TURFGRASS TRENDS

COURSE MANAGEMENT

How to Minimize Spray Drift

Choosing an appropriate nozzle is key to limiting drift and controlling droplet size *By Robert E. Wolf*

The misapplication of any turf care product is a major concern. One form of misapplication is spray drift. Although drift cannot be completely eliminated, drift deposits can be limited by using proper application techniques and equipment.

When drift occurs, the turf care product a superintendent is using is often wasted. Due to the high potential for sensitive areas in turf settings (flowers, water, etc.), damage may occur outside the target area. The off-target damage from products like 2, 4-D and glyphosate will be obvious, while applications of a fungicide or insecticide may not be as noticeable.

Through vapor drift and particle drift, chemicals move downwind, causing damage to the turf setting. Vapor drift is associated with the volatilization of pesticide molecules and their movement off target. Particle drift is the off-target movement of spray particles formed during or after the application. The amount of particle drift depends mainly on the number of small "driftable" particles the nozzle produces. Although tiny droplets provide excellent coverage, decreased deposition and increased drift potential limit the minimum size that will provide effective pest control.

Factors affecting spray drift

Several equipment and application factors determine the amount of spray drift that occurs. Nozzle orientation, spray pressure, boom height, spray volume and nozzle type and size all affect the off-target movement. The ability to reduce drift is only as good as the weakest component in the spraying procedure (See summary of recommended procedures for reducing particle drift injury on the next page.).

The potential for drift must be considered when selecting a nozzle type. Of the many nozzle types available for applying pesticides, some — especially newer nozzles — are specifically designed to reduce drift by decreasing the amount of small driftable spray particles in the spray pattern. However, those who select a nozzle type that delivers larger droplets for maximum drift reduction should know that those nozzles could potentially decrease coverage and efficacy.

Spray height is also an important factor in reducing drift losses. Mounting the boom closer to the ground (without sacrificing pattern uniformity) can reduce

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STRATEGIES TO REDUCE SPRAY DRIFT

RECOMMENDED PROCEDURE	EXAMPLE	EXPLANATION
Select nozzle type that produces coarse droplets.	Turbo Flood, Turbo Flat-fan, Turf Jet, Air-Induction/venturi	Use as large droplets as practical to provide coverage necessary.
Use lower end of pressure range.	Use 20 to 30 psi for Turbo Flood, Turbo Flat-fan, TurfJet. Air-Induction/venturi may require above 40-50 psi or higher.	Higher pressures generate many more small droplets with greater drift potential (less than 150 microns) except for the air induction/venturi designs.
Lower boom height.	Use as low a boom height as possible to maintain uniform distribution.	Wind speed increases with height. A few inches lower boom height can reduce off-target drift.
Increase nozzle size.	If normal gallonage is 30-40 GPA, increase to 60 to 70 GPA.	Larger capacity nozzles will reduce spray depositing off-target.
Spray when wind speeds are less than 10 MPH and moving away from sensitive plants.	Leave a buffer zone if sensitive plants are downwind. Spray buffer zone when wind changes.	More of the spray volume will move off-target as wind increases.
Do not spray when the air is completely calm.	Absolutely calm air generally occurs in early morning or late evening and is usually associated with a temperature inversion.	Calm air reduces air mixing, and leaves a spray cloud that may move slowly downwind at a later time.
Use a drift control additive when needed.	Several conventional polyacrylamides and the newer biodegradable polymers are available.	Drift control additives increase the average droplet size produced by the nozzles.

This summary table provides several strategies which, when used in combination, will result in the best chance to minimize drift. One strategy alone will not necessarily prevent drift. A combination of strategies will provide the best insurance against the off-target movement of the turf protectant product used.

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drift. Nozzle spacing and spray angle determine the correct spray height for each nozzle type. Wide-angle nozzles can be placed closer to the ground than nozzles producing narrow spray angles. Yet, older wide-angle nozzles also produce smaller droplets, somewhat negating the advantages of lower boom height. However, newer wide-angle drift reduction nozzles (air-induction/venturi) are designed to reduce the number of small droplets, and will therefore help to reduce drift as well.

Using nozzles with larger orifices likewise minimizes drift. Increasing the spray volume by using higher capacity spray tips (usually at lower pressures to maintain constant flow rates) results in larger droplets that are less likely to move off target. Lower pressures can also increase droplet size, reducing coverage, while higher pressures and lower flow rate nozzles will lead to more drift by producing finer spray droplets. Changing pressure alone will change the flow rate per nozzle and the overall application rate. The only effective way to reduce drift by increasing spray volume is to increase the nozzle size.

Although not directly an equipment factor, using drift control additives (commonly called deposition aids) in the spray solu-

tion increases spray droplet size, thereby minimizing the potential for drift damage. Tests show that in some cases downwind drift deposits are reduced from 50 to 80 percent with the use of drift control additives. However, in some cases increased drift has occurred when drift control additives were added to the tank mix. Drift control additives constitute a specific class of chemical adjuvants and should not be confused with products such as surfactants, wetting agents, spreaders and stickers. Drift control additives are formulated to produce a droplet spectrum with fewer small droplets.

A number of drift control additives are commercially available, but to be effective they must be mixed and applied according to label directions. Some products are recommended for use at a rate of two to eight ounces per 100 gallons of spray solution. Increased rates may further reduce drift but may cause nozzle distribution patterns to be non-uniform. Drift control additives vary in cost depending on their rate and formulation, but they are comparatively inexpensive for the amount of control they provide. It is wise to test these products in your own spray system to ensure they are working properly before adapting this practice. Not all products work equally for all systems.

Focus on droplet size

From spray equipment catalogs and web sites, most applicators know how to use flow rate charts to determine the nozzle orifice size needed to deliver a proper application volume (GPA or G/1000 sq. ft.).

Applicators are also comfortable in making those applications with the help of an automatic rate controller, which helps improve the uniformity of application volume. However, a properly calibrated sprayer does not guarantee the application will achieve its highest level of efficacy or minimize drift.

The next step in calibration, calibrating for droplet size, is designed to achieve a more uniform droplet spectra, although most applicators are not familiar with it. The step requires applicators to review droplet size charts to choose nozzle types and pressure levels that will meet a specified droplet classification listed on the pesticide label. The droplet size created by a nozzle becomes very important when the efficacy of a particular turf protection product is dependent on coverage or when the minimization of material leaving the target area is a priority. Pesticide manufacturers are beginning to add droplet specifications and spray quality requirements to their labels. Thus, consulting the nozzle manufacturers' droplet sizing charts is essential.

To help applicators select nozzles according to droplet size, spray equipment manufacturers are including drop size charts with their catalogs and websites. The charts classify the droplet size from a given nozzle at various pressure levels according to a standard established by the American Society of Agricultural and Biological Engineers (ASABE). The standard (S-572.1) rates droplets and droplet size categories are color-coded as shown in the chart. Remember, if the label specifies a particular droplet size category, you are required to set up the sprayer to meet that particular spray quality. The label is the law.

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ASABE STANDARD S-572.1 SPRAY QUALITY

CATEGORY	COLOR
Extra Fine (XF)	purple
Very Fine (VF)	red
Fine (F)	orange
Medium (M)	yellow
Coarse (C)	blue
Very Coarse (VC)	green
Extra Coarse (EC)	white
Ultra Coarse (UC)	black

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