

A TWO YEAR STUDY ON THE RESPONSE OF COMMERCIAL PROCESSING TOMATOES TO SIMULATED GLYPHOSATE DRIFT. Greg R. Kruger, William G. Johnson, and Stephen C. Weller, Graduate Research Assistant, Associate Professor, Department of Botany and Plant Pathology, Professor, Department of Horticulture and Landscape Architecture, Purdue University, West Lafayette, IN 47907.

Herbicide drift on vegetable crops is a major concern for vegetable growers. In Indiana 3,250 ha of processing tomatoes are grown annually and they often are located near glyphosate resistant corn or soybean fields. Because of the widespread use of glyphosate for post-emergence weed control, it is important to understand how glyphosate drift impacts tomato growth, development, and yield. The purpose of this study was to determine the effect of glyphosate drift on processing tomato yields. The dose response study was conducted in Lafayette, IN in 2007 and 2008 with two tomato cultivars (331 and 611) and two timings of glyphosate application (2 weeks and approximately 5 weeks after transplanting). The simulated drift rates of glyphosate were $1/3^{\text{rd}}$, $1/10^{\text{th}}$, $1/30^{\text{th}}$, $1/100^{\text{th}}$, $1/300^{\text{th}}$, and $1/1000^{\text{th}}$ based on an X rate of 0.64 kg ae/ha of glyphosate. Treatments were applied with a backpack sprayer delivering 140 l/ha at 117.2 kPa of pressure. Spray solutions contained 2.8 kg/ha of AMS and 0.25% v/v NIS with the glyphosate. Crop injury, yield (both red fruit and green fruit), and flower loss were evaluated. Data were analyzed using non-linear log-logistic modeling in R and pooled across years and cultivars. There were significant differences between the first herbicide timing and the second timing for flower loss, red fruit yield, and total fruit yield. A 25% flower loss occurred at 0.0511 kg ae/ha ($\sim 1/12^{\text{th}}$ of 0.64 kg ae/ha) at the first timing and at 0.0075 kg ae/ha ($\sim 1/85^{\text{th}}$ of 0.64 kg ae/ha) for the second timing. A 25% reduction in red fruit weight occurred at 0.0439 kg ae/ha ($\sim 1/15^{\text{th}}$ of 0.64 kg ae/ha) for the first timing and at 0.0085 kg ae/ha ($\sim 1/75^{\text{th}}$ of 0.64 kg ae/ha) for the second timing. Glyphosate drift at the early bloom (approximately 5 weeks after transplanting) lead to greater fruit loss than drift onto tomato plants in the vegetative stage (2 weeks after transplanting). Glyphosate drift delayed fruit ripening even at very low drift rates (approximately $1/8^{\text{th}}$ of 0.64 kg ae/ha for the first timing and $1/91^{\text{st}}$ of 0.64 kg ae/ha for the second timing) indicating that tomatoes are very sensitive to glyphosate.