

TIME OF DAY EFFECT ON GLYPHOSATE EFFICACY. Keith Mohr and Reid J. Smeda, Graduate Research Assistant and Assistant Professor, Agronomy Department, University of Missouri, Columbia, MO 65211.

Under some conditions, glyphosate efficacy has been reported to decrease when evening applications were made. Several studies have suggested diurnal leaf movements as a possible reason for reduced control. However, reduced control has also been observed on species that exhibit little to no diurnal leaf movement.

Greenhouse studies were conducted to determine the effect of glyphosate rate and velvetleaf leaf angle on time of day applications. Velvetleaf were grown in a 14 h photoperiod (starting at 06:00 h). On 4-leaf stage plants, 0.01 or 0.042 kg ae/ha glyphosate was applied; only 0.042 kg/ha glyphosate was used for the leaf angle study. Application time and corresponding leaf angle (in degrees) were 14:00 (-10), 17:00 (-10), 18:30 (-30), 19:15 (-60), and 20:00 h (-80). Leaf angle was measured as follows: 0 degrees = leaf parallel to ground, -90 degrees = leaf perpendicular to ground. Pipe cleaners were used in the leaf angle study to mechanically manipulate leaf angle. In one series of treatments, leaf angle was manipulated to correspond with each angle above and all treatments were sprayed at 14:00 h. In another series, leaf angle was held constant at -10 degrees and sprayed at the above stated times. In the final series of treatments, leaf angle was not manipulated, and herbicide applications were sprayed at each of the above times.

Plant biomass increased as glyphosate applications were delayed toward evening regardless of glyphosate rate or leaf angle. At 0.01 and 0.042 kg/ha glyphosate, biomass increased over 25 and 75%, respectively, between 14:00 and 20:00 h applications. In the leaf angle study, leaf angle alone accounted for 82% of the differences in efficacy compared to the control. When leaf angle was held constant, application time of day accounted for 17% of the difference in efficacy compared to the control. These data indicate that the time of day effect is not overcome by glyphosate rate and that leaf angle results in the greatest decline in glyphosate efficacy. Leaf angle alone, however, does not completely account for reduced glyphosate efficacy, suggesting that some physiological process(es) may be involved.