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New fungicides control white rot in onions, garlic

By Lisa Lieberman

White rot in onions and garlic—one of the worst soilborne diseases in California—is becoming a bigger problem in the Central Valley. Over the past three years, infected acreage has increased to 13,000 acres.

"It's a devastating disease and the acreage affected is expanding slowly, but surely," said Tom Turini, a University of California Cooperative Extension vegetable crops farm advisor for Fresno County.

The good news for farmers is that a fungicide registered for use against this disease this year—Folicur—appears to have strong potential in helping growers fight white rot. In addition, Endura, which has also performed well against this pathogen, should become available in the near future.

In the Central Valley, white rot is usually more severe in garlic than in onions, but can affect onions as well. In garlic fields, the disease can destroy 100 percent of the crop. The above-ground symptoms start out with the lower leaves turning a yellowish brown. Eventually, the whole plant collapses and dies.

White rot is an insidious disease for several reasons. The fungus produces resting structures (sclerotia) that can survive in the soil for decades. Just a few sclerotia per liter of soil can cause economic damage. Once the disease gets established in fields, it's almost impossible to get rid of it.

The resting structures are dormant until they are exposed to sulfur-containing compounds produced by onions, garlic and related plants. These compounds "wake up" the fungus, which sends out thread-like material that can attack the roots of the susceptible plants. Once in the plant roots, the fungus moves within the plant and can move from the roots into the base plate and into the bulb. The bulb is then rendered unmarketable.

The problem with white rot-afflicted fields is that there is no easy cure. Typically, a grower would consider a white rot-infested field unacceptable for garlic or onion production.

While there are other vegetable crops growers can plant on the west side of the San Joaquin Valley, garlic remains an important crop. Onions and garlic are among the largest acreage vegetable crops grown in Fresno County.

"White rot is absolutely devastating and the disease has expanded so much in the valley that the choices are becoming limited as to where growers can grow onion and garlic crops," Turini said.

Over the past few years, researchers had been experimenting with certain biostimulants, including Diallyl disulfide, which is a commercially available product, as well as garlic powder, garlic juice and/or onion and garlic compost. The thought was that these biostimulants could "trick" any latent white rot into germinating in the absence of a crop susceptible to this disease. Once the resting structures of the fungus germinated in a field without a susceptible crop, there would be no food source to sustain it and it would die out.

Researchers were successful in reducing the densities of white rot resting structures in the soil using these methods by over 90 percent. However, in many situations this wasn't enough to avoid economic damage, Turini said.

"If you have 150 sclerotia per kilogram of soil and you decrease that level by 90 percent, you still have 15 sclerotia left, and that can still do a lot of damage," Turini said.

Turini and other researchers have been experimenting with several fungicides that look promising, including Endura and Folicur. Turini looked at the influence of fungicide applications on disease severity and overall yield when incorporated at planting in combination with applications made through buried drip irrigation systems.

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He also tested the efficacy of the materials when applied only at planting in furrows. Under the very high inoculum levels that were present at this site, Turini found that when Folicur was applied at 20.5 ounces at planting, the disease severity was substantially reduced and the yield doubled as compared to the untreated control. Folicur is now registered for applications at planting for onions and garlic to control this disease.

Endura at 6.8 ounces per acre or Cannonball (fludioxinil) at 8 ounces per acre applied at planting resulted in similar decreases in symptom severity and increases in yields. However, Cannonball is not registered on onions or garlic and Endura is not registered for an application at planting.

Turini said that there's still more research and more fine-tuning to do in terms of learning when and how to apply these fungicides for treating white rot.

Although it is possible to double the yield of garlic with a fungicide application made at planting, the yield may still be low due to white rot. The best management plan is going to include the use of multiple strategies, including sanitation to limit the spread of the fungus that causes this disease. In fields with a history of the disease, the use of Diallyl disulfide could reduce the level of sclerotia in the soil followed by the application of a fungicide to further reduce the likelihood of experiencing economic loss, Turini said.

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