

Management of *Ascochyta* blight of chickpea

Causal pathogen: *Ascochyta rabiei*

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- The pathogen is introduced through infected seed and via airborne inoculum. Note that infected seeds are often symptomless.
- Timing of disease onset depends on inoculum arrival, but disease symptoms often appear at the late vegetative stages or bloom initiation.
- Infections result in tan to brown lesions on leaves, stems, and pods.
- Within lesions, concentric rings of small gray to brown specks can generally be found. Each of these specks is a pycnidium, a tiny flask-shaped fruiting structure containing thousands of spores of the causal pathogen.
- Diseased pods often fail to produce seed or may produce shriveled, discolored seeds.
- *Ascochyta* blight can reach epidemic levels very quickly.
- Even low levels of foliar disease during the bloom period can lead to high levels of pod infections during the pod-fill period. Because many infected pods do not set seed, management of pod infections is critical for preserving yield potential and maintaining seed quality.
- Disease risk is always highest during periods of rainfall and/or heavy dews.

FOLIAR AND POD LESIONS:



STEM LESIONS:



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1. Select a moderately resistant variety.

- B-90 (also known as Amit) is a small-seeded Kabuli chickpea with moderate resistance to *Ascochyta* blight.
- CDC Frontier is a medium-seeded Kabuli chickpea with moderate resistance to *Ascochyta* blight.
- CDC Luna is a large-seeded Kabuli chickpea with fair resistance to *Ascochyta* blight.

2. Use seed that has been tested for *Ascochyta*.

- *Ascochyta* is seed-borne, and the disease is readily transmitted from infested seeds to seedlings.
- Diseased seeds are not always discolored. Make sure your seed has been tested for *Ascochyta*; the plant disease diagnostic labs at NDSU and MSU conduct this test. It is best to only use seed that tests completely negative for *Ascochyta*. Never use seed with *Ascochyta* incidence greater than 0.3%.

3. Treat your seed with the fungicide thiabendazole (Mertect 340-F).

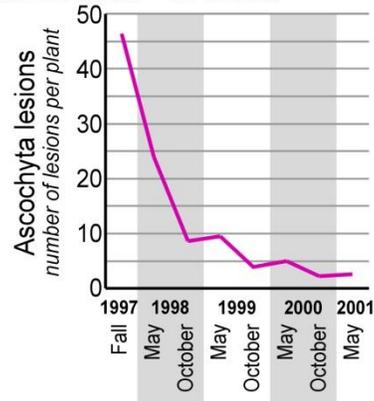
- Treat your seed with thiabendazole even if your seed test indicates an incidence of *Ascochyta* infection of 0%. Seed testing is generally done on a relatively small seed sample (500 seeds), and few seed lots are completely free of *Ascochyta*-infested seeds.
- Other commonly used seed treatments (eg Apron Maxx) are not very effective against *Ascochyta*. Likewise, thiabendazole is not very effective against *Phytophthora* root rot and other seed and seedling diseases of chickpea. Treat with a mix of thiabendazole and other products if you need protection against seed and seedling diseases.

4. Long rotations out of chickpeas are best.

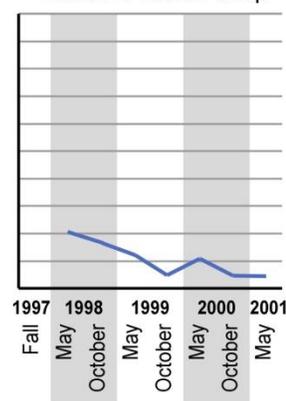
- A minimum 3-year rotation out of chickpeas is recommended.
- Low levels of *Ascochyta* transmission from chickpea residues to a new crop may occur even after rotating out of chickpeas for 3 years. Research conducted in a heavy clay soil in Saskatoon, SK suggests that transmission from infested chickpea residues to new chickpeas drops sharply after a 2-year rotation out of chickpeas but can continue for at least 4 years since the previous crop. *The effect of soil type and climate on survival of the *Ascochyta* pathogen is poorly understood, and it is unknown whether different results might be obtained in different soil types or climates.*
- In addition to small grains and oilseed crops, lentils and field peas are acceptable rotational crops. *Ascochyta rabiei*, cause of *Ascochyta* blight on chickpeas, is specific to chickpeas; other *Ascochyta* species cause *Ascochyta* blight on lentils and field peas.

