Getting the Best Out of Pest Applications

BY KARL DANNEBERGER

"You know, I apply a jug on the front and a jug on the back." Pesticide (herbicide, fungicide and insecticide) sales on golf courses in the United States exceed $300 million annually, with most of these dollars going through a sprayer. Years ago we may have just thrown a product into a spray tank and sprayed it out, without much thought of where it was going or how we might be affecting the efficacy of the product.

However, the pesticides today are characterized by low concentrations of active ingredient, and a high degree of specificity depends on dilution and coverage for efficacy. Spray volume, droplet size, pressure and speed at which pesticides are applied influence efficacy. Optimum efficacy, however, needs to be balanced against the potential for drift and non-target effects.

Spray volume, the amount of water applied to a given area, varies widely depending on the pesticide. It is difficult to draw broad generalizations, such as increasing water volume increases control. Conflicting studies have found that increasing spray volume increases weed control in some cases, while other studies have found either no effect with increasing spray volume or actually a decrease in some cases. It should be mentioned that, where increased weed control has been observed with decreasing spray volume, the proper type and amount of adjuvant was added (Nalewaja and Ahrens, 1998).

Regarding fungicides, spray volume has had little effect on turf disease control (Latin, 1998). Where spray volume has had a minimal effect, the most common nozzle used was the flat fan. Given coverage is adequate and uniform, lower spray volumes can be used.

Droplet size is largely dependent on the nozzle size and pressure. As a rule, the smaller the droplet size the more efficacious the pesticide. However, there are limits on how small droplet size can go. A spray droplet the size of 50 microns (as a reference the thickness of a human hair falls between 75 microns and 100 microns) remains suspended in the atmosphere indefinitely until it evaporates. In this case, the risk of drift is high. Drift is less likely to occur when droplet size is above 200 microns (Zhu et al., 1994). In addition, advances in spray nozzle technology have led to low-drift nozzles that produce less drift when compared to traditional flat fan nozzles.

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In the practical world of golf course management, difficulties often arise when applying these above principles on variable terrain and changing environment conditions. Bouncing up and down a hilly fairway on a spray rig requires on-site decisions. Fortunately, technology-advanced spray equipment has made these decisions easier.

However, the time-honored practices — including calibrating; selecting proper nozzles; and checking for wear, boom height and drift potential — need to be conducted on a regular basis with or without the most advanced sprayers. It's not much different than checking the air in your car tires. You don't have to, but the cost usually shows up in reduced gas mileage and frequent tire replacement.

Finally, going back to the first quote of the article, too many spray decisions are made based on how much is "left in the tank." If not enough is left to complete the front nine, we might speed up to get the coverage or conversely slow down if we have "too much." Needless to say, the impact often manifests itself in variable control. Likewise, reducing spray volume for the purpose of reducing the time necessary to spray (through elimination of multiple fill-ups) can impact control.

With the cost of pesticides and the limits on how much we can apply, is it worth it to be slack on how we apply them?

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