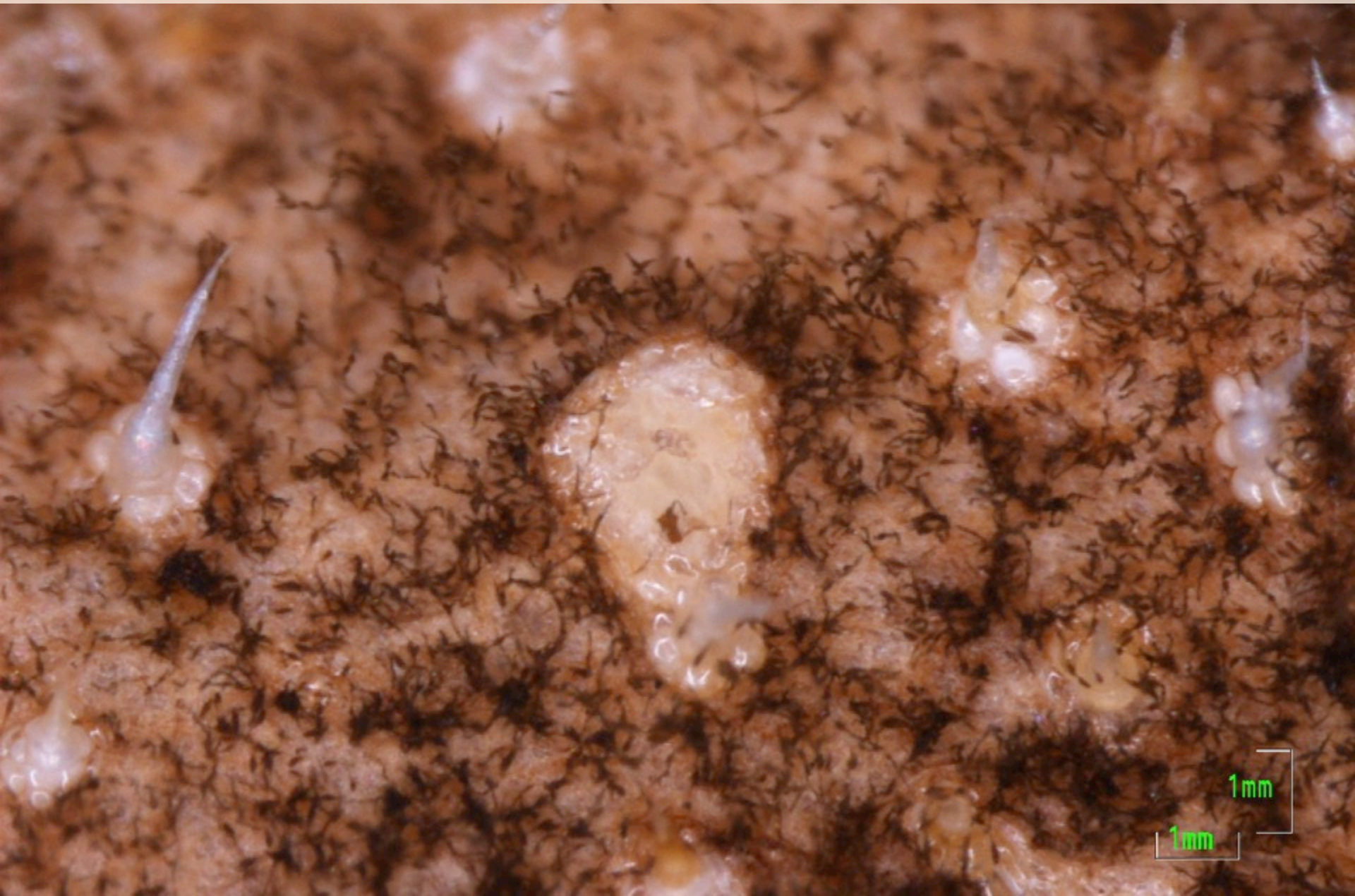


A definitive confirmation can only be done by microscopic analysis of spore morphology.



A leaf with severe blighting due to **Alternaria leaf spot**. The dark sections on the necrotic region is due to the conidia of the fungus

Close-up of the blighted leaf indicating numerous dark conidia. A leaf hair is shown for comparison



Matt also notices **Powdery mildew** caused by *Sphaerotheca fuliginea*. It is an easy disease to identify with white talcum-like formation on upper side of leaves



Powdery talcum-like formation can be noticed on the under side of leaves and sometimes on fruits also.



