Pests and Diseases of Garlic
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- Insect pests
- Viruses
- Leaf diseases
- Bulb infections
- Physiological disorders
Onion Maggots

- Common pest found in alliums, only a minor pest for garlic
- Adult is a fly that looks very similar to a small common house fly
- Onion maggot similar looking to other pest but are specific to alliums
- Eggs laid on stem and maggots migrate down to bore into underground part of stem
- Young plants wilt, yellow and die. Older plants have hollowed out stems and rotting
- Chemical control is rarely necessary; hand removal of infected plants is useful
Onion Thrips

- Very small about 1mm long –
- Very common and found worldwide. Considered one of the worst insect pests for alliums.
- Both juvenile and adults attack the leaves by sucking the sap
- Lots of hosts – numbers build fast – quick life cycle
- Causes silvering on the leaves (lack of chlorophyll)
- Vectors for viruses (IYSV)
- Predators feed on juvenile thrips
- Predatory mites are available
- Chemical control available
- Pest and predator
Mites

- Garlic Bulb Mites - Wheat curl mite & Dry bulb mite
- Very small, about 0.25mm long, cannot see with naked eye
- Very common and found worldwide.
- Feeding during the growing season results in twisted leaves & stunted growth.
- They excrete a toxin when feeding causing damage which can be confused with viruses (Tangle Top)
- In storage, feeding injury is seen as sunken brown spots on garlic cloves and can lead to drying of cloves and rotting by disease.

Control options
- Curing, hot water, sulfur dust, rotation
- Vectors for viruses
- Breaks dormancy when invade
Aphids

- Onion aphid not commonly found in garlic
- A sap sucking pest
- Winged and wingless types. Small about 2mm long
- Heavy infestations will kill seedlings
- Vectors for viruses
- Predators feed on adults and juveniles
- Chemical control is rarely necessary; White oil is useful for control
Nematodes

- Stem and bulb nematode
- Attacks all members of the allium family. Very small, cannot see with the naked eye. Persists in the soil for many years.
- Light infestations - no symptoms.
- Heavy infestations - stunted plants with pale thickened leaves that soon become twisted and rolled.
- Severe infestations - bulbs becoming swollen and spongy and eventually a secondary organism will cause extensive rotting.
- Some varietal resistance has been observed.
- Most nematodes remain in the bulb and stem. Remove these from the field as soon as possible and destroy
- Garlic bulbs are one of the main methods of transmission.
Nematodes

Often confused with Fusarium basal rot
Nematodes

- Crop rotation and sanitary measures are very important. Survive adverse conditions for 3-5 years.
- Rotate every 4 years.
- Rotate with Carrots, potatoes, spinach, corn and wheat as they are poor hosts for stem and bulb nematode.
- Heat treatment will only reduce numbers, not eliminate them.
- Mustards and rapeseed make a useful green manure crop.
- Fumigation is a chemical control option (economical?).
- You can have soil samples and bulbs analyzed for nematodes.
- Thresholds have been established (100/kg soil?).

Looks similar to Fusarium basal rot.
Other insect pests of Garlic

- Wireworms
- Cutworms
- Cluster caterpillars
- Rutherglen bugs
- Red Legged Earth mite
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- Insect pests
- **Viruses**
  - Leaf diseases
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Viruses

- 12 different virus species (belonging to 4 virus families) known to infect alliums worldwide
  - Allexiviridae family (mites)
  - Carlaviridae family (aphids)
  - Potyviridae family (aphids)
  - Tospoviridae family (thrips)

- 9 to 10 species found in Australia
- Australian garlic crops are generally chronically infested with viruses
- Yellow streaking a common symptom
- Plant tissue culture required if you want virus free plants – No real test available
- Virus concentration important
Viruses – Onion Yellow Dwarf virus
Viruses – Management options

- Plant tissue culture required if you want virus free plants – No real test available
- Cannot cure a garlic virus
- Strong healthy plants will do better
- Adopt a management program to minimize virus in your seed stock
  - Separate seed increase area
  - Cull out plants with symptoms
  - Keep best, sell worse
- Control insect vectors
- Virus concentration important
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Rust – *Puccinia allii*

- Distinctive orange pustules
- Develops into black resting spores
- First seen on underside of leaves but develops on both sides
- Disseminated by wind
- Disease development depends on Temperature, moisture and inoculum
  - Temperature between 12 and 21 °C
  - At least 4 hours of leaf wetness
- Easy to model and predict
- Irrigation management (drip)
- Minimize spore loads, remove trash
- Chemical control options available – use at 10 to 14 day intervals
- Can be a trade barrier
Downy Mildew – *Peronospora destructor*

