

# A New Look at a Costly Problem

Research on fungicide resistance in dollar spot.

BY JOSEPH ROBERTS



*Dollar spot can be a serious problem for golf courses with cool-season turfgrass.*

In the world of turfgrass, fungicides are vital tools that help provide aesthetically pleasing views as well as adequate playing surfaces for golfers. However, fungicide resistance can prevent fungicides from working and cost superintendents greatly while allowing disease to progress. In the past, fungicide resistance has been studied only after it has been observed in the field. Research at North Carolina State University is attempting a different approach to understand fungicide resistance.

Dollar spot, caused by *Sclerotinia homoeocarpa*, is a devastating and persistent pathogen that terrorizes golf course turf throughout the United States. Superintendents battle this disease for long periods throughout the year, and fungicide applications are often necessary to maintain acceptable turf quality and playability. Fortunately, there is a wealth of fungicide chemistries available, including, but not limited to, benzamidazoles, demethylation inhibitors (DMIs), quinone outside inhibitors (QoIs), nitriles, and the list

goes on. One newer class of fungicides known as the succinate dehydrogenase inhibitors, or SDHIs, has proven to provide effective and long-lasting control of dollar spot.

Currently, boscalid is the only SDHI that effectively controls dollar spot, but fungicides with similar modes of action are soon to come. SDHIs have a site-specific mode of action that works by



*Detailed field work is required in Ph.D. candidate Joseph Roberts' research at North Carolina State University.*



disrupting the succinate dehydrogenase pathway in respiration, thus slowing the growth of *S. homoeocarpa* and reducing dollar spot development. However, one problem with site-specific fungicides is the high likelihood of resistance development. Fungicide resistance is a growing problem in turfgrass management and occurs when fungicide applications fail to provide adequate control. All areas that receive fungicide applications are susceptible to fungicide resistance development, especially if fungicide programs are not tailored to prevent fungicide resistance (i.e., rotating and tank-mixing fungicide chemistries). Individuals of a given pathogen can be fully resistant, meaning that the fungicide fails to work completely, or partially resistant, meaning that a higher rate of fungicide is needed to provide control.

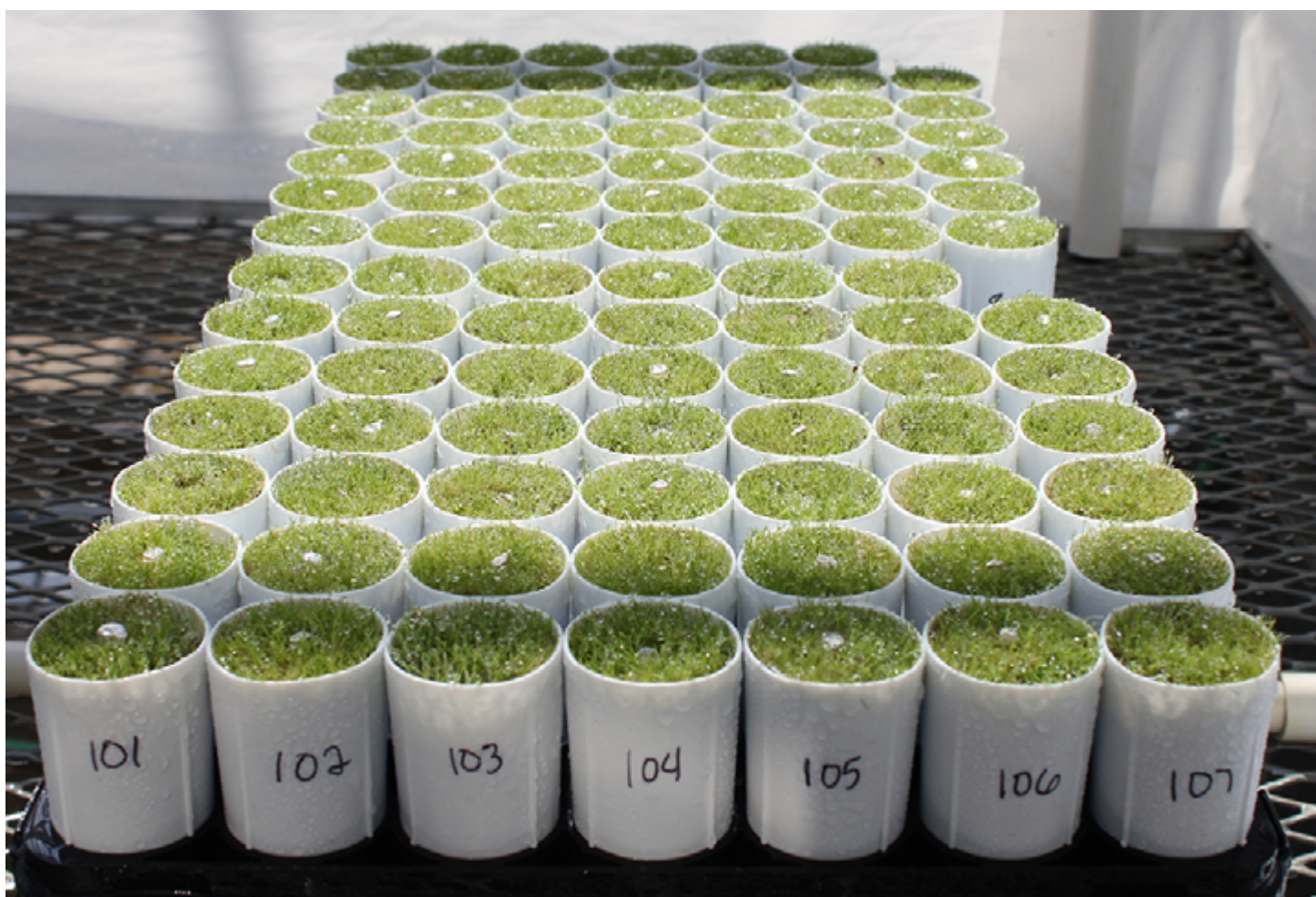
Fungal pathogens in other crops have already developed resistance to

the SDHIs, and, if they are not used cautiously, the dollar spot pathogen will likely become resistant as well. My research interests focus on the development of resistance to SDHI fungicides and development of methods for prevention and early detection. The goal is to determine the possible mechanisms of boscalid resistance in *S. homoeocarpa* before it occurs in the field. Current projects are focused on sequencing the genes in the succinate dehydrogenase complex in multiple isolates of *S. homoeocarpa* to identify possible mutations that could lead to resistance. By identifying the mutations that confer resistance, we can develop methods to detect it earlier in the field. Early detection can prevent expensive and unnecessary fungicide applications over resistant areas. Additionally, further tests could offer recommendations for different fungicide programs and how they influence the development of fungicide resistance.

## HOW YOU CAN HELP

While this project is in its early stages, we have made significant advances in the past few months. However, we are limited currently in dollar spot isolates with varying levels of boscalid exposure. We are interested in obtaining dollar spot samples from areas that have previously received applications of boscalid. Areas that receive two to three applications per year are preferred. Our goal is to provide information to avoid the development of resistance and help superintendents combat this devastating disease. If you are willing to contribute dollar spot isolates, please feel free to contact me at [jaroer3@ncsu.edu](mailto:jaroer3@ncsu.edu). Thank you for your help.

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Screening multiple samples of dollar spot is an important part of finding disease resistance to certain fungicides.