The Western Producer

Calm, clear day dangerous time to spray

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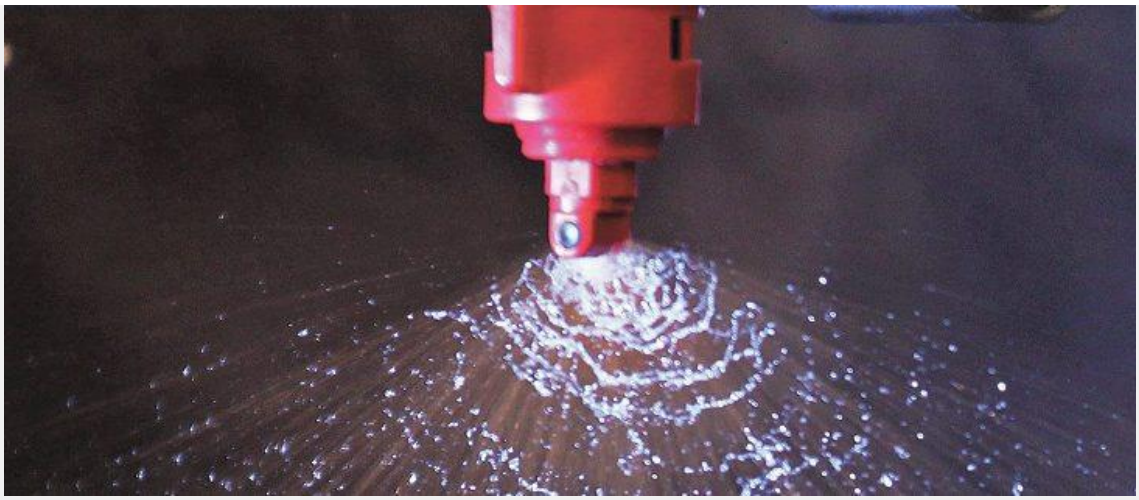

A coarse sprayer nozzle reduces the number of fine droplets. | File photo

> A temperature inversion keeps cold air down and fine droplets of chemical hang in the air until a breeze blows them to an unintended crop

The storm has passed and conditions are calm. Farmers are eager to get out to the fields and spray the crops after a weather-induced delay.

But don't do it, says Andrew Thostenson, a pesticide program specialist with North Dakota State University.

He said that is one of the worst times to spray because conditions favour an inversion, which is the presence of cold air near the surface that causes spray drift and chemical spread where it isn't wanted.

And don't try to spray in late afternoon or evening on a calm, clear day either because an inversion is also more likely.

Inversion as it relates to pesticide application is a complicated topic — so complicated that NDSU has published a 16-page booklet about it.

Thostenson gave the Coles Notes version to participants in the Farming Smarter field school held in Lethbridge July 5-7.

An inversion occurs when objects on the surface have absorbed heat during the day and then release that long-wave radiation starting in late afternoon and through the night until a few hours after sunrise.

The result is warmer air up high and cooler air close to the ground. Spraying into that cooler air layer results in drift of the finer droplets.

“As you release the spray droplet from your nozzle, the coarse droplets usually have enough mass to be able to make it down to the target,” said Thostenson.

“But the driftable fine droplets, and we characterize these as somewhere around 200 microns or less, they just go laterally.

“One of the fallacies that people think about with respect to temperature inversion is this assumption that they become trapped in a cool air layer, and that’s really, simply, not so.”

Rather, the droplets hang and will not evaporate in cool air. Then, with even a slight breeze, they flow down range with the cool air, just as water would do.

The result can be disastrous if those droplets reach an unintended crop or other target.

Inversions will not occur if there is at least 25 percent cloud cover at night or if the wind is more than four or five km-h, he said.

“When you have wind, you cannot have a temperature inversion, and it’s because the wind tumbles and mixes the atmosphere so much that there’s an even distribution of temperature.”

A farmer’s senses can help predict the likelihood of an inversion.

The first clue is when dust or smoke hangs in the air and doesn’t dissipate or rise. As well, smells will be more noticeable.

“Those odours will be more intense because there’s no dissipation of those odours because there’s no wind and because the inversion is keeping those odour molecules suspended close to the ground,” said Thostenson.

Farmers may also notice that sound travels further, such as train whistles or motor noises.

Given those clues, it is not a good time to spray.

Fog is also an indication to delay spraying because it shows that cold air is sitting just above the surface.

“Whenever you have fog, you’re done,” he said.

“You’re not spraying because you’re introducing the same fine droplets into the atmosphere that the fog is, and they’re not going anywhere except slightly down range in the light wind that may be out there.”

Thostenson said humidity plays a huge role in inversions, which under dry conditions will build faster in the afternoon and have greater intensity than inversions that occur when humidity is high.

However, the inversion will collapse and dissipate much quicker than it would under high humidity.

Generally speaking, the most dangerous time to spray is late afternoon, Thostenson said.

The sad fact is that conditions that seem the best for spraying can actually be the worst.

Ten steps to minimize spray drift

- Use the coarsest droplet size possible for reasonable efficacy of the product.
- Avoid wetters that increase drift potential.
- Operate sprayer at optimum speed for boom stability, and minimize effect on airflow behind the machine and boom.
- Keep boom height as low as possible to reduce the amount of time that droplets are in the air.
- Be prepared to adjust operations based on weather variations.
- Consider microclimatic conditions, especially at night.
- Continually monitor site conditions and crop height.
- Use on-board weather stations, smoke devices or ribbons to note wind direction and speed.
- Use extra care when spraying over partially bare ground, where heat may cause rapid evaporation and thermals.
- Avoid spraying if an inversion is likely.