PESTICIDE DRIFT
WHAT IS IT?

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When pesticides are deposited outside a target application area, it is called **PESTICIDE DRIFT**. This is different than **tank contamination** (the wrong pesticide in the tank) or **overspray** (when pesticide is directly applied outside of the target area, usually by accident). Pesticide drift can take two forms, **PARTICLE DRIFT** and **VAPOR DRIFT** (or sometimes a combination of the two).

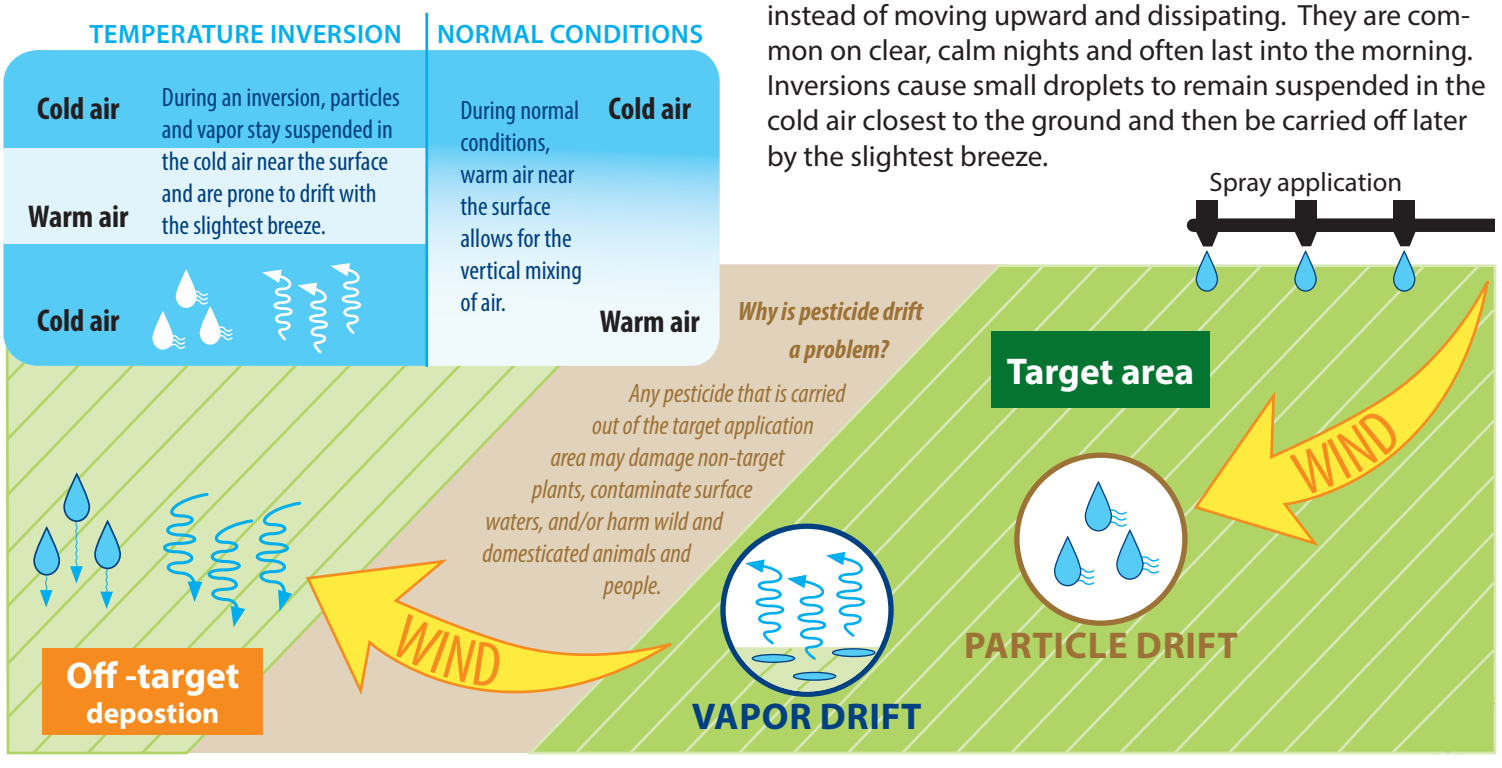
PARTICLE DRIFT is the movement of the spray droplets produced at the time of application and is influenced by three main factors — wind speed, droplet size, nozzle height, and also by changes in temperature and relative humidity.

