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## MAXIMIZING GLYPHOSATE PERFORMANCE

Mike Staton, MSU Extension Agricultural Educator  
Dr. Christy, Sprague, MSU Weed Extension Specialist

Glyphosate applications to Roundup Ready corn and soybeans have proven to be an effective and efficient way to control weeds in these crops. The following recommendations will help you maximize the performance of your glyphosate products.

- Know your glyphosate formulation. You need to know the glyphosate concentration expressed as pounds of acid equivalent (a.e.) per gallon and if the formulation contains a surfactant. If the product does not contain a surfactant, add a non-ionic surfactant at 0.25% by volume. MSU weed scientists have determined that some glyphosate products that include a surfactant will perform better under certain adverse conditions if additional non-ionic surfactant is added at a rate of 0.25% to 0.5% by volume. These products are identified in Table 10 of MSU Extension bulletin E-434 “Weed Control Guide for Field Crops.”
- Always add spray grade ammonium sulfate (17 lbs. of ammonium sulfate per 100 gallons of water) to your spray tank before adding glyphosate. MSU weed scientists evaluated several commercially available water conditioners and found straight ammonium sulfate performed the best.
- Apply glyphosate at the proper rate. Consider weed species and weed heights to determine your application rate. The full rate of glyphosate (0.75 a.e./acre) must be applied to provide consistent control of velvetleaf, common lambsquarters and giant ragweed.

- Increase glyphosate application rates to compensate for larger weeds.

Table 1. Influence of glyphosate application timing on velvetleaf control

Velvetleaf height (inches)	Roundup Weathermax® required for 90% control (oz/acre)
5	28
10	34
21	40

Source: Steven Knezevic, University of Nebraska

- Time your glyphosate application properly. Control barnyardgrass, crabgrass and nightshade before they reach 4 inches tall. Proper timing also reduces yield losses from weed competition. Apply glyphosate before the weeds reach 4 inches tall in corn and narrow row soybeans and before they reach 6 inches tall in soybeans planted in 30 inch rows to minimize yield losses.
- Rain-free periods range from 1 to 6 hours for glyphosate products. Check the product label or the MSU Weed Control Guide for this information and follow the recommendations.
- Avoid making applications during extended periods of hot, dry conditions. Herbicide absorption is decreased due to thickening of the waxy epidermis of the leaves of certain weed species.



- Research has proven that early morning and late evening applications result in reduced glyphosate activity. Don't spray velvetleaf after the leaves have begun to tip in the evening. If you must spray in the early morning or late evening, select fields having smaller more sensitive weeds or increase the glyphosate rate.
- Let the dew evaporate prior to applying glyphosate.
- Avoid glyphosate antagonism when making foliar applications of manganese to soybeans. The surest method for achieving maximum weed control and alleviating manganese deficiency symptoms is to make separate applications of manganese sulfate and glyphosate. Always apply the glyphosate at least three days before the manganese. If you must mix manganese and glyphosate in the same tank, make sure to use the chelated manganese (Mn-EDTA) after ammonium sulfate has been added to the tank. Do not use other chelated materials as some of these have demonstrated significant antagonism. Mn-EDTA must be applied at lower rates to avoid burning soybean leaves so more than one application may be required.

This fact sheet was originally produced by the Soybean 2010 project and will be updated as needed by its successor, the Soybean Management and Research Technology (SMaRT) program. The SMaRT program was developed to help Michigan growers increase soybean yields and farm profitability. Funding for SMaRT is provided by MSU Extension and the Michigan Soybean Promotion Committee. Additional information about increasing soybean yields and profitability can be found online at <http://www.michigansoybean.org>.

#### Reference Materials:

“Understanding Glyphosate to Improve Performance”, R. Hartzler, Iowa State University, C. Boerboom, University of Wisconsin, G. Nice, Purdue University and P. Sikkema, University of Guelph.