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Factors influencing drift potential

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Abstract
Herbicide drift is a recurring problem in agriculture, and the growing use of postemergence herbicides will increase the potential for off-target injury. Due to the nature of herbicide application, it is virtually impossible to eliminate drift. However, applicators can greatly reduce this risk by using appropriate sprayer equipment and common sense. An article by Mueller and Womac in a 1997 issue of *Weed Technology*(volume 11, pages 639-643) provides useful information on factors that influence drift with glyphosate. The article is entitled "Effect of formulation and nozzle type on droplet size with isopropylamine and trimensium salts of glyphosate." My article will provide a brief summary of a portion of the results reported in their paper.

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The researchers used a laser drop/particle size analyzer to determine the impact of several factors on droplet size with glyphosate applications. Three formulations (Roundup, Roundup Ultra, and Touchdown), three nozzle types (extended range flat fan [XR], Drift Guard [DG], and Turbo TeeJet [TT]), and three spray pressures (20, 40, and 60 PSI) were evaluated.

The data presented in Table 1 are pooled over all other factors (i.e., the data for the XR nozzle represent the average of the three glyphosate formulations sprayed at three pressures). The table shows the percentage of spray volume present in spray droplets less than 191 microns in diameter. The Spraying System catalog states that any droplet less than 200 microns is a potential contributor to drift.

All three factors studied had a significant effect on the percentage of volume found in small droplets. The two new nozzle types designed to minimize drift (DG and TT) reduced the volume of small droplets from 45 percent with the XR tip to 32 percent with the DG tip and to 27 percent with the TT tip. As one would expect, increasing spray pressure resulted in a greater volume of small droplets.

The most interesting finding was that glyphosate formulation influenced droplet size distribution. With Roundup, 29 percent of the spray volume was in droplets less than 191 microns compared with 43 percent with Roundup Ultra. Touchdown was intermediate with 32 percent of the volume found in the small-droplet range.

The authors also reported that several interactions were observed among the factors studied (data not presented here). For example, at 40 PSI the TT nozzle was most effective at reducing small droplets with Roundup Ultra, whereas the DG nozzle was best with Roundup.

When Roundup Ultra was introduced in 1996 there were numerous problems with drift onto adjacent cornfields, resulting in significant crop injury. Because of the number and severity of the problems, many people concluded that the change in formulation (Roundup to Roundup

Ultra) was responsible for the drift problems. The data support this theory because Roundup Ultra resulted in a greater percentage of the spray volume in droplet sizes prone to drift than the other glyphosate formulations. However, this finding does not necessarily mean that the change in formulation was a major factor in the 1996 drift problems. Several other factors were involved that are just as likely to have played a role in this problem. First, much of the corn crop was under considerable stress due to unseasonably cool conditions, thereby making it more prone to injury. The cool, humid weather also would favor greater off-target movement and allow small droplets to stay intact longer prior to evaporation.

Experience with Roundup Ultra in 1997 showed that this product can be used with minimal drift problems. However, as with any product, applicators must take steps to ensure that the sprayer is set up properly (nozzle selection, spray pressure, and boom height) to minimize off-target movement, and they also must use common sense when monitoring weather conditions to avoid problems. Table 1. Effect of several factors on the percentage of spray volume contained in droplets <191 microns in diameter.

Factor		**Percentage of volume in droplets <191 microns**
Formulation	Roundup	29
	Roundup Ultra	43
	Touchdown	32
Nozzle type	XR	45
	DG	32
	TT	27
Spray pressure	20	26
	40	36
	60	42

LSD within each factor = 1.7. From, Mueller and Womac. 1997. Effect of formulation and nozzle type on droplet size with isopropylamine and trimensium salts of glyphosate. Weed Technology 11: 639-643.

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