As wind speed increases, particles can be carried further away from the application site. The risk of drift also increases with smaller droplets, which fall more slowly and are easily moved by wind. Increased spray-boom height also increases the potential for droplets to drift. As temperatures rise and relative humidity falls, the water in spray droplets evaporate, making the droplets smaller and increasing the risk of drift. All of these factors interact and can influence the rate and risk of particle drift.

VAPOR DRIFT is the movement of pesticides as fumes after application of a pesticide containing a volatile active ingredient and is influenced by several factors — temperature and humidity, and soil conditions.

Simply put, a substance is volatile when it easily evaporates at normal temperatures. For many of the active ingredients in agriculture pesticides, volatilization is more likely to occur when temperatures are greater than 85 degrees F and relative humidity is lower than 40%; the potential for vapor drift is greatest under these conditions during **and** for 2-3 days after application. Some active ingredients require immediate incorporation to limit volatilization (these requirements are listed on the EPA label). If soil conditions are too wet for immediate incorporation, the risk for vapor drift increases.

A weather phenomenon that can make both **PARTICLE DRIFT** and **VAPOR DRIFT** more likely is if the application is made during a **temperature inversion** (when warm air is sandwiched between layers of cold air). Inversions promote the lateral movement of a pesticide over large distances because the layer containing the particles or vapor can settle off target (sometimes looking like ground fog or smoke); instead of moving upward and dissipating. They are common on clear, calm nights and often last into the morning. Inversions cause small droplets to remain suspended in the cold air closest to the ground and then be carried off later by the slightest breeze.



PESTICIDE DRIFT

KNOW WHEN NOT TO SPRAY

Under some conditions (like strong winds), the only way to prevent drfit is by not spraying. In all other situations, spray decisions need to be made based on risk assessment **before** the pesticide is mixed. Keep in mind, even if the sprayer is loaded and on-site, if conditions become unsuitable during the application, **STOP.**

Applicators are under tremendous pressure to spray — from imminent pest damage, impatient customers, or schedule-wielding supervisors — BUT it is up to the applicator to make this decision and ultimately their responsibility if damage occurs from drift, so learning how to assess risk is paramount.

Keep in mind even if the sprayer is loaded and on-site, if conditions become unsuitable during the application,
STOP.

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RISK ASSESSMENT PROCESS

1. Where are the sensitive areas ?

- ✓ **Identify sensitive areas near the site in all directions:** Areas include waterways, adjacent crops/natural areas, livestock and/or human habitat.
- ✓ **Estimate the distance downwind to sensitive areas:** Particle drift occurs downwind. As the distance downwind increases, the potential for exposure decreases. Also, keep in mind that during a temperature inversion or when wind speed is near zero, the direction of winds cannot be predicted.

2. What are the weather conditions?

- ✓ **Check the forecast before heading out to the site:** Then double-check the conditions once at the site — record wind speed/direction and check for temperature inversion.

3. Evaluate the drift potential

1. **Given the weather conditions, how likely is it that pesticide will drift onto sensitive areas?**
2. **What is the likelihood that drift will cause adverse effects in these sensitive areas?**
3. **Does the pesticide being applied pose a particular threat given the site conditions and sensitive areas?**

If the risk is very high:

- ✓ **Do not make the application if drift is likely or if risk cannot be adequately assessed because drift has consequences:** If the use of a pesticide is directed in a manner that results in significant pesticide drift in amounts that 1) Cause actual harm to persons, property, or the environment; 2) Could potentially cause such harm under any reasonably foreseeable circumstances; or 3) Are readily visible, then the applicator may be subject to civil, criminal, or administrative penalties. Though the applicator may be insured, the average loss to an application business is typically 4x more than the insurance claim.

Can the risk be reduced?

No single management practice will adequately reduce drift; a combination of the following considerations and careful planning is the best strategy.