- Fine greyish growth (mycelium)
- First seen on older leaves
- Leaves begin to go yellow around the infected areas
- Disseminated by wind
- Disease development depends on Temperature, moisture and inoculum
- Prefers cool temperatures (down to 6 °C)
- Only needs 1.5 hours of leaf wetness
- Use disease free bulbs
- Crop hygiene
- Chemical control options available – use at 10 to 14 day intervals
Purple Blotch – *Alternaria porri*

- First seen as small water-soaked brownish lesions
- As spots enlarge, they assume a bull’s eye appearance
- Then becomes somewhat sunken and purple in colour
- Bulbs may become infected at harvest (when ‘topping’)
- Usually a secondary infection
- Varietal resistance recorded
- Minimize spore loads, remove trash
- Chemical control options available – use at 10 to 14 day intervals
Stemphylium leaf blight – *Stemphylium spp*

- Brown and black in colour
- Usually a secondary infection
- Disseminated by wind
- Disease development also depends on temperature and leaf wetness (8 hrs)
- Varietal resistance recorded
- Chemical control options available – use at 10 to 14 day intervals
Leaf disease - control

- Irrigation management
- Crop hygiene
- Disease free bulbs
- Crop rotation
- Protective fungicide program
  - Copper, Sulphur & Mancozeb
- Curative fungicide available
  - Folicur® (Turuconazole) & Ridomil® (Mancozeb & Metalaxyl)
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Bulb infections

- Physiological disorders
White Rot – *Sclerotium cepivorum*

- Can be very devastating disease
- First seen as small patches in the field (yellowing leaves)
- Bulbs will rot with white mycelium present
- Will spread in subsequent years via sclerotia
- Sclerotia enable the fungus to survive for many years
- 10 year rotation required
- Recommended fungicides will only give limited control
- Prefers cooler temperature (10 to 20 °C)
White Rot
White Rot
Pink Root – *Pyrenochaeta terrestris*

- Only attacks roots
- Pink roots are an obvious symptom
- Roots turn brown and die
- Does not kill, reduces yield
- Prefers warmer temperature (25 to 35 °C)
- No chemical control options
- 3 year rotation recommended
Basal Rot – *Fusarium oxysporum*

- Soil borne fungus
- Usually a secondary invader – enters through wounded tissue or base plate
- Disease develops from base and moves towards clove tips
- First field symptoms are yellowing leaves
- Advanced symptoms resemble nematode damage and white rot (slower decay rate)
- Prefers warmer temperatures than white rot (>20°C)
- More likely seen later in season
- Lightly infected plant continue to decay in storage – are reduced to shriveled mummies
Fusarium Rot – *Fusarium oxysporum*

- May show no symptoms in field
- Avoid rotating with other alliums and cereals
- Store at cool temperatures and low humidity
- Avoid storing damaged bulbs
- Remove infected bulbs from field
- Avoid planting infected crops
- Good sanitation practices
Neck Rot – *Botrytis allii*

- Highly destructive in onions
- Occasionally seen in garlic
- Usually not seen until close to harvest
- First seen on necks near soil line
- Tops can become slippery and water soaked (tops will pull away when harvesting)
- Survives in soil as sclerotia, crop residue and on seed
- A problem in storage
- Curing can be useful?
- Chemical control options include seed treatment and foliar sprays
Neck Rot – *Botrytis allii*
Black mould – *Aspergillus nigar*

- Black powdery spore masses develop on the outer scale leaves on bulbs
- Seen more in white varieties
- Develops in storage under hot humid conditions
- Prevent by curing
- Forced air an option
Other diseases of Garlic

- **Penicillium decay**
  - Can infect plants but usually a storage problem
  - Fungicides will control (seed treatment)
  - Use disease free seed stock

- **Damping Off**
  - *Pythium*
  - Seeding issue

- **Bacterial rots**
  - *Erwinia* and *Pseudomonas*
  - Associated with foul smell
  - Avoid overhead irrigation
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Waxy Breakdown

- Cause unknown
- High temperature?
- Low oxygen levels?
- Symptoms only seen after removing skins
- Entire clove turns amber colour but remains firm
- No control measures known
Disorders of Garlic

Side shooting

- Seen as stringy leaves extending out of the pseudostem
- Cause unknown
- Climate driven – warm winters
- High nutrient inputs
- Associated with larger softer bulbs
Pests and Diseases of Garlic

Thank you