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needed
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NEW HERBICIDES

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Dual-tip nozzles ideal
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ASYMMETRIC NOZZLES BETTER FOR FUNGICIDES

New dual-tip asymmetric nozzle is ideal for fungicide applications.



PHOTO BY JOHN DIETZ

by John Dietz

Fusarium is an old pest in Manitoba's Red River Valley but it is becoming a big new pest about 500 kilometres northwest, in the Swan River Valley. To get ahead of the disease game, seed grower Wayne Alford went shopping for nozzles to provide better coverage.

"I wanted to improve my application of fungicides. I did some research, and saw an article that mentioned asymmetrical TurboDrop nozzles," says Alford. "Two seasons later, I'm a happy customer."

TeeJet Technologies and Greenleaf Technologies each have recently added a new type of dual fan nozzle that's particularly well suited for applications of fungicides with high-clearance sprayers, says Tom Wolf, research scientist with Agriculture and Agri-Food Canada (AAFC) at Saskatoon.

TeeJet has 25 types of sprayer tips available for broadcast applications with boom-type sprayers. The TeeJet AI3070 produces two wide-angle, flat spray patterns. To maximize coverage, the lead nozzle is tilted 30 degrees forward to hit vertical, exposed targets such as wheat heads. The back nozzle, tilted 70 degrees to the rear, applies a heavier rate against the back of the retreating heads. Drift-resistant drops are produced with the use of a venturi design.

Greenleaf Technologies manufactures 13 types of nozzles. Greenleaf TurboDrop Asymmetric Dual Fan (TADF) Nozzle is the latest. It has a 10-degree forward spray and a 50-degree rearward spray to overcome the same issues faced by traditional flat fan dual nozzles that have matching forward-rear spray angles.

In normal operation, the travel speed of the sprayer moves droplets along with it. They tend to deposit in the driving direction. Because of this, the coverage of the backside of the vertical wheat heads tends to be weaker.

Several manufacturers have developed bodies that will support two nozzles (or jets) that spray forward and backward from the

vertical, typically at 30-degree angles.

A limitation of a double nozzle is that as you travel faster, the spray deposit on the forward-pointing nozzle increases while the contribution of the backward-pointing nozzle decreases. As a result, low speeds were advised to take advantage of this design.

According to Wolf, design engineers decided it wasn't necessary for the angles to be identical, and that a variation was better for faster speeds. "The asymmetric design is intended to allow these faster travel speeds," he notes. "To even out the playing field, they said let's decrease the contribution of the front nozzle and increase the angle of the back nozzle. More help is required to keep drops moving back to hit a target that they are actually moving away from."

In 2012, Wolf did trials with the TeeJet AI3070 to see if the deposit pattern changed with travel speed and to see if there was an impact from boom height. He predicts that results probably would be similar with the TurboDrop Asymmetric nozzles.

Using a vertical plastic drinking straw target with similar dimensions to a wheat head, they measured results separately for the forward- and backward-pointing nozzles at speeds between eight and 16 kilometres/hour in increments of 2 km/h. Previously, with a non-asymmetric design, they determined that increasing the travel speed increased the amount of deposit from the forward-facing nozzle.

"While we found that the relative amount on target was usually about 30 percent greater from the forward-pointing nozzle, that did not change with increasing the travel speed," says Wolf. "And, the amount of deposit from the backward-pointing nozzle didn't

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ABOVE: New dual-fan nozzles are particularly well suited for applications of fungicides with high-clearance sprayers.

moxynil, put something else in there so you're not totally relying on glyphosate," says Robinson.

New burndown products

Nufarm Canada is launching two herbicides this spring – Blackhawk and KoAct – to help with burnoff of RR volunteers.

BlackHawk is a spring burndown product, to be used with glyphosate to provide enhanced broadleaf weed control through both contact and systemic activity. BlackHawk contains both Group 14 and Group 4 components (carfentrazone and 2,4-D ester) to help in the battle against resistance development.

KoAct herbicide is a burndown product for spring, summer-fall or post-harvest use. It controls many broadleaf weeds, including canola volunteers, prior to seeding wheat and barley. It can be used either alone or with glyphosate. KoAct contains both Group 2 and Group 4 components, using two modes of action to help in the battle against resistance development.

"Blackhawk is designed specifically for use before seeding cereal crops, like wheat and barley, and ahead of soybeans. For this purpose, corn is considered a cereal crop," says Robinson. "With two modes of action, it's going to give you better, quicker control of volunteer canola."

Robinson says NuFarm has spent two years developing Blackhawk especially for growers in Manitoba to throw in sprayer tanks with glyphosate, to provide the strength they need to clean up the glyphosate-resistant volunteers ahead of cereal crops. "It's going to give you better activity in cooler spring conditions when you might be having challenges with things like buckwheat and kochia along with your Roundup-ready canola volunteers," he says.

Blackhawk is the first package to contain both active ingredients. NuFarm's packaging of the ingredients makes them easier to use in a tank mix with glyphosate and provides a competitive price point. Blackhawk will retail as an 80-acre case for about \$5.50 per acre.

