Fungicide and Nematicide Update

GLENN WHITNEY, Texas A&M University Agricultural Research and Extension Center, Beaumont

Cereal Disease Control Research

Applied research with foliar fungicides in cereal grains has shown several advances in disease control over a broad spectrum of pathogenic fungi. Some fungicides are protectants and others are systemic. Recently there has been much interest in the sterol inhibitors. Two that have received the most attention are the systemic fungicides triadimefon (Bayleton) and propiconazol (Tilt).

Studies in New Zealand on oats (*Avena sativa*) and barley (*Hordeum vulgare*) indicated that both triadimefon and propiconazol gave excellent control of crown rust of oats (*Puccinia coronata*) by both conventional and controlled droplet application methods. Significantly better disease control was obtained by the controlled droplet method, but possible phytotoxicity was noted. On barley, propiconazol and triadimefon gave excellent control of spot blotch (*Drechslera sorokiniana*), but propiconazol was significantly better.

In rice (*Oryzae sativa*) disease studies on four varieties in Texas, propiconazol showed superior control of five diseases: narrow brown leaf spot (*Cercospora oryzae*), brown leaf spot (*Bipolaris oryzae*), leaf smut (*Entyloma oryzae*), sheath spot (*Rhizoctonia oryzae*), and brown blotch (*C. oryzae*). Bitertanol (Baycor), a protective sterol inhibitor, also gave good control of these diseases. Two applications at booting and heading are necessary for season-long protection. Sheath blight (*R. solani*) is the most damaging disease of rice in the United States. Triphenyltin hydroxide (Super Tin, Du-Ter) is the only labeled material that gives effective control of the disease. Propiconazol controls this disease more effectively and controls a much broader spectrum of pathogens in this crop. Propiconazol is now being developed for rice disease control and should be labeled in the near future.

Twenty-two of 27 reports on cereal diseases in volume 37 of *Fungicide and Nematicide Tests* deal with controlling wheat (*Triticum aestivum*) diseases. Powdery mildew (*Erysiphe graminis* f. sp. *tritici*) infection was severe generally east of the Mississippi River. In Pennsylvania, triadimefon significantly controlled the disease and increased yields. In one test, a single application suppressed powdery mildew infection and increased yields. A combination treatment was more effective than the single fall application, however. Triadimefon also gave excellent control of the disease in Indiana, but in tests in Mississippi showed little or no control. Mississippi researchers did report excellent control and corresponding yield increases with propiconazol. A tank mix treatment with benomyl (Benlate) and EBDC (Dithane M-45) was also effective in both Mississippi and Arkansas.

Control of Septoria leaf blotch (*Septoria tritici*) has raised a question about the relationship of the disease to powdery mildew. In general, suppression of powdery mildew was associated with increased severity of leaf blotch. It is not known if leaf blotch increase resulted from additional leaf surface being available for *Septoria* infection or if a physiological interaction between the two pathogens and the fungicide may have occurred. Triadimefon controls powdery mildew effectively but seems to give mediocre control of leaf blotch.

Studies in Australia and in Pennsylvania showed that propiconazol was more effective than triadimefon in controlling leaf blotch. Similar results were found in Missouri, but the treatment giving the best results was a benomyl-propiconazol tank mix.

Experiments in Washington showed control of stripe rust (*Puccinia striiformis*) with both triadimefon and propiconazol; the treatments were about equal in effectiveness. Two applications produced a greater degree of disease control than a single application. Two applications of both compounds also gave complete protection up to the early milk stage in Australia. Oregon researchers reported significant yield increases with triadimefon, but three applications of chlorothalonil (Bravo) gave comparable control.

Glume blotch (*Septoria nodorum*) was effectively controlled under an epidemic situation in Tennessee by propiconazol, chlorothalonil, and EBDC. Although propiconazol produced the highest degree of control, EBDC had the only significant yield increase in the test. Results from Kentucky also showed EBDC as the superior treatment.

Researchers in Nebraska reported significant control of tan spot (*Pyrenophora trichostoma*) with single applications of propiconazol and triadimefon. Two applications of propiconazol and EBDC gave significantly higher disease control than triadimefon.

Benomyl was found to be superior to thiophanate-methyl (Topsin-M) and thiabendazole (Mertect) in controlling foot rot (*Cercosporella herpotrichoides*) in Oregon. All three treatments reduced "severe lesion" development.

Leaf rust (*Puccinia recondita* f. sp. *tritici*) infection was widespread in the United States in 1981. The disease was reported in nine states. Triadimefon, propiconazol, or EBDC showed the greatest degree of control over all the tests. Researchers in Arkansas and Nebraska reported all three compounds significantly protected plants from leaf rust infection. In Arkansas, six varieties were used at four different locations; control varied among varieties at all locations. In Indiana, two applications each of triadimefon and EBDC significantly reduced leaf rust infection.

In working with foliar fungicides on cereal grains or most any row crop, the variety used and the climate at the test site greatly influence the results. To test the efficacy of a particular fungicide against a particular disease, conditions for an epidemic must be set. A susceptible variety is planted in an area where the disease is endemic. If weather conditions are conducive to the growth and spread of the pathogen, the fungicide's performance can be noted with reasonable certainty. A positive relationship between disease severity and yield increase should also be obtained.

In cereal grain fungicide testing, an early application is generally more effective than a late one and two applications are usually better than one. This is simply due to fungicide protection at the proper time of infection. The longer the period of protection, the less the pressure of disease.

In many fungicide tests, disease may be reduced without a yield increase or yield may increase without evidence of severe infection in either the sprayed or unsprayed plots. This is usually a varietal response. No variety is completely immune to all pathogens. There is a degree of resistance, whether horizontal, vertical, or a combination of the two, to each disease. Usually more than one disease is found in the test. The environment may be perfect for the development of one pathogen but not exactly right for another. When a variety with some resistance is grown in an environment not too conducive to pathogen growth and spread, subtle disease differences result.

Dr. Whitney is editor of the field and cereal crops section of Fungicide and Nematicide Tests, *William C. Nesmith, Editor, published annually by the New Fungicide and Nematicide Data Committee of The American Phytopathological Society. Copies of current and past volumes may be obtained from Richard E. Stuckey, Business Manager F & N Tests, Plant Pathology Department, University of Kentucky, Lexington 40546.*