Cluster of long white chains of conidia of powdery mildew



Florida weather conditions are ideal for occurrence of foliar diseases on cucurbits round the year. This necessitates the judicious use of protective and systemic fungicides and rotating fungicide chemistries for effective disease management.

	Disease	Management options
1	Downy mildew	a. Weather forecasts, and use IPM Pipe sentinel plot mapping for progression of the disease in Florida b. Fungicide application based on the predicted models
2	Gummy stem blight	a. Fungicide application (Always needs to be ahead of the disease) b. Rotate chemistries as fungal resistance to fungicides is prevalent.
3	Anthracnose (Races 1,2)	a. Resistant varieties for Race 1 b. Fungicide application (Always needs to be ahead of the disease)
3	Angular leaf spot	a. Clean transplants, Bactericide application
4	Cercospora leaf spot	a. Fungicide application
5	Alternaria leaf spot	a. Fungicide application
6	Powdery mildew	a. Fungicide application at the first onset of the disease

Scenario 2: Donna Demorest, during one of her watermelon field visits came across plants wilting in a field in Columbia county. From literature she knows of atleast 3 different causes for plant wilting.



Possible reasons:

1. Bacterial wilt: **B**
2. Fusarium wilt: **F**
3. Lack of water: **P**
4. Excessive soil moisture: **P**



Wilting of watermelon vine may be due to **Fusarium wilt** caused by *Fusarium oxysporum* f. sp. *niveum*

Severe vascular discoloration and white mycelial formation is a positive confirmation of **Fusarium wilt**. Pathogen is host specific to watermelon.



Bacterial wilt caused by *Erwinia tracheiphila* vectored by striped cucumber beetles will not cause a mycelial formation. A bacterial ooze from the cut stem is a positive ID.

	Disease	Management options
1	Bacterial wilt	a. Cucumber beetle management
2	Fusarium wilt (4 races)	a. Resistant varieties b. Grafting with squash rootstocks c. Fungicide drench applications at transplanting

Scenario 3a: What is going on with the cucurbits. Leaf and fruit distortions!. David Nistler, regularly comes across numerous types of issues at the Clay county on all kind of cucurbits. Kevin knows that this may be due to viruses, or some physiological issues.

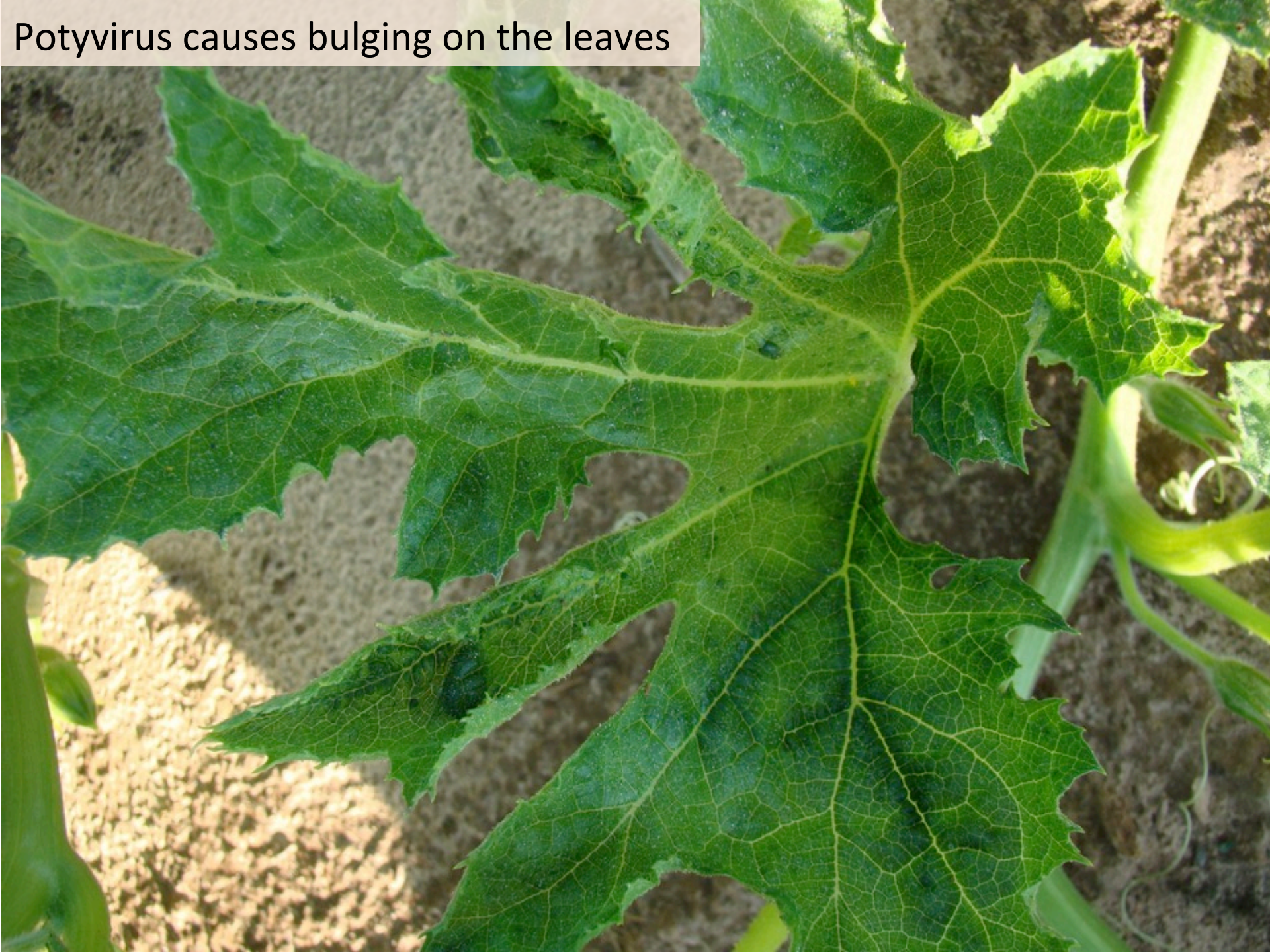
Possible reasons:

1. Zucchini Yellow Mosaic Virus (ZYMV) potyvirus: **Viral (V) - aphids**
2. Papaya Ringspot Virus - W(PRSV-W)/ WMV-1 (potyvirus) **V - aphids**
3. Watermelon Mosaic Virus-2 (WMV-2) potyvirus: **V - aphids**
4. Squash Vein Yellowing Virus (SqVYV): **V (Watermelon vine decline; white fly)**
5. Cucumber Leaf Crumple Virus (CuLCrV): **V - white fly**

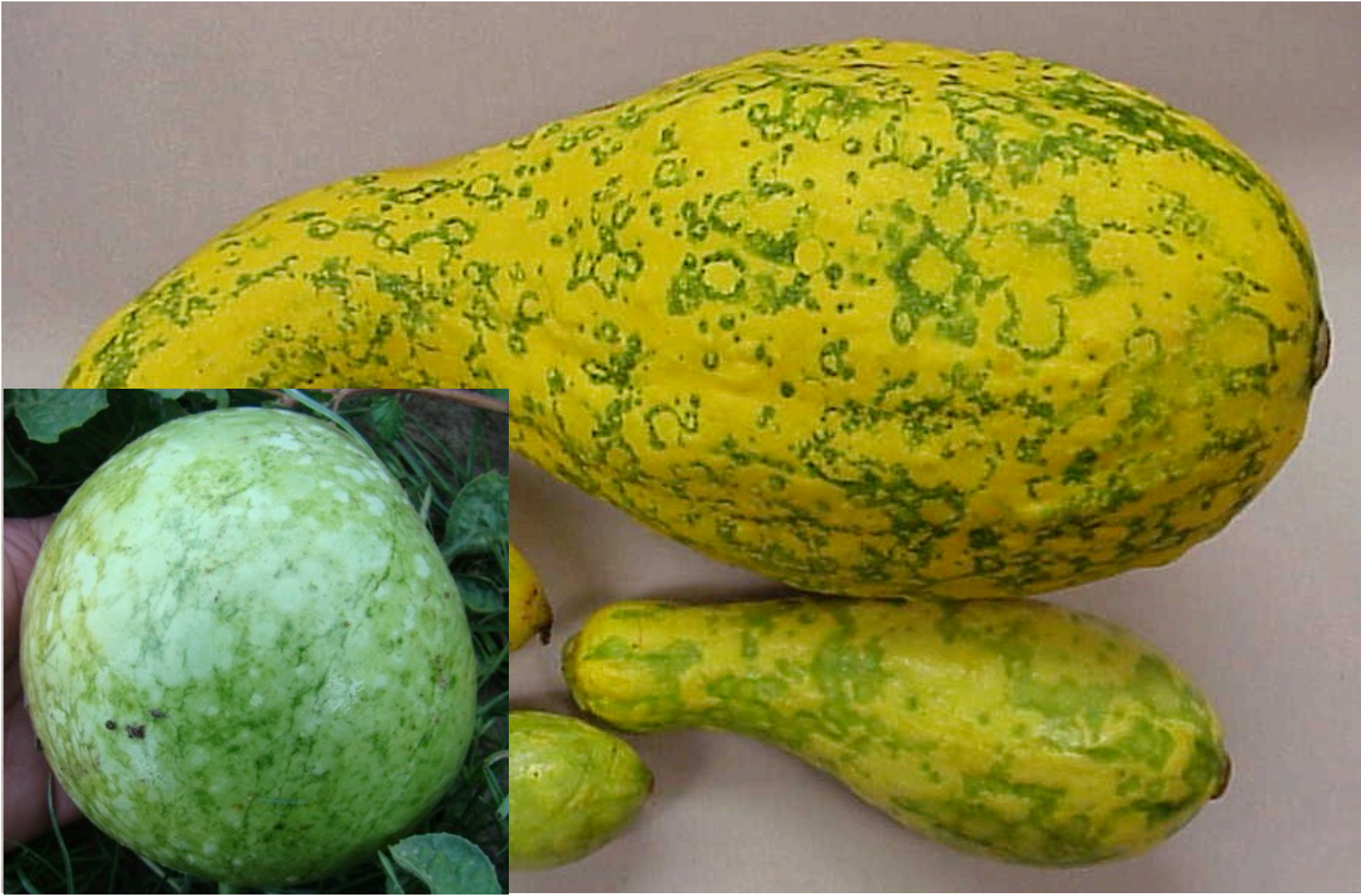
Distorted appearance of the leaves; inward curling



