

Seed rots and Seedling diseases and what to look for in 2013?

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Keeping in view the current planting conditions of various crops particularly in the wet saturated soils, we want to throw some light on to possible seed rots and seedling diseases which might creep into our area. These rots and diseases can kill seeds and seedlings, reduce plant stands, and there by significantly reducing yields. Hence, we will briefly cover some important crops in our area which might be susceptible to the pathogens that cause these diseases, conditions favoring these diseases, and options for management. The major crops we would like to cover in this bulletin are soybeans, corn, wheat, barley, oats, rye, sunflowers, chick pea, dry beans, field peas, and canola.

Soybeans:

The most common and destructive pathogens that infect soybean in North Dakota are *Pythium*, *Phytophthora*, and *Rhizoctonia*. *Pythium* and *Phytophthora* are also called as water molds and known to cause pre and post-emergence damping off. The optimal conditions at which *Pythium* and *Phytophthora* can infect readily are very wet to saturated soil conditions with *Pythium* preferring cool soil (50 to 60°F) and *Phytophthora* prefers slightly warmer soils (60 to 76°F). Whereas, *Rhizoctonia* prefers moist but not saturated soils and its activity is most in warm soils (over 75°F). Thus, the first pathogen to watch for after planting in this year is *Pythium*. The soft-rot symptoms caused by *Pythium* and *Phytophthora* are very similar and cannot be distinguished without laboratory examination, while the reddish-brown lesions caused by *Rhizoctonia* are easier to recognize.



Damping off of soybean seedlings. XB Yang photo



Reddish Brown Lesions caused by *Rhizoctonia*. B. Nelson Photo

Management Strategies for *Pythium*:

1. Minimize soil compaction and remove excess moisture through increased drainage.
2. For seed treatment options refer to 2013 North Dakota field crop fungicide guide.
3. Delay planting until conditions will result in a rapid and uniform emergence.

For *Phytophthora*:

1. Cultivars with partial resistance will be a great option.
2. For available seed treatment options refer to 2013 North Dakota field crop fungicide guide.
3. Also consider planting in well drained soils.

For *Rhizoctonia*:

1. Plant only clean, certified seed with a known cold germination of at least 70 percent or a warm germination of at least 85 percent.
2. Plant in warm (above 60 F) soils.
3. Treat seed with a protectant fungicide refer to 2013 North Dakota field crop fungicide guide.

Corn:

Corn is spared by most of the seedling pathogens relatively compared to soybeans as *Pythium* is the only common seed and seedling rot pathogen that might cause widespread problems in North Dakota.



Fig a: Corn seedling blight

Fig b: Corn seedling rot caused by *Pythium* spp. Venkat chapara Photo

Management:

1. Minimize soil compaction and remove excess moisture through increased drainage.
2. For seed treatment options refer to 2013 North Dakota field crop fungicide guide.
3. Delay planting until conditions will result in a rapid and uniform emergence.

Wheat, Barley, Rye and Oats:

Seed decay and seedling blights are commonly seen in all these crops collectively called as small grains. Again, the common soil-inhabiting or seed-contaminating pathogens are *Pythium*, *Fusarium*, and *Rhizoctonia*. The possibility of seed decay will be more in any soils that enhance rapid germination and emergence.

Symptoms include seed decay in soil, or seedling may become blighted by root infection. Stands are thin and uneven or missing in small to large areas.



Seedling blight caused by *Fusarium graminearum*

Photo from: <http://www.omafra.gov.on.ca/english/crops/pub811/14cereal.htm>

Management:

1. Delay planting until conditions will result in a rapid and uniform emergence.
2. Avoid planting after corn and maintain a balanced fertility program.
3. Fungicide seed treatments are very effective against seed-borne and soil-borne organisms that cause this disease.
4. Other options include the use of tolerant varieties and planting disease-free seed.
5. Use wheat in at least a 3-year crop rotation since these organisms can survive in wheat residues.
6. Avoid planting wheat after corn.

Sunflower:

Downy mildew: caused by *Plasmopara halstedii*. The occurrence of this disease might be more common this year as soils are wet.

The pathogen infects young roots of a seedling resulting in death ultimately leading to reduction in plant stands with blank spots in the main field.



Stunted plant with downy mildew infection (right) and the healthy (left).
Photo: Tom Gulya

Management:

1. Resistant cultivars available.
2. Seed treatment options are available in 2013 North Dakota field crop fungicide guide

Chick pea, Field pea, Lentils and Dry beans:

All the three primary pathogen types are involved in causing seed and root rots: *Rhizoctonia*, *Fusarium*, and *Pythium* species. These survive in the soil and spread when environmental conditions remain conducive over several seasons. While primarily soil-borne, these pathogens are also present in crop residue and dust of contaminated seed lots. In some areas soil-borne *Aphanomyces euteiches* causes serious root rot in pea. The pathogen causing ascochyta blight can also over-winter in pulse seed or residue. *Ascochyta* blight infects all pulses but each crop type is infected by a different *Ascochyta* species. Among the pulse crops, chickpea is most severely affected by *Ascochyta* blight and this disease is a key limiting factor to production in North America.



Fusarium wilt on Chick pea seedlings

Photo: <http://www.ndsu.edu/pubweb/pulse-info/chickpeatext.html>

Management:

1. Seed treatment options are available in 2013 North Dakota field crop fungicide guide.

Canola:

The common three wide host range primary pathogen types are involved in causing seed and root rots: *Rhizoctonia*, *Fusarium*, and *Pythium* species.



Lesions caused by *Rhizoctonia* on canola seedlings (right) and healthy (left).

Photo: <http://www.gov.mb.ca/agriculture/crops/diseases/fac70s00.html>

Management:

1. Seed treatment options are available in 2013 North Dakota field crop fungicide guide.

Take Home Message:

In North Dakota we have a great diversity of soil-borne pathogens and practicing single management practice may not be the answer to control all of the different pathogens, so thorough knowledge of seedling diseases and their identification is required. Although crop rotation can be helpful in reducing inoculum levels and most of the fungi are primarily pathogenic to the next crop on rotation; this might not work always. Seed treatment with fungicides has been a standard practice in crop production since long time, but many changes have occurred recently and other changes are on the way. The fungicide combination on most commercial crop seed now includes technical like fludioxonil, mefenoxam/ metalaxyl, azoxystrobin and ipconazole, which have the capacity to with stand the above discussed diseases on various crops. In addition to the above promising practices keeping good records of seedling disease problems can be a helpful management tool for the coming years.