

Updates on Management of Cucurbit Diseases in Illinois

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Major Cucurbit Diseases in Illinois

- Powdery mildew
- Phytophthora blight
- Downy mildew
- Bacterial spot of leaf and fruit

I will focus more on bacterial spot disease

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Powdery Mildew

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Powdery Mildew of pumpkin

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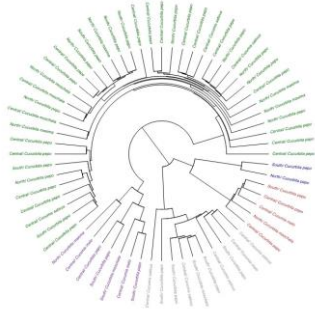
Powdery mildew of pumpkin: fruit stem

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Our cucurbit powdery mildew project

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Hierarchical clustering on the distance matrix of 64 isolates of *Podosphaera xanthii* from Illinois



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Fungicide Efficacy for Powdery Mildew

- Effective fungicides: **Procure, Proливо, Quintec (IL)**
- More fungicides: **The Veg. Prod. Guide**
- No strobilurin, or the highest rates
- Fungicides needed for resistant cultivars
- Fungicide application: at first observation of the disease inside canopy Efficacy
- Fungicide efficacy test: **Every year**

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Phytophthora Blight
(*Phytophthora capsici*)

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Phytophthora damping-off & vine infection

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Phytophthora fruit rot of pumpkin & squash

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Managing Seedling Death

- Seed treatment:
 - Mefenoxam (Apron XL LS)**
 - 0.64 fl oz/100 lb seed
(0.42 ml/kg seed)
- ❖ Protection of plants for 5 weeks

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Managing Phytophthora on Vine & Fruit

- Since 1999 tested more than 50 potential fungicides and have effective fungicides
 - ❖ Orondis Ultra (FRACs: U15, 40)
 - ❖ Revus: (FRAC: 40)
 - ❖ Ranman (FRAC: 21) + Silwet L-77
 - ❖ Elumin (FRAC: 22)
 - ❖ Presidio (FRAC: 43)
- Spray at weekly schedule
- Follow label directions

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Managing Cucurbit Phytophthora Blight

- Recommended practices in Illinois
 - ❖ ≥3 years of effective crop rotations
 - ❖ Seed treatment with mefenoxam
 - ❖ Grow on raised beds, if possible
 - ❖ Avoid using contaminated water
 - ❖ Remove or disk early infected plants
 - ❖ Fungicide applications at first sign of the disease (7-day, alternate)
 - ❖ Effective sanitation

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Downy Mildew

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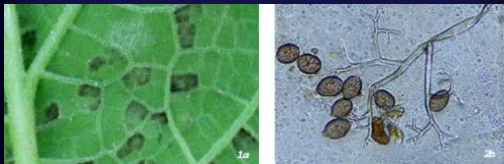
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Pumpkin downy mildew

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Cucurbit downy mildew pathogen

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Management of Downy Mildew

- Check pathogen movement: <http://cdm.ipmpipe.org/>
- Field scouting is very important
- Accurate disease diagnosis is essential
- Fungicide applications is needed

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Fungicides for Downy Mildew

- Effective fungicides in Illinois:
Gavel, Omega, Orondis Opti, Orondis Ultra, Presidio, Ranman, Revus, Zampro
- Suggested fungicides in Illinois:
Orondis Opti, Orondis Ultra, or Revus, Ranman, or Presidio mixed with chlerothalonil (i.e., Bravo Weather Stik)

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Bacterial Spot

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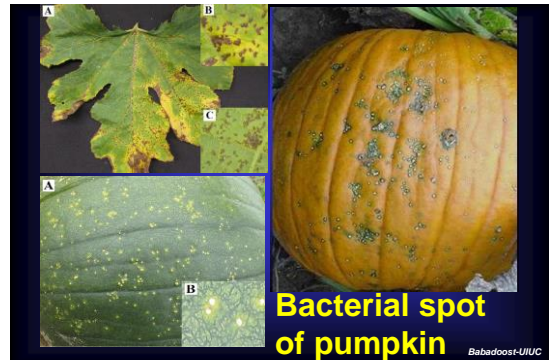
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Cucurbit Bacterial Spot

- Plant parts infected: Leaf & fruit
- Status: An emerging disease
- Pathogen: *Xanthomonas cucurbitae*
- Areas of occurrence: Worldwide
- Major hosts: pumpkin & winter squash
- Favorable conditions: Wet & warm

