Welcome to the webinar!

- The webinar will start at the top of the hour.
- Find a handout of the slides in the "handouts" section of your gotowebinar control panel.
- To type in a question, use the question box on your control panel.
- The webinar is being recorded and you can find it in our archive in the coming week at http://www.extension.org/pages/25242 and on the eOrganic YouTube channel

Jared Zystro, Organic Seed Alliance

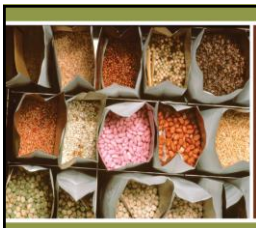
Shannon Carmody
Washington State University

Advancing the ethical stewardship and development of agricultural seed

Organic Seed Production Six Webinar Series Part 3: Managing Diseases and Pests in Seed Crops

Jared Zystro, Organic Seed Alliance
Shannon Carmody, WSU

http://www.extension.org/organic_production



ORGANIC seed ALLIANCE

Managing Diseases and Pests in Seed Crops

Jared Zystro, Organic Seed Alliance

Outline

1. **Considering potential pathogens**
2. **Reducing opportunities for pathogens**
3. **Choosing appropriate genetics**
3. **Managing environmental conditions**
4. **Managing diseases as they appear**

Considering potential pathogens

- What diseases are important to consider?
  - Virulent
  - Seedborne
  - Found in your area
  - Talk to pathologist
  - Disease knowledge will help you understand lifecycle, climatic prefernences, alternate hosts, controls, etc.

Considering potential pathogens

- Talk to pathologist or consult references
- Disease knowledge will help you understand lifecycle, climatic prefernences, alternate hosts, controls, etc.

Reducing opportunities

- Rotations
- Residue management
- Manage alternate hosts and volunteers

Reducing opportunities

- Caution around bringing seed in
- Sterilize seedling trays

Choose varieties with genetic resistance

Plant Disease Resistance Codes

A | Anthracnose | Fungus | *Colletotricum lindemuthianum*
AB | Early (Alternaria) Blight | Fungus | *Alternaria solani*
ALS | Angular Leaf Spot | Bacterium | *Pseudomonas syrvingae* pv *lachrymans*
AS | Alternaria Stem Canker | Fungus | *Alternaria alternata* f sp *lycopersici*
B | Bacterial Wilt | Bacterium | *Erwinia tracheiphila*
BB | Bacterial Blight | Bacterium | *Xanthomonas carotae*
BBS | Bacterial Brown Spot | Bacterium | *Pseudomonas syringae* pv. *syringae*
BLS | Bacterial Leaf Spot | *Xanthomonas campestris* pv *vesicatoria*
BLS 1–3 | Races 1–3
BLS 1, 2 | Races 1 & 2
BLS 1–10 | Races 1–10
BMV | Bean Mosaic Virus
BYMV | Bean Yellow Mosaic Virus
CMV | Cucumber Mosaic Virus
CTM | Curly Top Beet Mosaic Virus
CVYV | Cucumber Vein Yellowing Virus
DM | Downy Mildew | Water Mold
E | Enation Mosaic Virus
F | Fusarium Wilt | Fungus
FOR | Fusarium Crown and Root Rot | Fungus | *Fusarium oxysporum* f. sp. *radicis*
HB | Halo Blight | Bacterium | *Pseudomonas savastanoi* pv *phaseolicola*
L | Gray Leaf Spot | Fungus | *Stemphylium solani*

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Manage environmental conditions

- Keep plants happy - avoid crop stress.
- Time planting to avoid conditions where pathogens thrive.

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Manage environmental conditions

- Maintain airflow with spacing and row orientation.
- Avoid overhead watering.

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Manage environmental conditions

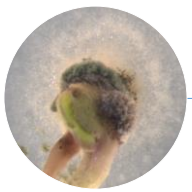
- Time watering so that plants can dry quickly.
- Avoid working in field when plants are wet.

Manage diseases as they appear

- Remove and destroy infected plants.
- Apply OMRI approved controls.
- Know when to destroy the field.

Dry seed after harvest

Importance of Seedborne Pathogens



Seedborne Pathogens

- Pathway for pathogen introduction
- Inoculum source for disease outbreaks
- Reduced seed quality

History of Seed Pathology

1912: APHIS PPQ started under the Quarantine Act → 1918: L.C. Doyer first official seed pathologist → 1924: International Seed Testing Association (ISTA) founded → 1940s: Seed Pathology coined by Paul Neergaard and Mary Noble

1958: Delegates to the 1st Seed Pathology Workshop
Seed Testing Station
Cambridge, England, 1958

Photo from Agarwal and Sinclair 1997

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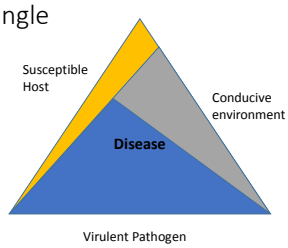
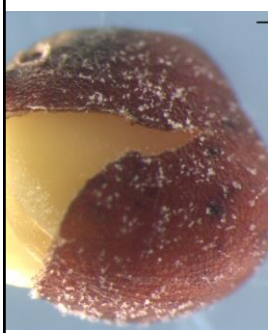
The Disease Triangle

When these 3 elements occur, plant disease can develop. Reducing just one of these elements helps you manage disease or reduce the potential amount of disease.





