AGRONOMIC Spotlight

Technology Development by MONSANTO

Soybean Seedling Diseases

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Wet, poorly drained soils and air temperatures below 68° F can be typical during spring planting and crop emergence. These characteristics favor development of the fungal pathogens that cause soybean seedling diseases as well as slow germination and plant growth. Therefore, it is important to take steps that may prevent soybean seedling diseases and also scout for these diseases after planting.

Prevention

Weather and poorly drained soils are not the only factors that may increase the chance of soybean seedling disease. Soil-borne fungi may be problematic in any soil type, given the proper growing conditions. In addition, any factor that delays germination or seedling emergence provides increased opportunity for disease infection. The first form of prevention is to avoid using poor quality seed for planting purposes. Use only high quality seed that is not contaminated with any fungal pathogens. This will help prevent low germination and increase seedling vigor. The longer it takes a seed to emerge and establish, the greater the chance of stand-loss due to disease. Other factors that may contribute to seedling disease are; inadequate seedbed preparation, compaction, planting too deep, nematode infestations, and high rates of some herbicides.

In fields with a history of *Phytophtora* pressure, resistant or tolerant soybean varieties should be planted. A fungicide seed treatment, such as Acceleron™ seed treatment products, may also be used to prevent seedling disease. However, it is important to realize two factors regarding fungicide seed treatments. A fungicide seed treatment will not protect seed that is already infected or poor quality seed. In addition, a particular fungicide seed treatment may not be effective for all seedling diseases and different fields vary as to what pathogens are present. Therefore, scouting after planting is necessary.

Scouting, Identification and Management

In the event that scouting reveals stand reduction, it is important to determine if the cause was a fungal pathogen. Identifying the specific pathogen is important to help determine the proper fungicide seed treatment to use the following year or for the replant if significant stand reduction occurred.

Different pathogens are present under different field conditions therefore, collecting the following information from each field can help distinguish which pathogen is present: general soil temperatures, general soil moisture (saturated, wet or dry), variety resistance or tolerance to *Phytophthora*, and plant growth stage.

There are three main categories of seedling diseases:

- **Seed rot** occurs during the V0-VE growth stages and may be caused by three pathogens; *Pythium*, *Phytophthora*, and *Phomopsis*. Determining which pathogen caused the seed rot can be difficult. Typical symptoms are soft decay of seed and missing seedlings in the row or poor emergence.
- **Seedling Mortality (damping-off or seedling blight)** occurs during the VE-V4 growth stages. Figures 1, 2, and 3 show pictures of the three pathogens; *Pythium, Phytphthora, and Rhizocotonia,* that can cause seedling mortality. A flow chart of symptoms and other characteristics used to distinguish pathogens that cause seedling mortality can be found in Figure 4.
- **Root or lower stem decay** may take place during the seedling stage or may not be apparent until later the reproductive stages (VE-Rn). Pathogens that cause root and stem decay during the seedling stage are the same as those that cause seedling mortality therefore, Figure 4 can be used for identification.

For assistance determining if disease is present and the specific pathogen that caused it, contact your state Plant Disease Clinic.

Figure 1. *Pythium* damping-off (left) exhibiting typical green characteristic before turning

Figure 2. Pre-emergence *Phyphthora* damping-off (right), symptoms are similar to those caused by *Pythium* except soil temperatures are warmer (70-80° F). (Picture Courtesy of Dr. Schmitthenner, Emeritus Faculty of Ohio State University)

Figure 3. Characteristic reddish lesions on the stem of soybean plants infected with *Rhizoctonia.*

(continued on page 2)

(Continued from page 1)

Finally, seedling disease symptoms may be confused with herbicide damage, effects of low pH, or other seedling disorders. Make sure to take these factors into consideration. Compared to herbicide damage, seedling diseases usually occur in irregular patterns which may correspond to changes in soil type. Herbicide damage typically does follow a pattern related to the equipment and a group of adjacent plants will be affected.