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Collapse of pumpkin fruit infected by *Xanthomonas cucurbitae*



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Management of Bacterial Spot

- Disease development
- Host range
- Crop rotation
- Pathogen survival in the field
- Seed treatment
- Use of chemicals and biocontrols
- Genetic variation of the pathogen
- Plant resistance

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Host-Range of *X. cucurbitae*

- Based on the observations and greenhouse studies, *X. cucurbitae* infects only plants in the Cucurbitaceae family
- *X. cucurbitae* may survive on other plants without symptoms (more studies are needed)

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Crop Rotation for managing *X. cucurbitae*

- We conducted 4 years of field studies and currently analyzing the data

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Survival of *Xanthomonas cucurbitae* in the Field and in/on Seeds

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Field survival of *Xanthomonas cucurbitae*



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Xanthomonas cucurbitae: Field Survival

- Field survival: *X. cucurbitae* survived longer than 24 months with pumpkin leaves and fruit tissues and the bacteria were viable
- ❖ **Consideration:** 3-year crop rotation with non-cucurbits

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Xanthomonas cucurbitae: Seed Survival

- Seed: *X. cucurbitae* survived longer than 18 months in naturally-infected and artificially-inoculated seeds at 39°F and 72°F (4°C and 22°C)
- ❖ **Conclusion:** Infected/infested seeds will likely be free of *X. cucurbitae* in 3 years

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Seed Treatments

- Hot-water: 55°C for 15 min - effective
- HCl: 0.5% for 40 min - effective
- NaClO: was not effective
- ❖ **Conclusion:** Seed treatment with hot-water or HCl eradicates *X. cucurbitae* in/on seeds without significantly affecting seed germination and seedling vigor

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List of some compounds tested

Chemicals:

- | | |
|-------------------------|--------------------------|
| 1. ActiGard 50 WG | 14. SciEx83-3S |
| 2. Agion E | 15. SciEx83-4S |
| 3. Agrimycin 17 WP | 16. Tanos 50 DWG |
| 4. Badge X2 DF | 17. Quintec 2.08 SC |
| 5. Cuprofix Ultra 40 DF | |
| 6. Cueva FL | Biocontrol agents |
| 7. Dithane 75 DF | 18. Actinovate AG |
| 8. Kasumin 2L | 19. Cx-9030 |
| 9. Kocide 3000 46.1 DF | 20. Regalia |
| 10. Mil-Stop SP | 21. Serenade ASO |
| 11. Mycoshield 17 WP | 22. Sonata ASO |
| 12. Nordox 75 DF | 23. Several new agents |
| 13. Phyton-016B | |

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Conclusions:

- Incidence and severity of bacterial spot on leaves and fruits are reduced by application of some chemicals and biocontrol agents, but none was highly effective.
- Recommended chemicals: **Actigard (P 01), Kocide-3000 (M1), Manzate PRO Stick (M3), Regalia (P5), Quintec (13)**. Manzate, Quintec, or Regalia should be mixed with Kocide.

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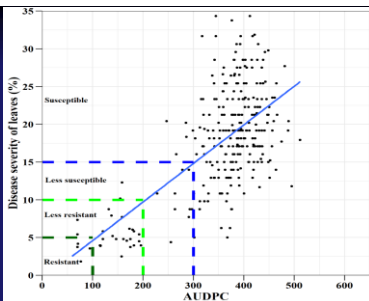
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Cucurbits Resistance to *X. cucurbitae*

- We have screened 81 commercially-grown pumpkin and winter-squash cultivars and 300 accessions of cucurbits in the greenhouse and field for their resistance to *X. cucurbitae*

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Screening cucurbit accessions for resistance to *Xanthomonas cucurbitae*

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Cucurbits Resistance to *X. cucurbitae*

- All commercially-grown pumpkin and winter squash cultivars are susceptible to *X. cucurbitae*
- 30 cucurbit accessions were found less susceptible to *X. cucurbitae*
- Only 4 accessions were identified as resistant to *X. cucurbitae*

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Managing Bacterial spot

- Recommended practices for 2021
 - ❖ Plant pathogen-free seed or disease-free seedlings
 - ❖ ≥ 3 years of crop rotation with non-cucurbits
 - ❖ 2 applications of Actigard after seedling emergence
 - ❖ Begin spray application at vine spread

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**Thank You for
Your Attention**

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