Potyvirus causes bulging on the leaves



Unique patterns on the fruits. It is difficult to separate between ZYMV, PRSV, and WMV-2 based on field symptoms!.



Leaf crumpling on cucurbits is only known to be caused by **CuLCrV**, vectored by white flies.



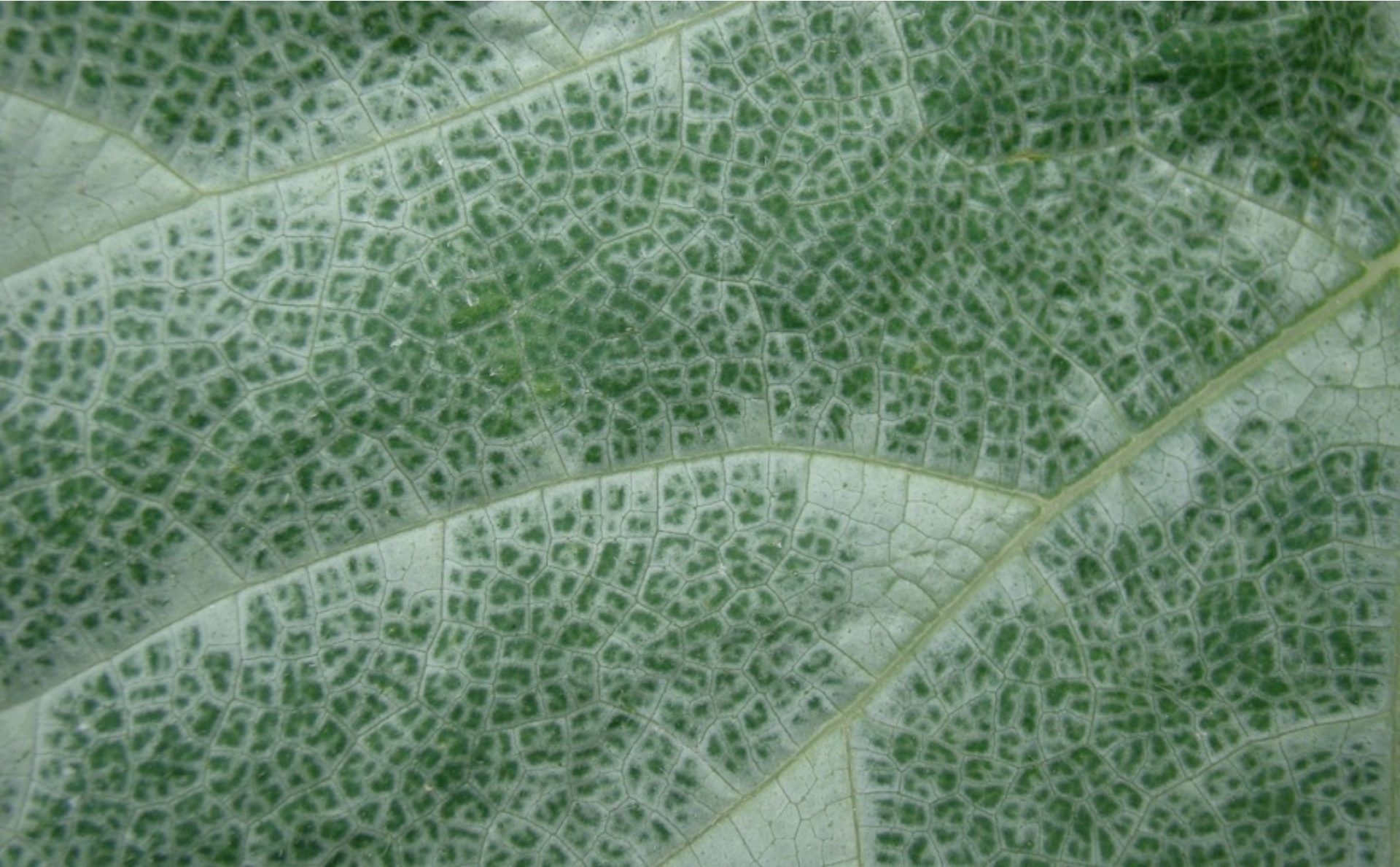
Leaf crumpling and yellowing is a definitive confirmation for **CuLCrV**



