Research and Regulatory Wrap Up

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WHITE ROT UPDATE

- Registration Status
- Grant-In-Aid Program
- White Rot Master Plan
- GPS Mapping Program Grant
2013 Research Projects

WHITE ROT

1. Davis/Ferry (UCDavis)- Sensitivity of white rot to various fungicides.

2. Oregon State- New strategies for managing white rot. *(program delayed until new pathologist on board at Madras Station)*


4. Turini/Biscaro- White Rot mapping and site specific management for garlic & onion fields in Fresno Co.

5. Wilson (Tulelake)- Tank mixes and late season control of white rot.
White Rot Mapping Plan

- Utilize GPS mapping system
- Use software to allow mapping of infected sites
- Use computer software to treat, when possible, infected sites plus offset
- Obtain additional grant $$ to expand program and purchase additional hardware and software for mapping and application.
WHITE ROT MASTER PLAN

- Inspection of all garlic seed fields
- Garlic seed field maintenance
- Policy for planting and harvesting from areas known to have white rot
- Reporting of fields with white rot infection
- Treatment for known infestations (all Allium producers)
- Certified Garlic Seed Programs
- Development of methods to reduce soil populations of white rot sclerotia
CDFA Certification of Garlic Field
SYMPTOMS

White rot of onion and garlic is a disease caused by the fungus *Sclerotium cepivorum*. Symptoms include the death of bulbs, stunted growth, and distorted roots. Infected bulbs are often identified by the presence of small, brown, bean-shaped structures called sclerotia, which are found on the surface of the soil or on the bulbs themselves. The disease can also cause garlic to rot during storage.

DISEASE CYCLE

The disease is spread through infected plant debris and soil in which sclerotia survive. Sclerotia can overwinter in the soil and infect healthy plants in the spring. Infected plants can carry the disease to unaffected plants through root contact or soil splash.

CONTROLS

PREVENTION

- **Sanitation**: Remove and destroy all infected plants and plant debris.
- **Cultural Practices**: Practice proper crop rotation and sanitation measures to reduce the population of the pathogen in the soil.
- **Chemical Controls**: Apply a fungicide to control the disease once it is present.

CHEMICAL CONTROLS

Chemical fungicides can be effective in controlling white rot.hey are typically applied as a spray or drench immediately after harvest or at planting to prevent disease development.

ORGANIC ACCEPTABLE PRACTICES

Organic growers can use solarization and mechanical roguing to control white rot. Solarization involves covering the soil with plastic and keeping it warm to kill the pathogen. Mechanical roguing involves removing infected plants by hand to prevent the spread of the disease.

SUMMARY—CONTROLLING WHITE ROT OF ONION AND GARLIC

To Prevent New Infected Fields:

- Use clean, disease-free garlic seeds and onion transplants
- Clean tractor equipment, shoes, etc. between infected and uninfected fields
- Don’t let irrigation water in infected fields spread to clean fields

When You Find a New Infected Field:

- Reduce further spread of the disease to new areas
- Wash equipment between healthy and infected fields
- If possible, prevent the spread of irrigation water between healthy and infected fields
- After harvest, do not compost or till under infected bulbs; dispose of them
- Reduce irrigation, which may slow disease progress

When You Want to Plant Alliums in a Field that is Known to have White Rot:

- Apply a sclerotia germination stimulant (such as garlic oil), 1 year before planting any Allium crop. Shank apply 1 gallon of product per acre in moist soil under moderate temperature conditions (50-70°F). There cannot be any garlic or onion plant debris in the field during application, or the fungus can complete another life cycle and produce more sclerotia. After application, other crops can be grown in the treated area (but not Allium crops). After at least 1 year, Alliums can be planted in the treated area.

- At planting, apply a fungicide in furrow. Apply chemical in a 4-6” bandwidth. Options include:
  - tebuconazole [Folicur, Oriva, Tebuzol]-20.5 fl oz/A
  - fludioxonil [Cannonball]- 8 oz/A
  - boscalid [Endura]- 8.5 fl oz/A

- Tebuconazole is the most effective fungicide for white rot control. Please note that tebuconazole is phytotoxic on onions if it is applied at a higher concentration than the recommended 20.5 fl oz/ac. Phytotoxicity can also occur if the bandwidth is narrowed, even at the recommended rate per acre. If a narrower bandwidth is applied, the tebuconazole concentration per acre must also be reduced.

- Fludioxonil and boscalid are also effective in reducing white rot.

