Practical Training for On-farm and Collaborative Plant Breeding 3: Management Considerations for Seed Quality

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Find additional resources and the recordings of previous webinars in this series at https://eorganic.info/node/35654

Upper Midwest Collaborative Plant Breeding Network

ORGANIC seed ALLIANCE
SeedLinked
eOrganic
Nature and Nurture Seeds
THE UNIVERSITY of WISCONSIN MADISON
SKC Seed to Kitchen Collaborative
KC Tomato
USDA National Institute of Food and Agriculture U.S. DEPARTMENT OF AGRICULTURE

Webinar Series

1. **Goal setting and design (Jan 10)**
   Identifying opportunities and designing projects
1. **Selecting high-quality breeding material (Jan 17)**
   Choosing parents, Accessing germplasm, MTA's, IPR
1. **Management considerations for seed quality (today)**
   Seedborne diseases, Seed testing and sanitation
1. **Getting to variety release (Jan 31st)**
   Commercialization planning, Licensing, IPR
1. **Scaling up seed production (Feb 7th)**
   Enterprise budgets, Stock seed, Contracting
1. **Data management and analysis (Feb 14th)**
   Managing pedigrees and data, answers to your analysis questions!

Regional climate affects ability to produce seeds

Organic Seed Alliance
Advancing the ethical development and stewardship of the genetic resources of agricultural seed
PO Box 772, Port Townsend, WA 98368

Climatic Considerations for Seed Crops: Guidelines and Field Trainings for Organic and Specialty Vegetable Seed Producers

https://seedalliance.org/publications/climatic-considerations-for-seed-crops-guidelines-and-field-trainings-for-organic-and-specialty-vegetable-seed-producers/

Utilizing public and private labs for disease diagnostics

Images and descriptions

Tissue Sampling

Find a local or regional expert

NPDN
NATIONAL PLANT DIAGNOSTIC NETWORK

https://www.npdn.org/

Disease Nurseries: Turn a negative into a positive

Heavy disease pressure = selection opportunity for resistance

Separate disease "nursery" from other production areas

Different levels of resistance

Organic-approved Seed Sanitation Procedures

- Procedure is used by the Dawson lab at UW-Madison
- Approved by the Midwest Organic Services Association (MOSA)
- Currently used for tomato and pepper seeds

Organic-approved Seed Sanitation Procedures

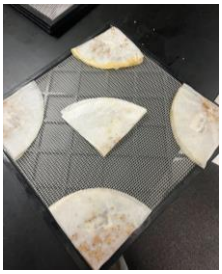
- Seeds are put into muslin drawstring bags with label attached, and hung from a glass stir rod into beaker of sanitizing solution
- First sanitization step uses a 10% solution of trisodium phosphate (TSP), seeds are soaked for 30 min
- Use a stir rod while seeds are soaking, the heating element is not used
- *Note – TSP cannot be poured down the drain in Dane county, check what the proper disposal methods are for your area

Organic-approved Seed Sanitation Procedures

- Next seeds are soaked in a 0.5% solution of bleach for 20 min
- This is followed by rinsing for 5 min to wash off any residue from the treatments

Organic-approved Seed Sanitation Procedures

- Finally, seeds are placed on coffee filters and dried
- Have not seen any effects of this procedure on germination



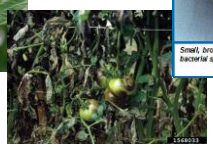
Erica Kempter

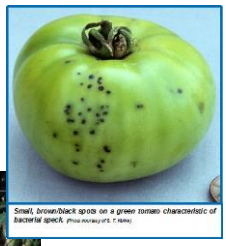
Plant breeding webinar 1-24-23

Skills needed for disease management in plant breeding

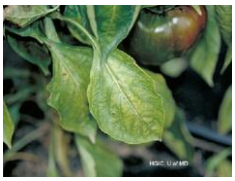
- Observation
- Being a detective
- Discernment

Scouting for disease





Identify the Disease



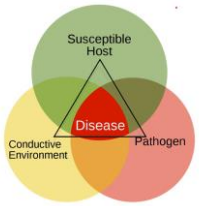
Identify the Disease

Resources

- University extension

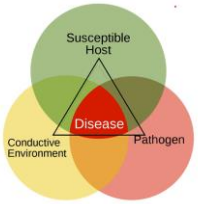
- Private labs

Learn about the disease



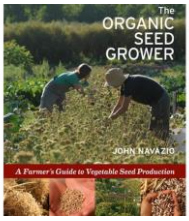
Learn about the disease

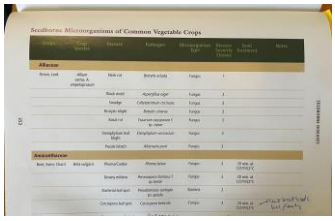
- Where does the pathogen come from? How is it transmitted? Can it be seedborne?



