

as many different numbers at these diseases as possible.

Many turf managers are already dealing with resistance at their golf course. In many cases, fungicide classes such as the benzimidazoles, dicarboximides and DMIs may be useless or have extremely short residuals. Preventative applications of multi-site fungicides such as chlorothalonil and fluazinam are required to ensure good disease management. However, an area that we still do not clearly understand is the fitness cost to the pathogen when the population becomes resistant.

What did the fungus give up in order to circumvent the consistent fungicide application? We know from grape pathology that there is a documented fitness penalty when a resistance develops to the dicarboximide family, which means the population will likely revert to the original non-resistant state. Many labs are working to understand the biological consequences when fungi develop resistance, but we are not quite there yet. The bottom line is that managing fungicide resistance should follow the same strategy as preventing fungicide resistance. I advise superintendents to rotate and tank-mix products when managing fungicide resistance.

## UTILIZING RESOURCES

The current suite of fungicides is quite awesome with respect to efficacy, but selecting the appropriate product, rate and timing still requires knowledge of the target pathogen. It is important for turfgrass managers to remain current on research surrounding turf diseases. Attend meetings, the GIS and regional shows to catch up on the current knowledge on diseases. Having good resource material in the office is helpful.

Another essential resource, in addition to the ones I mentioned in the previous article, is the "Compendium of Turfgrass Diseases" published by APS Press. It has a beautiful collection of images and succinct descriptions of

turf diseases, including conditions that favor disease development. Of course, your local turfgrass extension specialist would be willing to help with building a successful fungicide program as well. However even with all the knowledge they possess, they can only be helpful if the turf managers are completely open and honest with them regarding their situation and issues.

Disease pressure and fungicide resistance enter the thought process when purchasing chemicals and developing a solid disease management program, but what happens to the fungicide after they are applied? The next article will cover that topic!

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