In-crop control

After the RR corn and any new weeds emerge, there will be two or three weeks to control the weeds. Options include 2,4-D, bromoxynil products and, cautiously, MCPA.

The options for volunteer control in corn will vary with the hybrid variety and are open until the seedling crop is in the six-leaf

stage, notes Murray. Look for the auxin sensitivity rating for your chosen hybrid (auxins are a class of plant hormones that play a role in co-ordination of many growth and behavioural processes in the plant's life cycle and are essential for plant body development). The information – which should be available from the seed provider – may be a factor to consider when selecting the corn, notes Murray.

"We have low rate 2,4-D Ester up to the four-leaf stage. After that, we look at something like Buctril M. After six leaves, it's time to go fishing," he says.

The risk with both products is crop injury. The active ingredients are synthetic growth hormones (auxins) that become more damaging to the crop with increasing heat and moisture. Some evidence from Ontario suggests that large day-night temperature swings also may increase crop injury.


"You can go in with something as simple as 2,4-D," says Robinson. "It's fairly critical to follow the crop staging. You need to control most of those weeds at the two- to four-leaf stage with the 2,4-D. You want to do that when your crop is four to six inches tall, and before the six-leaf stage. You can also go in with MCPA Amine, at the same type of staging."

Straight bromoxynil is another option, he says, with a little bigger application window. It's best to aim for the four-leaf stage of the corn for a bromoxynil application, but it can go on as late as the eight-leaf stage.

Because bromoxynil is a contact herbicide, it does require more water. The water volume needs to be between 17 and 26 gallons per acre, as compared to 10-gallon rates for 2,4-D and MCPA products.

According to Robinson, there are some slight differences in crop tolerance and in weed response between the MCPA Amine and MCPA Ester. "You don't want to put MCPA Ester on corn because it's hotter on the corn and you have the potential for crop injury," he says. "But it's OK to put MCPA Amine on it."

Murray says both MCPA Amine and MCPA Ester can be hot on corn. "I would like to emphasize that any of these auxins will cause damage (even when applied early) if the environment promotes rapid corn growth (hot and humid). When these conditions are present, it is best to avoid spraying."

"You really have to pay attention to your growing conditions," notes Murray. "If you can avoid hot, humid conditions when spraying those products, that will help." 

ASYMMETRIC NOZZLES BETTER FOR FUNGICIDES

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change with speed either. We concluded that the performance of the asymmetric nozzles was speed-independent."

However, boom height is a factor in coverage. In earlier studies with single nozzles that were angled forward, was there was a significant impact of boom height. The angle of the nozzle was relatively unimportant while the boom was high, and deposits on vertical targets were low. When the boom was closer to the target, the angle became quite important, increasing deposits significantly.

"With the asymmetric design, we also found that we could

increase deposition on the vertical target significantly by keeping the boom low," notes Wolf. "When you have a high boom, the angle the spray leaves the nozzle at very quickly becomes irrelevant. Air resistance and gravity redirect the spray just to fall vertically, or move with prevailing winds. But when you spray very close to the target, the spray is still moving forward and backward as intended."

As a result, with asymmetric nozzles, a boom height controller is a very practical option. The operator can keep the boom low, without hitting the ground, and take advantage of the lower boom height.

Coarser spray qualities are also more important with an asymmetric nozzle pattern. A large drop has more momentum, and will travel longer in the intended direction. Therefore, larger droplets support a greater, more aggressive spray angle – especially for a vertical target.

“Our key conclusions from the study are that maintaining a low boom and having the spray reasonably coarse allows the double angle and the asymmetric angle to be beneficial,” says Wolf. “It is most beneficial in the fungicide world, where you are trying to hit a vertical target.”

The new design, however, did not produce any benefits in coverage on horizontal targets such as broadleaf crops and weeds. As a result, benefits are more likely for fungicides than herbicides.

The Swan Valley Seeds owner, Wayne Alford, installed TurboDrop Asymmetric nozzles on his 90-foot John Deere 4710 sprayer. In July 2011 and 2012, he applied anti-fusarium fungicide to protect his wheat.

First, he checked the nozzle performance using water-sensitive paper to reveal the actual spray pattern at head level in his wheat. The spray pattern was different from what he had seen with other nozzles. Drops from the forward nozzles were a little smaller; drops from the rear nozzles were a little larger. As long as it wasn't windy, they covered both sides of the sprayed paper.

Alford ran his own pressure test as well, with different speeds. He found the asymmetric spray maintained its pattern across a wide range of nozzle pressures. “The Asymmetric will work at anything from 10 g/ac and 12 m.p.h. up to 20 g/ac and 6 m.p.h. while the spray pattern and droplet size stay relatively consistent,” he says.

“I followed the directions for fusarium control: spray at six or 7 m.p.h. at 15 g/ac of water and recommended pressure. We had very good results. Good coverage. Minimal plugging. My seed crops weren't perfect, but the fusarium levels on my seed wheat were certainly very much lower than I had in past years. The two years of experience I have had have been very positive.”

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