

## Roundup is More Rainfast than Previously Thought

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Glyphosate products, sold by the brand name of Roundup<sup>®</sup>, are the most commonly used pesticides in the world by a sizeable margin. One of these products, Roundup Pro<sup>®</sup>, is commonly used by turfgrass managers to deal with a variety of management issues, including standard weed control and, perhaps most importantly, turfgrass renovation. Glyphosate-containing products are still the most effective products used to kill bermudagrass. Essentially all turfgrass renovation programs include the use of glyphosate products.


Glyphosate was first synthesized in the mid-1960s by Monsanto. Glyphosate was first sold as Roundup<sup>®</sup> in the mid-1970s for noncropland weed control in the United States, the United Kingdom, and Malaysia. By 1997, Roundup Ready<sup>®</sup> (crop plants genetically modified to withstand Roundup<sup>®</sup> applications) were being commercially planted and currently represent 60% of the U.S. soybean crop. This same technology has been developed in turfgrass species, but these genetically altered turf species have not yet been released.

Turfgrass managers know Roundup<sup>®</sup> to be very effective for controlling a wide range of weeds. The major advantage of Roundup<sup>®</sup> is its effectiveness for control of perennial weeds. This is accomplished because the herbicide is translocated to meristematic tissues and underground structures such as roots, rhizomes, tubers, etc. The product kills plants by interfering with essential amino acid synthesis.

But what are the disadvantages of Roundup<sup>®</sup>? Most turfgrass managers would quickly mention two issues:

(1) Roundup<sup>®</sup> is slow to kill plants, and (2) the herbicide must have a long rain-free or irrigation-free period after application. To state it another way, Roundup<sup>®</sup> is perceived to be not very rainfast. The old Roundup<sup>®</sup> product, and many currently labeled generic glyphosate products, state on the label "rainfall or irrigation occurring within 6 hours may reduce effectiveness." The newest Roundup<sup>®</sup> products in turf (Roundup Pro<sup>®</sup> and Roundup ProDry<sup>®</sup>) state on the label "heavy rainfall soon after application may wash this product off foliage and a repeat application may be required."

Are these statements necessary? And precisely how long does this product need to be on the plant foliage before rainfall or irrigation will reduce effectiveness? Over the last 18 months, this issue has been investigated at the Turfgrass Field Laboratory at North Carolina State University. Tall fescue was sprayed with Roundup<sup>®</sup>, Roundup Pro<sup>®</sup>, Roundup ProDry<sup>®</sup>, and an experimental Roundup<sup>®</sup> formulation; and 0.25 inch (6.4 mm) of irrigation was applied either 15, 30, or 60 minutes after herbicide application.

As noted in the table below, 0.25 inch of irrigation applied as soon as 15 minutes after Roundup<sup>®</sup> application still resulted in more than 90% tall fescue control with 3 of the 4 Roundup<sup>®</sup> treatments. Only the old Roundup<sup>®</sup> formulation failed to provide more than 90% control. When irrigation was applied 30 minutes after application, all Roundup<sup>®</sup> formulations provided at least 95% control of tall fescue. **These data suggest that Roundup<sup>®</sup> is more rainfast than the precautions on the label would suggest.** 

Effects of 0.25 inch of irrigation on tall fescue control 36 days after treatment with four Roundup<sup>®</sup> formulations.

Roundup <sup>®</sup> Formulation	Irrigation Timing (0.25 inch) following Roundup <sup>®</sup> Application			
	no rainfall	15 minutes	30 minutes	60 minutes
% Tall Fescue Control				
Roundup <sup>®</sup>	100	89	95	93
Roundup Pro <sup>®</sup>	100	94	96	99
Roundup ProDry <sup>®</sup>	100	92	96	94
Experimental Roundup <sup>®</sup>	100	96	99	98