- It is not effective to apply fungicides multiple times throughout the season, once white rot symptoms are visible, no controls are available.

Want to Know More? Check out these Resources:

UC IPM White Rot Management Guidelines
http://www.ipm.ucdavis.edu/PMG/6584100511.html

California Onion and Garlic Research Advisory Board Resources
http://cagalaricandonion.com/page1003/resources.html
Garlic Rust Management

- First observed CA 1934
- **Severe outbreak spring 1998**
- Section 18 for Folicur 1999 (7 years except 2003)
- **Azoxystrobin (Quadris) is only other registered compound**
- Steve Koike/Richard Smith (Monterey) to screen new products & evaluate management plan.
- Koike & Board Task Force developed Management Plan
Garlic Rust
I. Principles of Disease Management

To maximize the management of garlic rust and to best control plant diseases in general, one should be familiar with the concepts of (1) the plant disease triangle and (2) integrated pest management (IPM) for diseases.

(1) **Plant disease triangle:** In order for a plant disease to occur on a crop, three requirements must be met. There must be present a susceptible plant (the host) that is subject to infection. There must be a virulent or infectious agent (the pathogen) that is able to infect a host. Finally, there must be suitable conditions (favorable environment) that allow the host-pathogen interaction to take place. If one or more of these components are missing, then the plant disease will not occur.

![Plant Disease Triangle Diagram]

(2) **Integrated pest management (IPM) for diseases:** IPM is the management strategy that combines, as much as possible, diverse means of controlling pests. IPM does not rely on only one course of action but integrates a series of measures such as the following:

- Monitor, survey, and accurately diagnose the disease.
- Plant genetically resistant cultivars.
- Select sites that maximize plant growth but minimize pathogen development.
- Rotate crops and avoid over-planting any one commodity.
- Time crop planting and other production steps so as to favor healthy plant growth.
- Use plant materials that are free of the pathogen and disease.
- Prevent the introduction or spread of pathogens by using sanitation and exclusion measures.
- Manage other pests (weeds, arthropods) that harbor or vector pathogens.
- Judiciously apply effective disease control pesticides, chemicals, and bio-control agents.
- Modify the growing environment to favor the crops (= cultural controls).
- Monitor the environmental conditions and weather.

Information for “II. A Disease Management Strategy for Garlic Rust” (back page) was compiled by the following:

Mike Mantelli (Christopher Ranch), Kevin Ruble and Kevin Lehar (Woolf Farming), David Grimes (Sequoia Pack), Ryan Mask and John Duffus (The Garlic Co.), Larry Hanson and Matt Willson (Olam), Ryan Bounds and Louis Hearn (Syngenta Crop Protection), David Anderson (Valley Garlic), Justin Dutra (Stone Land Co.), Steven Koike (UCCE Monterey County), and Bob Ehn (CEO CAGORAB).
IYSP and Thrips Control

- Researchers:
  - Hanu Pappu (WA State Univ. Virology)
  - Eric Natwick (UCCE Imperial Valley)
  - Donna Henderson (UCCE Imperial Valley)
  - Steve Orloff/Larry Godfrey (Tulelake)
  - Tom Turini (UCCE Fresno County)
  - Mike Davis (UC Extension Pathologist, Davis)
  - Howard Schwartz (CSU)
IYSP and Thrips Control

- Determine effects of early season preventative treatments
- Identify thrips species during season
- Evaluate an alternating programmed spray program for thrips
- Determine overwintering sites for thrips
- Evaluate new chemistries for control
Seed Corn Maggot

- Rob Wilson/Larry Godfrey (UCCE – IREC)
  - Evaluation of seed treatment products
- Mary Ruth McDonald (Univ. of Guelph, Ontario)
- Commercial evaluation of FarMor seed treatment
Weed Control Processed Onions

- Weed Control
  - Rob Wilson (IREC)
    - Herbicide programs for weed control in processed onions
Onion Insect Pests

- Thrips (Thrips tabaci, Frankliniella species)
- Maggots (Delia antiqua, D. platura)
- Leafminers (Liriomyza species)

Storage Fungal Diseases

- Aspergillus niger
- Alternaria
t
- Pestalotiopsis spp.
Thank you to:

- Syngenta
- Dow Chemical
- Bayer CropScience
- DuPont
- Valent
- MANA
- BASF
- Bejo Seeds
- John Deere Water
- Nichino America
QUESTIONS???

THANKS FOR YOUR TIME