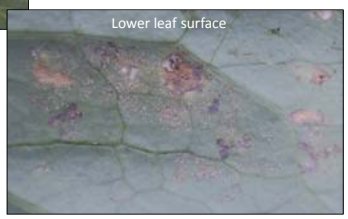
New developments in managing downy mildew, black rot, and Alternaria leaf spot in cole crops




Chris Smart
Rachel Kreis
Holly Lange

Cabbage Downy Mildew

Downy Mildew



Downy Mildew

- Survives in the soil on crop debris, or on weeds
- MUST have water (leaf wetness) to infect
- Minimum 3 year rotation without cole crops
- Spores can blow from plant to plant, and to adjacent fields
- Also produces an overwintering spore that survives in the soil
- We looked at fungicide efficacy in 2014 and 2015

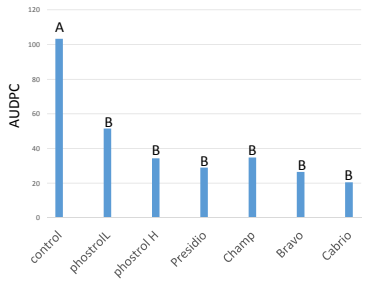
Downy mildew on cabbage

Treatments

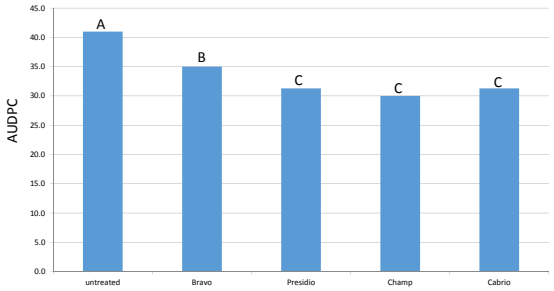
- Untreated control
- Bravo Weather Stik (chlorothalonil)
- Champ 30 WG (copper hydroxide)
- Cabrio EG (pyraclostrobin)
- Presidio SC (fluopicolide)
- Phostrol 500 (phosphorus acid) low rate (2.5 pt/A)
- Phostrol 500 (phosphorus acid) high rate (5 pt/A)

Downy mildew trial

Cabbage downy mildew trial 2015



Downy Mildew Trial 2014



Summary

- Downy mildew was quite severe in 2015, and we were happy with the amount of disease and application of control products
- All treatments were more effective in controlling downy mildew than the untreated control

Black Rot

Xanthomonas campestris pv. *campestris*

We only received three samples in 2015…

but we know almost everyone had black rot

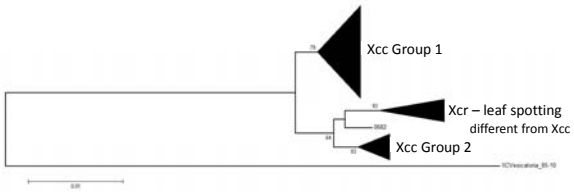
We completed a new approach to compare Xcc isolates from around the world

After 10 years, there were just too many fingerprints

- Multi-locus sequence typing (MLST)
- Use DNA sequence of 8 genes to identify strains
- Obtained sequence from each of the eight genes for each of 154 isolates
- Aligned the sequences, and identified unique sequence 'types' or strains

Results of Sequencing

Three major groups in NY, Xcc groups 1 and 2, and a group with the leaf spot isolates (different from Xcc)



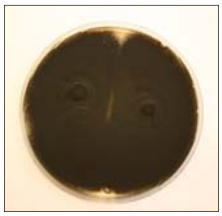
Symptoms of leaf spotting

Summary for Black Rot

- When we compared our sequences to those from other locations around the world, there (so far) was no geographic clustering
  - That is, the isolates from NY were not all together in one group and completely different from isolates from Europe. Need to compare more isolates from around the world
  - In several instances the identical isolate was observed in NY and in Europe
- 2016 plan to test potential new control products in greenhouse
  - We need to identify the best strategy for reducing spread

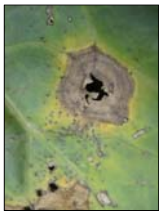
Alternaria Leaf Spot

- Brown or Black Specks
- Specks Enlarge Concentrically
- Yellow Halo
- Bull's Eye Lesions
- Dead Tissue



Alternaria Leaf Spot

- Are all isolates the same?
- Collected about 50 isolates over several years
- Wanted to understand how diverse the pathogen is here in NY
- Are isolates susceptible to commonly used fungicides?

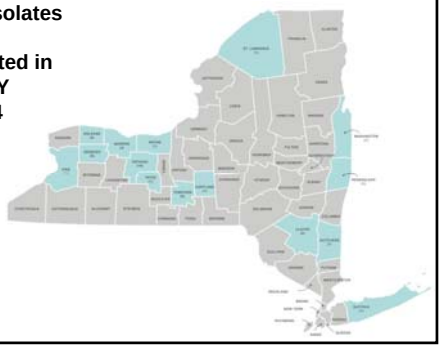


Rachel Kreis

Isolates used in this study

Total of 49 NY Isolates

Majority collected in western NY 2010-2014



Diversity Results

- The population is VERY diverse
- Of 49 isolates, 44 were unique!
- Why is this important?
  - Sources of inoculum besides overwintering in the field

Fungicide Sensitivity Project

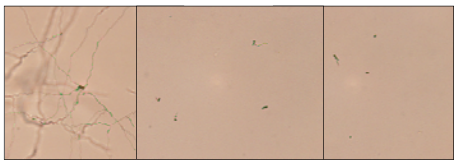
Why? New York Growers have concerns about fungicide resistance

Project Evaluate NY isolates for sensitivity to azoxystrobin (Quadris) fungicide using a spore germination assay

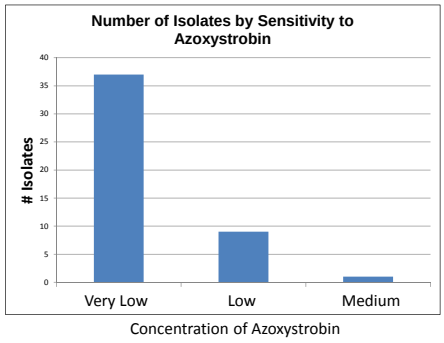
- We also tested isolates on chlorothalonil and all tested isolates were sensitive.

Spore Germination Assay

1. Grow isolates in culture.
2. After 7 days, make a spore suspension.
3. Spread suspension on water agar plates various concentrations of **azoxystrobin** (from 0 to 25 µg/mL).
4. Count germinated spores after 24 hours.
5. Calculate effective concentration providing 50% inhibition (EC_{50})



Results



Fungicide Sensitivity Project

Project Sequence *cytochrome b* gene in NY isolates for point mutations known to confer resistance to azoxystrobin.

Results

- No mutations were found at in the *A. brassicicola cytochrome b* gene
- All isolates sensitive to azoxystrobin (Quadris)

Thanks CRDP, Growers and Extension Educators!!