MONSANTO

Backgrounder
Glyphosate and Drift
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Monsanto's glyphosate herbicides, such as Roundup WeatherMax® and Roundup ProMAX®, are non-selective herbicides, meaning that they have the potential to affect many species of plants. Therefore, it is very important that non-target plants are not exposed to direct spray or to spray drift when these herbicides are applied.

Glyphosate has extremely low volatility, which means that it will not evaporate from surfaces such as soil or treated plants and move through the air after application to injure non-target vegetation. However, it is possible, as with any sprayed substance, that spray droplets could drift off-target during application. Research has demonstrated that application procedures and equipment can be optimized to significantly reduce spray drift in most circumstances. Monsanto's product labels state that the applicator should avoid drift to desirable plants and crops.

Pesticides, including herbicides, can be applied using various equipment and techniques as specified on the product label, including aerial application equipment, broadcast boom sprayers, backpack sprayers, and hand-held applicators. Spray drift from any of these techniques can be minimized by taking into account spray droplet size, wind speed, other environmental factors, and application equipment design. When drift does occur, there is a rapid decline in surface deposition with increasing distance from the target site for both ground and aerial applications. An extensive study of spray drift of ground applications has been conducted in Europe, in which pesticide drift at varying distances from the edge of a treated field was measured (Ganzelmeier *et al*., 1995; Ganzelmeier and Rautmann 2000). For field crops, these authors report that at 5 meters from the edge of a treated area, less than 1 percent of the application rate drift was measured (using data from 50 trials). As the distance from the edge of the field increased, the deposition rate declined to 0.10 percent at 30 meters.

Studies have also demonstrated that aerial applications can be made with significantly reduced drift to off-target areas when label instructions are followed. There are a variety of techniques available to aerial applicators to reduce off-target drift, such as swath adjustment, nozzle orientation, and boom height and length. In a forestry application, it has been reported that deposition was typically less than 10% and 1% of the application rate at 25 meters and 75 meters, respectively (Payne *et al*. 1990). It has also been reported that spray deposition decreased to less than 10 percent of the application rate in the first 30 meters downwind, and was less than 5 percent at a distance of 200 meters (Riley *et al*. 1991). An extensive study of drift from aerial, broadcast ground, and orchard applications has been conducted by the Spray Drift Task Force in the United States, and a computer model (AgDrift®) has been developed to predict drift under varying environmental conditions and application equipment configurations (Teske *et al*., 2002).

Anti-pesticide activists sometimes cite a published study which reported that glyphosate drifted up to 400 meters during ground applications and up to 800 meters during aerial applications (Yates *et al*., 1978). These tests were conducted 25 years ago to learn which application methods would minimize drift. Several nozzle and pressure settings were tested, including some that would intentionally lead to off-target drift. Activists have cited results of tested application methods that were not acceptable then or now. Yates *et al*. includes the statement: "Significant reduction in drift losses were obtained with proper application equipment." Activists have also cited another study (Payne and Thompson 1992) to imply problems with aerial drift, but in truth, the authors concluded that, with proper

precautions, the herbicides "could be applied in a wider range of wind speeds than that currently used without causing increased environmental impact in sensitive areas."

The word "sprayer" is actually a misnomer for most aerial herbicide application systems. A better term is "uniform droplet control system." Today's application equipment employs devices similar to hypodermic needles, which create single droplets in rapid succession. The larger the needle, the larger the droplets.

Precision is very important to aerial applicators, and good applicators adhere to guidelines to suspend spraying operations under gusty wind conditions. Professional aerial applicator associations have developed sophisticated training procedures for their members. In situations where desirable vegetation borders a targeted site, aerial applicators typically establish a buffer zone (a distance between the site of application and area to be protected) to minimize effects to non-target vegetation.

References

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