- ✓ **Apply the coarsest spray:** The coarsest droplet size spectrum that provides sufficient coverage and pest control applied at the lowest boom height that provides uniform coverage is ideal.
- ✓ **Decrease spray pressure:** Increased spray pressure increases the number of small droplets produced, so keep pressure as low as possible within the range for the nozzle and product.
- ✓ **Select nozzles carefully:** Pesticide labels may require a spray of a defined droplet size spectrum, ranging from "very fine" to "very coarse." For example, air induction nozzles are engineered to reduce the number of fine droplets. Spray nozzle catalogs contain tables showing the spectrum produced for different nozzle-pressure combinations — a single nozzle may produce a different range of droplet sizes at different pressures.
- ✓ **Understand drift-reduction agents:** A pesticide label may require the use of drift-reduction agents under certain conditions (e.g., low spray rate). These adjuvants may reduce the number of small spray droplets but can also reduce coverage of the plant surface so use only according to directions on the label.

PESTICIDE DRIFT
DICAMBA

What is dicamba?

Dicamba is a synthetic auxin herbicide (Group 4) labeled used for broadleaf weed control in corn, sorghum, small grains, pasture, turf and dicamba-resistant soybean. As a plant growth regulator, it works by altering the target plant's hormones, causing abnormal growth and usually resulting in the plant's death.

How does dicamba move off-target?

PARTICLE DRIFT. Spray particle drift can be a major concern for off-target movement of dicamba. To minimize, make applications during wind speeds of 3-10 mph, use an approved drift reduction agent, and select nozzles that allow for the use of larger spray droplets at low pressure.

VAPOR DRIFT. Dicamba has a high potential for volatilization (changing to vapor) and therefore, injury from vapor drift is a concern. The risk is greatest when 1) low wind speeds (stable atmospheric conditions) and high temperatures (≥ 86 °F) occur following application, 2) applications are made during a temperature inversion or 3) using a spray solution with a pH ≤ 5.

Tank Contamination. Another way dicamba can injure off-target susceptible crops is when sprayer tanks, hoses, nozzles and/or measuring devices are not thoroughly cleaned after use; dicamba residue remains in the system and is then mixed into the next tank's solution.

Why is dicamba injury an issue?

Prior to 2016, dicamba was commonly in corn, and though formulations were prone to volatilization and drift, it wasn't until the introduction of novel dicamba-resistant soybean and their restricted use (lower volatility) dicamba products in 2017 that complaints of injury to non-target plants dramatically increased.

In response to these cases, the U.S. Environmental Protection Agency (EPA) imposed new label requirements in 2020 requiring mandatory training for certified applicators, record-keeping requirements, checking with the owner or operator of neighboring fields to find out what is planted or will be planted there, application date/growth stage restrictions, and in some areas, both a 310-foot in-field wind-directional spray drift buffer and a 57-foot omni-directional in-field buffer to protect federally listed threatened and endangered species. In 2021, volatility reducing agents are also required for dicamba applications in dicamba-resistant soybean. For more information, see U.S. EPA website: https://www.epa.gov/ingredients-used-pesticide-products/registration-dicamba-use-dicamba-tolerant-crops

Application & volatilization

1. Application decisions that affect dicamba volatilization include using **proper nozzle selection** (i.e. coarse droplets), **monitoring application conditions** and using the **right tank-mix products**.

2. **Applicators can select dicamba formulations that have a lower potential for volatilization**. Research has shown that the potential for volatilization differs between formulations depending on the salt.

3. **The use of pH buffering adjuvants** can buffer the spray solution from pH reduction. The use of adjuvants is required in dicamba applications made to dicamba resistant soybean.

4. **Be aware of tank-mix partners that reduce spray tank pH.** Research has shown that some commonly used dicamba tank-mix partners like glyphosate can reduce spray solution pH. Use pH buffers and/or avoid the use of certain tank-mix partners with dicamba.

Stewardship & dicamba

Dicamba works best on very small weeds, less than 4 inches. Use on medium-large weeds (> 4") may result in incomplete control and increase the likelihood of evolved herbicide resistant populations.

Additionally in corn, taking advantage of additional options for post emergent weed control of troublesome broadleaf weeds like waterhemp, giant ragweed, and horseweed will ensure the continued use and effectiveness of dicamba use in soybean, where broadleaf weed control options are limited.

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