Transmission of *Ascochyta* from infested chickpea leaf and stem residues to new chickpea plants may occur for at least 4 years. Numbers represent the average number of *Ascochyta* lesions that developed in greenhouse-grown chickpea seedlings inoculated with chickpea residues recovered from a site near Saskatoon, SK. Residues were buried 0, 2, or 4 in. deep in a heavy clay soil.

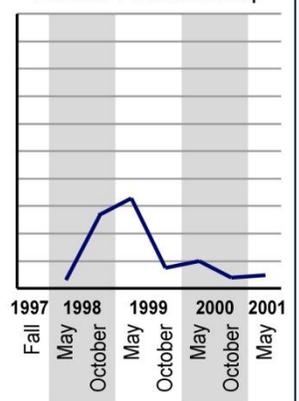
Leaf residues: On surface



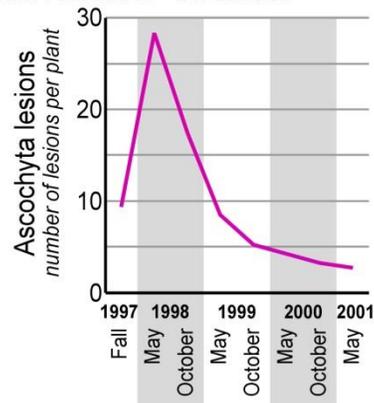
Buried 2 inches deep



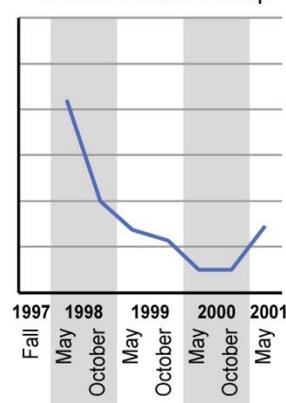
Buried 4 inches deep



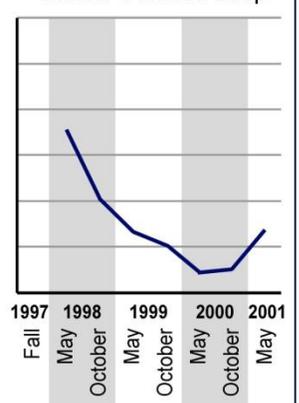
Stem residues: On surface



Buried 2 inches deep



Buried 4 inches deep



Gossen & Miller 2004. *Canadian Journal of Plant Pathology* 26:142-147.

5. Use foliar fungicides.

- **This disease can reach epidemic levels very quickly, and fungicide applications must be made in a timely manner.**
- **When possible, a preventative approach to managing this disease is recommended:**
 - If no disease has been detected 7 to 10 days before bloom initiation (if there have been frequent rain events and/or heavy dew) or at bloom initiation (if it is dry), a preventative application of chlorothalonil (Bravo WS, Echo 720, etc) is advised.
 - Seven to ten days after applying chlorothalonil, an application of a systemic fungicide (Proline, Endura, Priaxor, etc.) is generally advised.
 - If the weather remains favorable for disease, sequential applications of fungicides should continue every 10 to 14 days during the critical bloom and pod-fill period.
- ***Ascochyta* blight often develops at the mid- to late vegetative stages before bloom.**
 - Chickpea crops are at highest risk of early *Ascochyta* blight development when (1) they are located downwind of fields where chickpea *Ascochyta* blight occurred the previous season or (2) seed with seed-borne *Ascochyta* is planted. The *Ascochyta* pathogen produces airborne spores on overwintered diseased crop residues, and these spores are capable of long-distance movement in the atmosphere.
 - *Ascochyta* blight often first appears as scattered disease lesions on individual plants.
 - If the weather is cool and wet, significant spread from these foci of infection can occur before bloom; otherwise, the disease may not spread until the canopy closes.
 - In order to prevent secondary spread of *Ascochyta* blight from the initial foci of infection, applications of systemic fungicides are often advised as soon as trace levels of disease are detected, particularly if the weather is favorable for disease and/or the crop is nearing canopy closure. If the weather remains favorable for disease, sequential applications of fungicides should continue every 10 to 14 days during the critical bloom and pod-fill period.
- **Even if disease is at low levels at the end of bloom, a fungicide application may be warranted during the pod-fill stage.** Even when foliar disease is at low levels, the incidence of pod infection can be quite high. When pods become infected, they often do not produce seeds.