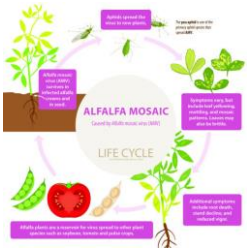
Learn about the disease: is it seedborne? Does the pathogen come from and/or get spread by seeds?

Resource:





How can I use disease life cycle information to make informed decisions about seedborne diseases?



Hot Water seed treatment - Only effective on specific pathogens and specific crops

Brussels sprouts	122	25	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Broccoli	122	20	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Cabbage	122	25	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Carrot	122	20	Alternaria leaf blight, bacterial leaf blight, cercospora leaf spot, Crater rot/Violet blight
Cauliflower	122	20	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Celeriac	116	30	Bacterial leaf spot, Cercospora leaf spot, Septoria leaf spot, Phoma crown and root rot
Celery	116	30	Bacterial leaf spot, Cercospora leaf spot, Septoria leaf spot, Phoma crown and root rot
Chinese cabbage	122	25	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Collards	122	20	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Coriander	127	30	Bacterial leaf spot
Cress	122	15	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Eggplant	122	25	Anthracnose, early blight, Phomopsis, Verticillium wilt
Kale	122	20	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Kohlrabi	122	20	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Lettuce	116	30	Anthracnose, Bacterial leaf spot, lettuce mosaic virus, Septoria leaf spot, Verticillium wilt
Okra	112	10	Anthracnose, Cercospora leaf spot
Mustard	122	15	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Onion (seeds)	122	20	Purple blotch, Stemphylium leaf blight
Onion (sets)	115	60	Botrytis, downy mildew, purple blotch, smut, Stemphylium leaf blight
Parsley	122	20	Alternaria leaf blight, Cercospora leaf spot
Pepper	125	30	Anthracnose, bacterial leaf spot, cucumber mosaic virus, pepper mild mosaic virus, tobacco mosaic virus, tomato mosaic virus
Radish	122	15	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Rutabaga	122	20	Alternaria leaf spot, bacterial leaf spot, black leg, black rot
Shallot	115	60	White rot
Spinach	122	25	Anthracnose, Cladosporium leaf spot, cucumber mosaic virus, downy mildew, Fusarium wilt, Stemphylium leaf spot, Verticillium wilt
Sweetpotato (roots)	113	65	Scurf, black rot
(cuttings, sprouts)	122	10	Scurf, black rot
Tomato	122	25	Alfalfa mosaic virus, Anthracnose, bacterial canker, bacterial speck, bacterial spot, cucumber mosaic virus, early blight, Fusarium wilt, leaf mold, Septoria leaf spot, Tomato mosaic virus, Verticillium wilt, double virus streak
Turnip	122	20	Alternaria leaf spot, brown spot, black leg, black rot
Yam (bulbets)	112	30	Homalodes

UMass Extension: https://ag.umass.edu/vegetable/news/hot-water-treatment-of-seeds

When to treat?

Hot Water Seed Treatment

- Use hot water to kill seedborne pathogens yet ensure that seed is still viable and stores well
- Temp must be very accurate within 0.1-1°F.
- Do test batches first!

Resource url: https://www.seedambassadors.org/wp-content/uploads/2016/03/Small-scale-Hot-Water-Treatment.pdf

Seed Hot Water Treatment

Biggest Challenge:

- maintain the correct temperature of the entire water bath

Hot water seed treatment

Additional Resources

- https://www.youtube.com/watch?v=MF1e8nn-W7g "Microbial Hitchhikers on Seed: Friend or Foe?" Presentation from 2018 Organic Seed Growers Conference
- https://seedalliance.org/publications/climatic-considerations-for-seed-crops-guidelines-and-field-trainings-for-organic-and-specialty-vegetable-seed-producers/ Climatic Considerations for Seed Crops
- https://seedalliance.org/publications/seed-quality-best-practices-for-vegetable-seed-handling-in-montana/ Seed Quality Best Practices
- https://www.npdn.org/ National Plant Diagnostics Network
- https://eorganic.org/node/33835 Managing Diseases of Tomato in Midwest Using Organic Methods
- https://www.organicseedcommons.org/ Organic Seed Commons
- https://www.eorganic.info/collaborativebreeding Collaborative Breeding Network Website
- Dawson Lab tomato seed cleaning protocol: https://www.eorganic.info/sites/eorganic.info/files/u461/2020%20MOSA-approved%20Seed%20Sanitation.pdf

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