How to diagnose when diseases are suspected in seed crops

Use online resources, extension bulletins, and other resources:

- APS Compendia of crop diseases
- PNW Vegetable Extension Group: www.mtvernon.wsu.edu/path_team/vegpath_team.htm
- PNW Plant Disease Mgmt. Handbook: www.pnwhandbooks.org
- American Phytopathological Society: www.apsnet.org

How to diagnose when diseases are suspected in seed crops

Submit a sample to a diagnostic lab

- Private labs
- University Plant Clinics
  - For the Pacific Northwest visit: articles.extension.org/pages/18660/disease-management-in-organic-seed-production

Tobacco Rattle Virus on Peony

Consider the disease triangle when taking samples

Provide basic crop information:

- Age
- Size
- Cultivar
- Location
- Exposure
- Weather
- Soil
- Cultural practices
- Pest management history

Fusarium Basal Rot on Onion

Consider the disease triangle when taking samples

Ask these 5 questions:

1. What was the timing of symptom development on your plants?
2. Is more than one plant species affected?
3. How is the field affected on a macro level?
4. How is the plant affected on a micro level?
5. What symptoms and/or signs can you observe?

Fusarium Root Rot on Beans

Seed health testing when your seed crop is diagnosed with a potentially seedborne pathogen

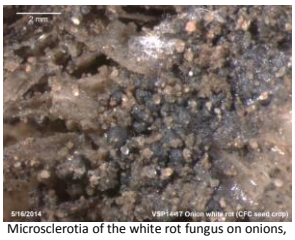
- California Seed & Plant Lab, Inc.
  Link: www.calspl.com/
- Eurofins STA Labs, Colorado
  Link: www.stalabs.com
  Email: info@stalabs.com
- Iowa State University's Seed Science Center and the ISU Seed Testing Laboratory
  Email: seedlab@iastate.edu
- State Departments of Agriculture (Seed Program)
- National Seed Health System
  Link: www.seedhealth.org

Organic Seed Treatments

- Hot Water
  - Hot water treatment of vegetables fact sheet by Sally Miller www.oardc.ohio-state.edu/sallymiller/extension/factsheets/organicseedtrt.pdf
  1. Warm the seed in water
  2. Heat seed to a set temperature for a set duration for that crop and pathogen in a circulating water bath
  3. Cool the seed in cold water
  4. Dry rapidly and thoroughly
- Disinfectants, e.g., NaOCl
- Biological Seed Treatments

Quarantines to prevent the introduction of new pathogens

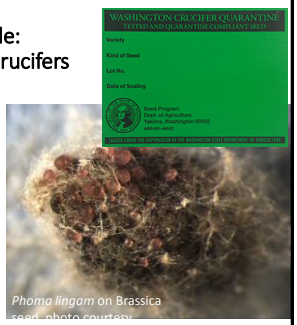
- Can be international, domestic, or even at the county level
- Examples include: Mad cow disease of cattle, scrapie in sheep, white rot in onions, rhizomania in sugar beet, and potato cyst nematode in potato
- Regulated nationally by USDA APHIS PPQ
- Regulated domestically by state departments of agriculture
- Seed growers must understand these risks!



Microsclerotia of the white rot fungus on onions, photo courtesy Lindsey du Toit

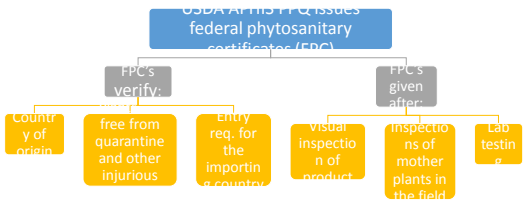
State Quarantine Example: Black leg & black rot of crucifers

- Black leg (*Phoma lingam*) and Black rot (*Xanthomonas campestris* pv. *campestris*) pathogens are quarantined and zero tolerance
- 6 counties in western WA (both pathogens), and 20 counties in eastern WA (black leg only)
- Seed must be tested and certified free of black leg & black rot pathogens



Phoma lingam on Brassica seed, photo courtesy

Phytosanitary certificates for international shipment of seed



Thank you!

- Find all upcoming and archived webinars at http://www.extension.org/pages/25242
- Have an organic farming question? Use the eXtension Ask an Expert service at https://ask.extension.org/groups/1668/ask
- We need your feedback! Please respond to an email survey about this webinar.
- Thank you for coming!