It Takes Two to Tank Mix

Here's the latest research and some information on combinations that work – and what to look for when you're considering a new one

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Issue

Superintendents are looking for more cost-effective ways to battle multiple springtime diseases without adding to labor costs or damaging the environment.

Solution

Tank mixing fungicides, with proper oversight and precautions, offers a way to deal with this often challenging conundrum.

You've all done it — mixing two chemicals to broaden the number of springtime diseases you can fight with one application. You match compatible chemicals, put them in a tank (maybe with a biological agent or fertilizer to give it some added kick) and test it on an inconspicuous spot on the course. If it works, you're ready to spray.

In the industry, these concoctions are known as tank mixes (or, less charitably in some circles, "witches' brews"). Experts say tank mixing is a useful way of treating more than one disease with fewer chemicals, thereby lessening the environmental impact of the two fungicides separately.

But the practice is not without potential drawbacks, and experts say superintendents should be cautious when they combine chemicals. Here are some ideas about why you should tank mix, what works and what precautions you should take before putting two chemicals together.

Why tank mix?

Jim Skorulski, senior agronomist for the USGA Green Section's Northeast Region, says tank mixing is a routine practice in the industry. He says it's usually done to broaden the spectrum of disease control, especially if one fungicide doesn't control all the pathogens the superintendent needs to control. Superintendents will often add an additional fungicide in the mix to protect against the secondary pathogen.

Skorulski also adds that broad-spectrum contact fungicides are often combined with more narrow, targeted penetrant products because superintendents want to reduce or

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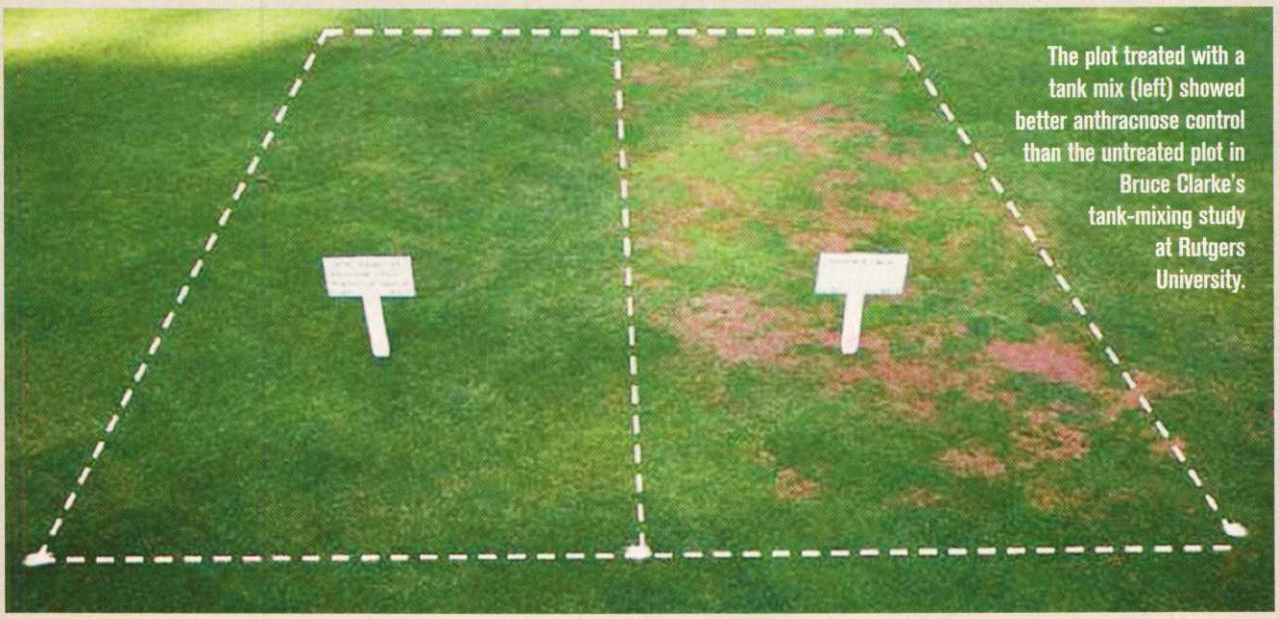

The plot treated with a tank mix (left) showed better anthracnose control than the untreated plot in Bruce Clarke's tank-mixing study at Rutgers University.