A leaf with severe CuLCrV



Scenario 3b: This looks like normal leaf patterns on watermelon. May be not! Keith Wynn at Hamilton county was not sure when a grower asked this question. Ken decided to take a close look.



Keith checks a healthy leaf and notices the difference.



There is clear silvering of the leaves, and is caused by **feeding of silver leaf white fly**. The white fly releases a toxin which causes these symptoms.



	Disease	Management options
1	ZYMV PRSW WMV-2	a. Aphid management b. Removing volunteer cucurbits and host plants
2	SqVYV	a. White fly management b. Remove volunteer cucurbits and host plants
3	CuLCrV	a. White fly management b. Removing volunteer cucurbits, host plants and plant debris for white fly control
4	Silver leaf	a. White fly management

Scenario 4a: In Leon county, Molly Jameson usually comes across numerous types of fruit rots on cucurbits. Molly would like to tell the grower about the specific cause so that a management option can be placed for future production.



Possible reasons:

1. Blossom end rot: **P**
2. Phytophthora crown and fruit rot: **O**
3. Sclerotium rot: **F**
4. Bacterial fruit blotch: **B**
5. Wet rot: **F**

Blossom End Rot



Phytophthora crown and fruit rot



Mustard like sclerotia is a definitive confirmation of **Sclerotium rot** caused by *Sclerotium rolfsii*



Sclerotium rot on winter squash



Wet rot is a disease of flower parts and fruits and has a characteristic appearance. Wet rot is caused by the fungus *Choanephora cucurbitarum*. It is a weak pathogen and generally is a secondary to mechanical or insect damage.



Bacterial fruit blotch causes a characteristic blotching on the fruit and is caused by the bacterium *Acidovorax avenae* subsp. *citrulli*



Scenario 4b: Libbie Johnson gets a call from a grower at Escambia county. He has ~200 acres of watermelon. The crop looks great the fruits looks good, and the leaf coverage is excellent. However, before the first pick the grower cut open some fruits and found necrotic sections in the rind.

Libbie and the grower started checking each of the varieties (triploids) planted and they could find necrosis in all of those varieties. The estimated disease incidence is on 30-50% of the fruits.

Libbie has no idea what is the issue, but she came across information regarding a disease with no confirmed causal agent till now.

Watermelon rind necrosis only affects the rind. However, the fruits are not marketable.

SqVYV can also cause these symptoms in the fruit. SqVYV will also show vine decline and vein yellowing which is absent in case of **watermelon rind necrosis**.



Scenario 5: Shep Eubanks gets a call from a squash grower in Gadsden county. Plants were stunted in sections of the field, but no clear signs of symptoms were noted. **Guess what?**



Root-knot caused stunting of the plants



Can Root-knot nematodes cause wilting of the plants?



Sure, Yes!

Guess what?.



- Field identification based on key symptoms caused by various pathogens can be an effective tool for rapid recommendations at the county level.
- However, if you are not sure, use diagnostic facilities at UF for definitive confirmation.

Contact for additional information

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