Fungicides: Why fungicides fail

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http://lib.dr.iastate.edu/cropnews/1282

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Fungicides: Why fungicides fail

Abstract
Sometimes management of plant diseases is accomplished through the application of fungicides. Many factors prior to, during, and after application will determine the success of the fungicide. On certain occasions, fungicide applications fail to manage the targeted disease. It is important to identify the reasons for these failures to prevent them from occurring in the future.

Keywords
Plant Pathology

Disciplines
Agricultural Science | Agriculture | Plant Pathology

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Sometimes management of plant diseases is accomplished through the application of fungicides. Many factors prior to, during, and after application will determine the success of the fungicide. On certain occasions, fungicide applications fail to manage the targeted disease. It is important to identify the reasons for these failures to prevent them from occurring in the future.

1. Diagnosis and fungicide selection

One thing to consider is inaccurate disease diagnosis. There are common problems that may be misidentified as fungal diseases including insect damage, chemical injury, bacterial diseases, nematodes, and environmental damage (see photos). Fungicide applications do not affect these other problems.

Even if the problem is accurately diagnosed as a fungal disease, there are some fungicides that will not manage all diseases. For example, contact fungicides do not control root rot diseases caused by Phytophthora. Without proper diagnosis, a fungicide may be selected that does not manage the targeted disease. Be sure the targeted disease is specified on the fungicide label.

Also, do not use dated fungicide material. The general rule is that fungicides stored over two years begin to lose their activity and may fail to work.

2. Loading fungicide in the sprayer

Mixing fungicides with too acidic or alkaline of water can reduce fungicidal activity, especially for water with a pH greater than 8.0. Optimally, water with a pH near 7.0 should be used for mixing pesticides. If water pH is not optimal, it easily can be corrected with pH buffers that are added to the water before mixing in fungicides.

For fungicides to effectively manage diseases, you must use them at recommended rates. In addition, care needs to be made when calculating treatment area and the amount of product to add to the tank. Be sure to carefully check the label before loading the sprayer and double check your calculations.

Mixing multiple pesticides in a spray tank can save time, but be sure they are compatible. Incompatibility can result in the formation of insoluble precipitates in your tank. Fungicide labels often contain information on mixing compatibility. If the label does not address compatibility, test a small volume of the spray mix in a glass jar for 30 minutes, and then look for separation or settling of pesticides in the jar. The order that pesticides of different formulations are added to the tank also may affect compatibility. Add different formulations of pesticides to the tank in this order: wettable powders, flowables, solubles, powders, surfactants, and then emulsifiable concentrates.

Similar symptoms on soybean caused by sudden death syndrome (left) and tebuconazole phytotoxicity (right). (Daren Mueller and Boyd Padgett, respectively)
Fungicides begin to lose their activity if they sit too long in the spray tank. Fungicide activity declines within 12 hours after mixing and is accelerated by poor water quality (high or low pH).

3. Sprayer calibration and application

Perhaps the most common cause of fungicide-application failure is from incorrect sprayer calibration. If a sprayer is not properly calibrated, too much or too little fungicide can be applied, which can result in fungicide toxicity or unmanaged disease. To avoid these problems, recalibrate the sprayer after any modifications to nozzles, pressure, or speed are made. Also, the material should be applied in the recommended volume of water, at a constant speed, and at the recommended pressure. Be sure to adjust the spray pressure for the nozzles used. Excessively high sprayer pressures result in small droplets that may drift. Calibrating and adjusting a sprayer takes time, effort, and involves math, but it can save money and make fungicide applications more effective.

4. Environmental considerations

Pay attention to weather forecasts prior to a fungicide application. Avoid spraying when rain is expected. A general rule is that systemic fungicides need a minimum of 3 hours on the plant surface before a rain. Contact fungicides are always sensitive to rain but more so prior to drying on plant surfaces.

5. Resistance

Fungicide resistance is one of the first things that may come to mind when a fungicide fails to manage disease. It is also one of the least-likely explanations. Fungicide resistance has been outlined in the past few weeks in this series. The only way to be certain if there are fungicide-resistant pathogens is to have them examined in a lab. Do not immediately assume that the cause of any fungicide failure is due to fungicide resistance.

Daren Mueller is an extension plant pathologist with the Iowa State University Corn and Soybean Initiative and the Pest Management and the Environment Program.

Announcements

New tile drainage technologies at field day

Iowa’s bountiful harvests wouldn’t be a reality without underground drainage. After years of installing tile in farm fields to increase drainage to improve yields and profits, questions are being asked about environmental impacts. New technologies that may minimize negative environmental impacts will be installed July 12 at the Iowa State University (ISU) Southeast Iowa Research and Demonstration Farm near Crawfordsville.

ISU Extension and the Natural Resources Conservation Service, along with tile manufacturers and local tiling contractors, will install controlled drainage systems and construct a wetland. The demonstrations will run from 9 a.m. to 4 p.m. One project will investigate controlled drainage to determine if this system has an advantage in southeast Iowa over conventional drainage. Controlled drainage allows excess soil moisture lower in the subsoil to be held early in the season in case it is needed later during dry weather.

A wetland will be constructed to see if it results in lower nitrates in tile water exiting the property. Tile will also be placed to compare shallow, close spacing of drainage tile to deeper, wider spacing. Both plowing and trenching machines will be demonstrated.

Matt Helmers, ISU Extension agricultural engineer, and Greg Brenneman, ISU Extension field engineer in southeast Iowa, will supervise the research conducted at the farm and collect data for several years. Both will be at the field day to speak with attendees, along with Jim Baker, ISU professor emeritus.

Certified crop advisers can obtain 3 hours of soil and water continuing education credit by attending a special session from 11 a.m. to 2:30 p.m. There is a $40 fee for credit. The rain date is July 13. Food will be available for purchase.

For more information, contact Jim Jensen, ISU Extension farm management specialist, 319-385-8126, jensenjh@iastate.edu or Kevin Van Dee, farm superintendent, Southeast Iowa Research and Demonstration Farm, 319-658-2353, kvande@lisco.net. The farm is located 1 ¼ miles south of Crawfordsville on Highway 218, then 2 miles east on County Road G-62, then ¾ mile north. Watch for ISU field day signs on Highway 218.