

# Feature Story



## Recognizing Temperature Inversions

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Mother Nature influences everything in farming—including herbicide application. This is in part thanks to a weather phenomenon called a temperature inversion, and working in the right weather conditions is essential for achieving on-target application. But what is a temperature inversion? How does it affect an application? And what are simple ways to recognize one?

Temperature inversions are a natural weather pattern. During daytime hours, dry air naturally cools with higher elevations. Solar radiation warms the earth's surface, and during days with little cloud cover, convection creates winds and gusts that heat the lower atmosphere.

As sunset nears, the solar radiation lessens and the earth's surface is no longer heated by the sun and soon begins to cool. Heat from the warmer air is transferred back to the soil, creating a layer of cooler, denser air near the soil surface. This is the beginning of a temperature inversion.

"Spraying during an inversion can likely result in small droplets getting trapped in the cool air of the inversion layer, suspending them above the target and enhancing drift risk," said Chad Asmus, Technical Marketing Manager, BASF. "This is not to be confused with volatility, which is when a liquid droplet converts to a gas after it has reached its intended target. Avoiding applications during an inversion is essential in achieving on-target success."

Off-target potential from spraying during an inversion increases because the small droplets can travel long distances, either downslope to low-lying areas or in an unpredictable manner with light and variable winds.

To mitigate off-target movement of pesticides due to inversions, be mindful of inversions during the following spray timings:

- >> **Mornings:** Very early mornings around sunrise are when inversions can be at their most extreme. One of the worst times to spray is when overnight skies were clear and wind speeds are low. Inversions can persist for one to two hours after sunrise on a calm day.
- >> **Late afternoon/early evening:** The lowest five feet closest to the ground can sometimes begin to form an inversion three to four hours before sunset. Evening inversions pose a greater risk for off-target movement because they are very persistent and will intensify until after sunrise.
- >> **Nighttime:** Inversions may have already been established and continue to intensify until after dawn.

Also, be aware of conditions that are likely to favor an inversion:

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- >> Clear skies during late afternoon and during the night
- >> Dry soil surface
- >> Wind speeds < 3 MPH that result in no air mixing
- >> Low areas, valleys, or basins where cool air will sink and collect.  
Inversions will form in these areas sooner, persist longer, and be more intense.

Avoiding applications during a temperature inversion is a label requirement and is one of many best management practices aimed at helping achieve on-target application. BASF created the On Target Application Academy (OTAA), which trains growers, retailers and applicators on these strategies for proper and effective herbicide application. To learn more about mitigating inversions and other keys to success, visit the online OTAA module at [www.growsmartuniversity.com](http://www.growsmartuniversity.com) under the "herbicides" tab.

"By paying attention to the conditions, growers will be able to recognize if a temperature inversion is likely to occur," said Asmus. "Avoiding applications at these times is a growers' best bet in achieving proper, precise weed control."

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