6. Selecting fungicides for *Ascochyta* management on chickpeas

- **Fungicide resistance management is critical.** Inadequate rotation of fungicide chemistries caused a loss of efficacy of QoI (strobilurin/FRAC 11) fungicides (Headline and Quadris).
- **Fungicide resistance management recommendations:**
 - If disease pressure is moderate, rotate between DMI (FRAC 3) and SDHI (FRAC 7) modes of action: The DMI fungicide **Proline** (prothioconazole) is registered (5.0 and 5.7 fl oz/ac) and has consistently provided excellent control of *Ascochyta* blight of chickpeas in field trials. The SDHI fungicides **Endura** (boscalid) and **Priaxor** (fluxapyroxad + pyraclostrobin) have provided excellent control of *Ascochyta* blight of chickpeas under most conditions.
 - If disease pressure is very high, tank-mix DMI (FRAC 3) fungicides with chlorothalonil but do not use SDHI (FRAC 7) fungicides. In field trials, SDHI fungicides such as Endura and Priaxor have performed equivalently to Proline except when disease pressure has been very high. Under very high *Ascochyta* disease pressure, SDHI fungicides can sometimes be overwhelmed by *Ascochyta* and provide poor disease control. Use of SDHI fungicides should be reserved to those situations in which *Ascochyta* disease pressure is moderate.
 - Consider tank-mixing DMI or SDHI (carboxamide) fungicides with chlorothalonil (Bravo WS, Echo 720, etc.), especially if the chickpea canopy is still open. Chlorothalonil has a different mode of action (method of controlling fungi) than other fungicides, and the use of chlorothalonil will help delay the development of fungicide resistance.
- **Strobilurin (QoI/FRAC 11) fungicides such as Headline and Quadris have lost their efficacy.** *Ascochyta rabiei*, the pathogen causing *Ascochyta* blight on chickpeas, has developed resistance to these fungicides.
- **ProPulse, a new product from Bayer that may be registered as early as 2012, should be used cautiously.** ProPulse is a premix of a DMI fungicide (prothioconazole, the active ingredient in Proline) and a SDHI fungicide (fluopyram). If you apply ProPulse and then Priaxor or Endura, you will not be rotating fungicide chemistries; likewise, if you apply Proline and then ProPulse, you will not be rotating fungicide chemistries. SDHI (FRAC 7) chemistries are high-risk for the development of pathogen resistance, and you need to make sure that you do not make sequential (back-to-back) applications of SDHI chemistries.

7. Which fungicides are best?

- Registered fungicides differ in their efficacy against *Ascochyta* blight on chickpeas.
- Fungicide efficacy testing results have been posted to the NDSU Carrington Research Extension Center website. As you select fungicides, you should assess the performance of fungicides across multiple trials and multiple locations. Fungicide performance can differ in response to which diseases are present, levels of disease when products are applied, environmental conditions, plant architecture and the susceptibility to disease of the chickpea variety planted, crop growth stage at the time of fungicide application, and other factors.

8. Do not plant chickpeas adjacent to a field where chickpeas were recently grown.

- Planting chickpeas adjacent to a field where chickpeas were recently grown can result in high *Ascochyta* disease pressure. The *Ascochyta* pathogen produces specialized airborne spores (ascospores) on overwintered diseased chickpea residues, and these spores are readily carried aloft in air currents. The ascospores are capable of long-distance transport, but adjacent fields receive particularly high disease pressure.

9. Even if disease-free seed is used and rotations are long, scout your chickpeas carefully for disease.

- The *Ascochyta* pathogen produces specialized airborne spores (ascospores) on overwintered diseased chickpea residues. These spores are readily carried aloft by air currents and can be moved long distances in the atmosphere. Chickpea fields planted downwind of fields where *Ascochyta* blight occurred the previous season are at high risk of *Ascochyta* blight outbreaks caused by these spores.
- In the Pacific Northwest, the release of ascospores from overwintered diseased chickpea residues coincides with emergence and early vegetative growth of new chickpea crops: Ascospore release peaks in April and can into May. Ascospores are generally deposited onto new crops during rain events.
- Airborne ascospores are an important source of *Ascochyta* blight in chickpea crops. Even if disease-free seed is used and rotations are long, scout your chickpeas carefully for disease.
- Late planting may help chickpeas escape this source of *Ascochyta* blight, but it is a risky strategy due to the yield penalty associated with late planting and annual fluctuations in the dates of ascospore release.

Release of ascospores from overwintered infested chickpea residues in the Pacific Northwest: Ascospore release patterns have not been studied in Montana and North Dakota but are likely to be fairly similar in our region.

