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 the development of fungal pathogens that cause soybean seedling diseases. Germination and plant growth can also be reduced. It is important to take steps that may help prevent soybean seedling diseases and 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 can 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 include: inadequate seedbed preparation, compaction, planting too deep, nematode infestations, and high rates of some herbicides.

In fields with a history of *Phytophthora* pressure, resistant or tolerant soybean varieties should be planted. A fungicide seed treatment, such as Acceleron® Seed Treatment Products, may also be used to help 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 of poor quality. In addition, a particular fungicide seed treatment may not be effective for all seedling diseases and different fields vary in pathogens 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 causing the disease is important for selecting proper fungicide seed treatments to use if a replant is necessary or to use in subsequent years.

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, 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 two soilborne pathogens: *Pythium and Phytophthora.* Seed rot can also be caused by seedborne fungi including *Phomopsis,* and seedborne bacteria including *Bacillus;* however, this paper concentrates on the mentioned soilborne pathogens. Determining which pathogen caused the seed rot can be difficult. Typical seed rot symptoms are soft decay of seed, 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: (1) *Pythium, (2) Phytophthora, and (3) Rhizoctonia,* that can cause seedling mortality. A flow chart of symptoms and other characteristics used to distinguish these pathogens 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 in the reproductive stages (VE-Rn). Pathogens that cause root and

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

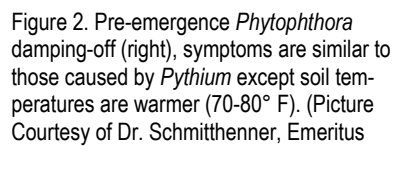

Figure 2. Pre-emergence *Phytophthora* damping-off (right), symptoms are similar to those caused by *Pythium* except soil temperatures are warmer (70-80° F). (Picture Courtesy of Dr. Schmitthenner, Emeritus

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

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stem decay during the seedling stage are the same as those that cause seedling mortality; therefore, Figure 4 can be used for identification.

Other factors similar to seedling disease symptoms, that require consideration, include herbicide injury, effects of low pH, insect injury, and other seedling disorders. Compared to herbicide damage, seedling diseases usually occur in irregular patterns which may correspond to changes in soil type. Herbicide damage typically follows a pattern related to the equipment and a group of adjacent plants are generally affected. For assistance to determine if a disease is present and the specific pathogen that caused it, contact your state Plant Disease Clinic.

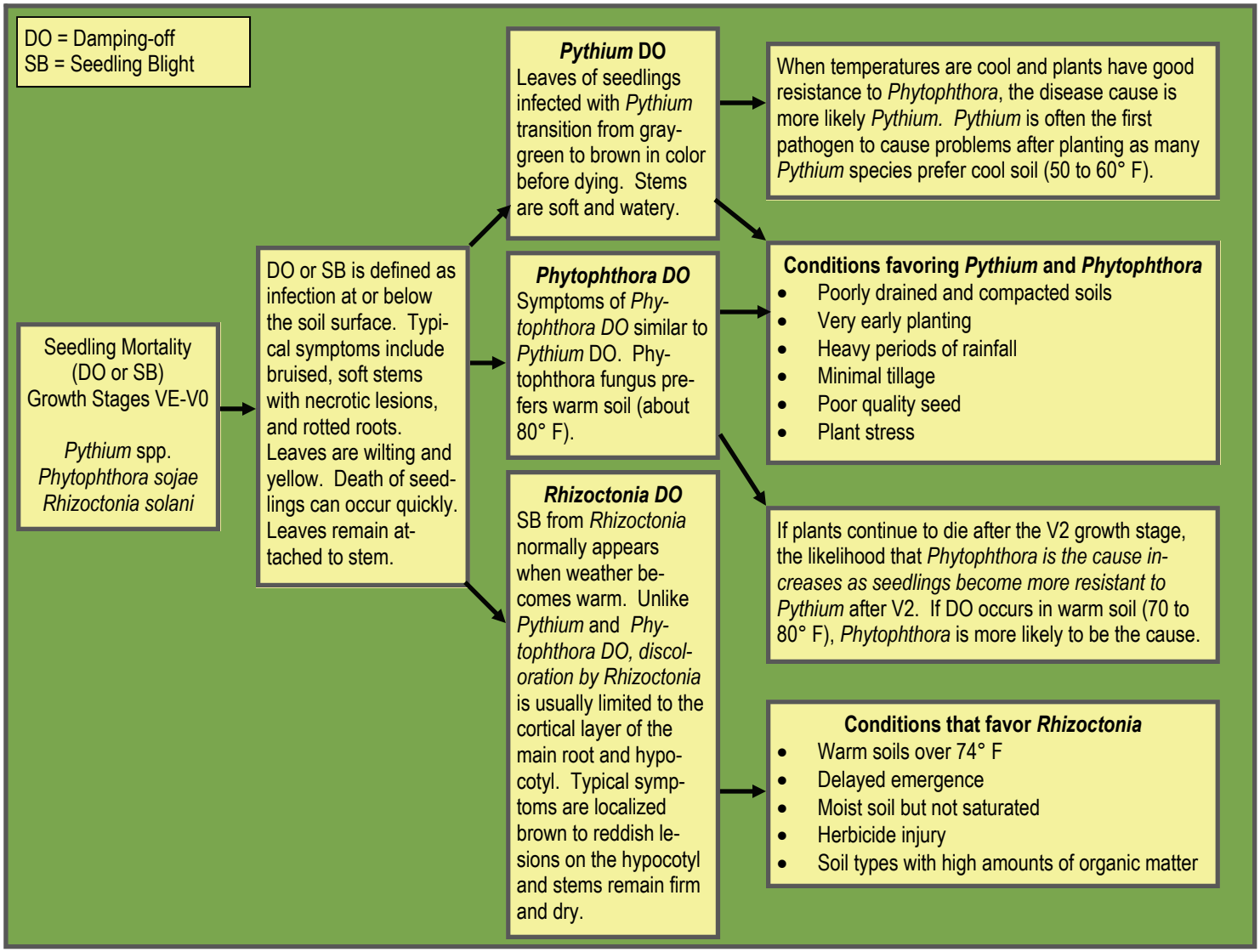

Figure 4. Flow Chart of Seedling Mortality (Damping-off or Seedling Blight) Symptoms of Soybean Seedling Diseases caused by three pathogens: *Pythium*, *Phytophthora*, and *Rhizoctonia*.

Sources: Fox, J.A., et al. 2009. Soybean seedling diseases. MSU Cares.com. Mississippi State University. http://msucares.com. (verified 6/5/2011).; Koenning, S.R. and E.J. Dunphy, 5/2000. Disease resistance in soybean. Soybean disease information note 6. North Carolina State University. http://www.ces.ncsu.edu (verified 6/5/2011).; Koenning, S.R., et al. 5/2000. Soybean seed and seedling diseases. Soybean disease information note 2. North Carolina State University. http://www.ces.ncsu.edu (verified 6/5/2011).; Plant Health Initiative. 2011. Available on-line: http://www.planthealth.info; Yang, X.B. 5/11/1998. Scouting for soybean seedling diseases. Integrated Pest Management. IC-480 (9). Iowa State University. http://www.ipm.iastate.edu (verified 6/5/2011).; Yang, X.B. 5/21/2001. Identification of soybean seedling diseases. Integrated Pest Management. IC-486(10). Iowa State University. http://www.ipm.iastate.edu (verified 6/5/2011).; Yang, X.B. and SS. Navi. 6/1/2010. Scouting for soybean seedling diseases. Integrated Crop Management News. Iowa State University. http://www.extension.iastate.edu (verified 6/5/2011).