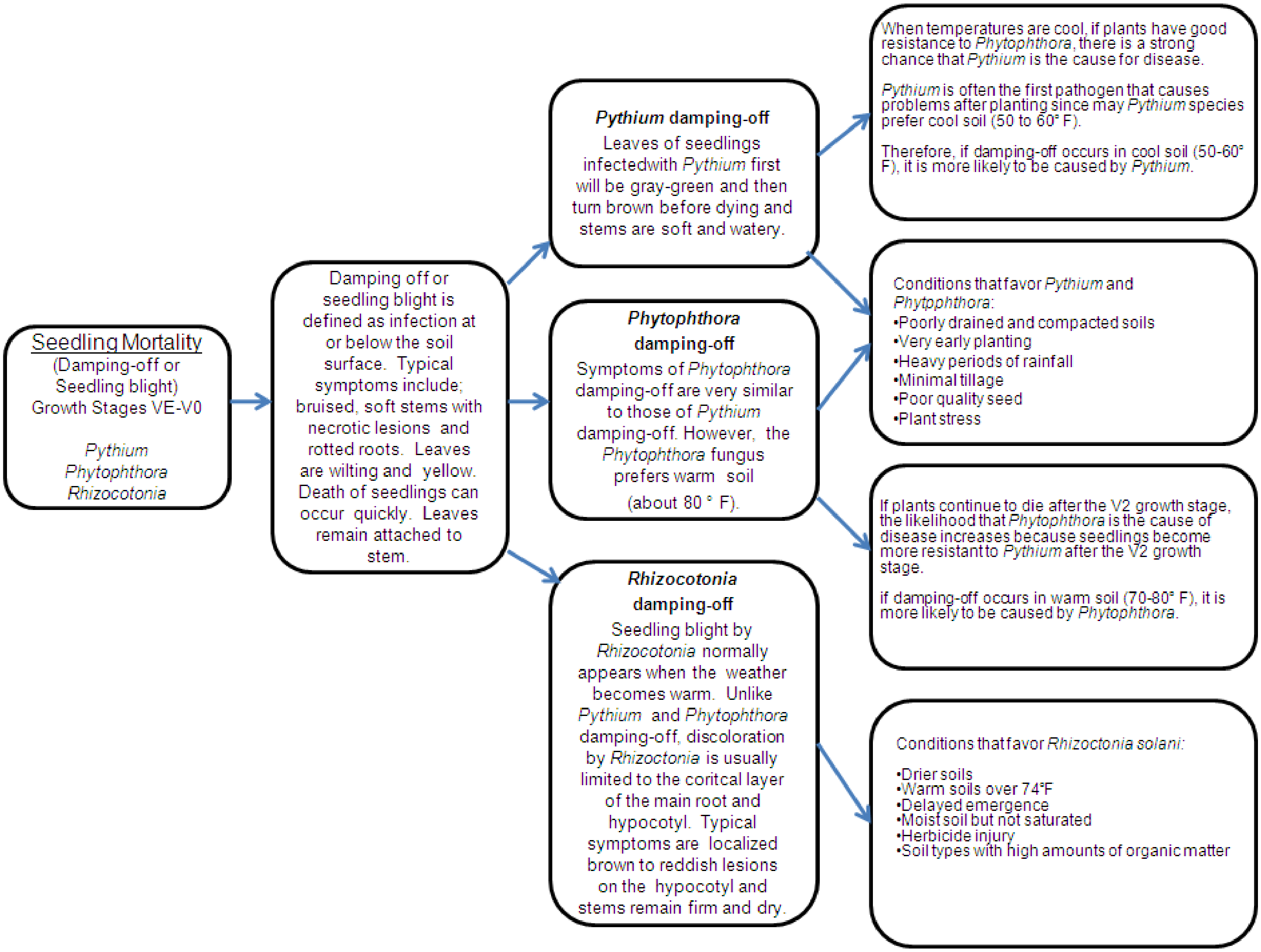

Figure 4. Flow Chart of Seedling Mortality (Damping-off or Seedling Blight) Symptoms of Soybean Seedling Diseases caused by three pathogens; *Pythium*, *Phytophthora*, and *Rhizocotonia*.

Sources: Fox, J.A., Sclumbato, G., Killebrew, J.F., Fulton, H. 2009. Soybean Seedling Diseases. Mississippi State University. MSU Cares. Mississippi State University Extension Service.; Koenning, S.R. and Dunphy, E.J. 2000. Disease Resistance in Soybean North Carolina State University Plant Pathology Extension; Koenning, S.R., Ferguson, J., and Dunphy, E.J. 2000. Soybean Seed and Seedling Diseases North Carolina State University Plant Pathology Extension; Plant Health Initiative. 2009. Available on-line: http://www.planthealth.info; Yang, X.B. 1998. Scouting for Soybean Seedling Diseases. Iowa State University. Integrated Pest Management. ICM > 1998 > IC-480 (9) -- May 11, 1998; Yang, X.B. 2001. Identification of Soybean Seedling Diseases. Iowa State University. Integrated Pest Management. ICM > 2001 > IC-486(10) -- May 21, 2001; Yang, X.B. 2010. Scouting Soybean Seedling Diseases. Iowa State University. Integrated Crop Management News.