ROUNDUP READY PLUS®
CROP MANAGEMENT SOLUTIONS

MINIMIZING OFF-TARGET DRIFT OF HERBICIDES

What You'll Learn...

- Drift is the movement of herbicide spray particles through the air, during or after application, to a site other than the intended target.
- Understanding how weather conditions affect drift can help to avoid a potential drift problem.
- Nozzle selection plays an important part in drift management by having a major effect on determining spray droplet size.
- Applicator knowledge, training, and decisions are key in the prevention of off-target herbicide drift.

Types of Drift

1. **Particle Drift** - This is the physical movement of spray particles by wind after the particles leave the sprayer and before they reach the intended target. Particle drift is the most common form of off-site movement with most herbicide products and can occur with any herbicide, regardless of the product or formulation. It is directly associated with spray droplet size in combination with boom height and wind speeds. Applicators can control droplet size by nozzle selection and operating equipment at the proper spray pressures to minimize fine droplets that are more prone to drift.
2. **Volatilization** – This is the movement of the vapor form of a herbicide after it has been deposited on the intended target. It is a function of herbicide formulation and ambient temperatures as well as plant or soil moisture. Volatilization can occur with certain herbicide products, such as some formulations of growth regulator herbicides.

Weather Conditions Affecting Drift

Weather conditions can affect the potential for herbicide drift. Wind speed is usually the most critical factor. It is generally recommended to spray when the wind speed is between 3 and 10 miles per hour (mph). The greater the wind speed, the farther off target small spray droplets can be carried.

An inversion can occur when the air is very calm with little air mixing. A temperature inversion occurs when a layer of warm air gets trapped between two layers of cooler air. Spray particles can get caught in the layer of warm air and move off target. A cloud-free night with no wind can be an indication of inversion conditions the next morning. Temperature inversions can also form as the sun sets under clear to partly cloudy skies and light winds. Inversions can be recognized by observing a column of smoke. If the smoke does not dissipate or moves downwind without mixing vertically, conditions indicate that the likelihood of an inversion exists. Inversions generally last until the morning sun heats the ground enough to lift the inversion, or until a weather front breaks it up. Use of a smoke bomb or smoke generator can help to identify inversion conditions.

Weather conditions can change suddenly, requiring applicator monitoring as to the suitability for spraying. To minimize the potential for drift, applications should be timed to correspond with periods of minimal atmospheric disturbance. Wind disturbances generally occur later in the day after the air has had time to warm and mix. The morning hours when winds are calmer, temperatures are lower, and relative humidity is higher are generally better for spraying. However, the exception is when inversions occur. High humidity and low temperatures are optimum conditions for reducing the risk of drift. Spray droplet evaporation and drift of smaller droplets can be most severe when conditions are hot and dry. Nozzles producing larger spray droplets that settle on the intended target faster, and are less susceptible to evaporation and drift, should be used if applications have to be made under hot and dry conditions.

Type of Herbicide

Knowing the chemistry and volatility potential of a herbicide can help minimize off-target movement. Applicators can choose not to spray until conditions improve, or choose a formulation of the product that is less subject to volatilization. There can be differences in volatility of the various salt formulations of dicamba. Dimethylamine (DMA) salt and dicamba acid are two of the oldest and most volatile formulations. Ester formulations of 2,4-D can have greater volatility than amine formulations. Companies are also developing new formulations of dicamba and 2,4-D that can help to minimize the potential for volatility.

Equipment and Application Considerations

Herbicide drift potential can be significantly reduced with proper equipment choices and application methods.

Spray Droplet Size - Spray droplet diameters are measured in microns. Drops smaller than 150 microns are most prone to drift. For reference, a 150 micron droplet size is about the thickness of a sewing thread, and a 100 micron droplet is about the thickness of a human hair. Small droplets are difficult to get deposited on the target, and can remain airborne and drift long distances because of their light weight and size. Smaller droplets also evaporate more quickly.

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Herbicide drift is less likely to be a problem when spray droplets are 200 microns and larger in size. In general, medium to coarse sized droplets (225 - 400 microns) can provide good herbicide coverage and are less prone to drift. However, the largest droplet sizes (extremely and ultra coarse) are recommended when using dicamba. Larger droplets are less affected by wind, fall to the intended target more quickly, and evaporate or volatilize more slowly. Spray nozzles produce a range of droplet sizes. Some nozzles are specifically designed to reduce drift by reducing the amount of small droplets in the spray pattern.

Nozzle Selection, Pressure, and Spray Volume - Spray nozzles can play an important role in drift management. Applicators can control spray droplet size by choosing the proper nozzles and operating equipment at the proper pressure. Air induction and drift-reduction nozzles produce larger, coarser droplets when compared to standard nozzles. Larger nozzle orifice sizes create larger droplets, which are less likely to move off target. Herbicide drift can be reduced by using the low end of the pressure range for the particular nozzle to produce large droplets. Higher pressures can generate many more small droplets that are prone to drift.

As spray volume is reduced, the droplet size can decrease, increasing the potential for drift. Using low pressures (30 to 40 pounds per square inch (psi) or less) and high volumes (15 to 20 GPA) can increase the droplet size, decreasing the potential for drift. When you reduce spray volume, the herbicide concentration will increase to maintain the same dose of active ingredient, and off-target drift can be more damaging. Increasing pressure should not be used as a substitute for spray volume. It is recommended to maintain pressures below 40 psi, and if you need coverage, increase spray volume through nozzle selection. Increasing the carrier volume will decrease the water droplet concentration, minimizing the risk of off-target drift damage.

Spray Boom Height and Speed of Application - Setting the boom at the lowest possible height while maintaining proper spray overlap will reduce the risk of herbicide drift. When the boom height is set too high, droplets must fall farther, increasing the chances for drift. The correct nozzle orientation or direction of spray will reduce the potential for drift. High application speeds and rapid speed changes should also be avoided.

Sprayer Shields - The use of sprayer shields is another means of reducing drift. Herbicide drift can be reduced substantially by using drift-reducing nozzles in conjunction with shields. However, shields should not be used as a substitute for following good drift management practices.

Other Considerations

Applicators should always use caution around sensitive sites and spray when wind direction is away from sensitive crops. Follow buffer zones and allow some buffer area that is not sprayed adjacent to sensitive crops or plants. Good communication with neighbors or growers owning adjacent fields can go a long way to reduce the likelihood of problems. Consider the use of drift control additives if possible. Always read the product labels and follow the precautions and recommendations provided for drift management. Remember that ultimately, it is the applicator's decision whether or not to spray.

Tips to Reduce Herbicide Drift

- Spray only when winds are blowing at low speeds, in a predictable direction away from non-target sites, and when gusts are infrequent and do not exceed 10 mph.
- Use larger orifice nozzles and the low end of the pressure range for the particular nozzle to produce large spray droplets.
- Use higher water volumes and increase the nozzle size to increase spray volume instead of increasing pressure to provide higher outputs.
- Lower the boom height while still maintaining the spray pattern and be sure not to travel too fast.
- Avoid spraying during an inversion. Do not spray when wind speeds are less than 3 mph which may suggest that an inversion is present.
- Read and understand the herbicide product label, and follow required buffer zones and spray drift management recommendations.

Sources:
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