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JIM LOKE, SUPERINTENDENT
BENT CREEK COUNTRY CLUB

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delay the development of disease-resistant pathogens.

"You'll also see superintendents add a fertilizer in the mix as well," Skorulski says. "They'll put any number of things together that they think will enhance their turf."

Jim Loke, certified superintendent of Bent Creek Country Club in Lancaster, Pa., says each superintendent tank mixes for different reasons, but the primary reason is to get a broad-spectrum effect.

"How aggressively someone tank mixes depends almost completely on his personality," Loke says. "But what I try to accomplish is to make sure I've got a mixture that will take care of more than one disease at a time."

What is working?

USGA agronomist Darin Bevard says superintendents in the mid-Atlantic region are mixing chemicals for a variety of diseases that hit in the spring, including anthracnose and summer patch. The most popular fungicide combination for these springtime diseases is sterol inhibitors (SI) with contact fungicides.

"When summer patch and anthracnose are the concerns, we see combined SI/contact fungicide applications early in the spring, with additional applications between 21 days to 28 days later," Bevard says. "Not only do they work well on the two targeted diseases, but they seem to deal preventatively with other problems like dollar spot and leaf spot."

Bevard says the treatments usually begin in mid-April and are completed in late May or early June. Loke says he swears by the SI/contact combination to control anthracnose on a preventative basis, and he often adds a pythium-control fungicide to the mix as well.

Karl Danneberger, professor of turfgrass science at The Ohio State University, says that spraying tank-mixed combinations of fungicides that each work individually on anthracnose will increase the efficacy of both.

Bruce Clarke, vice chairman of the Department of Plant Biology and Pathology at Rutgers University, hosted a two-year study on the efficacy of tank-mixing and rotational fungicide programs.

"What tank-mixing allows you to do is use lower rates of both chemicals while getting excellent control of several diseases at once," Clarke says.

Clarke says tank mixing also staves off resistance problems more effectively, particularly when the combined fungicides have two different modes of action. One somewhat surprising study finding was that an increase in nitrogen fertilization, combined with the fungicide application, led to a 30-percent reduction in anthracnose. "We didn't tank mix fertilizers with the fungicides because we didn't want to muddy the results, but you probably could do so quite easily," Clarke says.

Loke says he adds a humate product to his chemical applications because the combination seems to enhance the effects of the chemicals.

What to watch

Despite its popularity and success, tank mixing doesn't work in all cases. Danneberger says superintendents need to remember that not all chemicals are compatible.

"You should always check the label before

you tank mix anything," Danneberger says. "Incompatibility may be an issue. If you have any doubts about what you're going to do, check with the manufacturer first."

Loke says he doesn't just take the manufacturer's word for whether two chemicals are compatible. He performs a simple jar test each time he tries a tank mix. Loke takes the chemicals he's considering putting together and puts them into a 2-gallon jug, being careful to keep the proportions equal to what he will be putting on the course. If the two chemicals go into suspension, Loke knows they're safe to combine. If the two separate, then he doesn't make the application.

The USGA's Bevard says he worries more about the extraneous additives that superintendents put into tank mixes like biostimulants, fertilizers and other chemicals.

"When you start putting other stuff in there, it can lead to pH issues, which can reduce the effectiveness of the fungicide in some cases," Bevard says. "There are potential compatibility issues when you start adding items other than fungicides to the mix, so superintendents need to be careful."

USGA senior agronomist Keith Happ says superintendents should make sure they have added the proper amount of water to tank mixes. If there's not enough water, contact and upwardly mobile fungicides may not function properly.

Rutgers' Clarke recommends against tank mixing a fungicide that treats root diseases with a fungicide that treats foliar diseases because the application procedures are diametrically opposed.

"Fungicides that treat root diseases like summer patch need to be watered in after application," Clarke says. "If you mix that with a fungicide that needs to stay on the leaves to treat something like dollar spot, then you've completely defeated the purpose of the mix."

In the future, tank mixing may become far more scientific than it has in the past as superintendents try to use fewer fungicides, Clarke says. He's already seeing superintendents who are calculating the proper timing and ratios that will allow them to customize the programs to meet their exact needs.

"Superintendents are starting to create tailor-made programs for their individual courses," Clarke says. "They know where their diseases strike most often, and they are learning how to deal with them more precisely.

"The ultimate goal is to use fungicides only when you absolutely have to," Clarke stresses. "That's where we're headed — and precision tank mixing will be an integral part of that evolution." ■