RESPONSE OF PROCESSING TOMATOES TO SIMULATED DRIFT OF DICAMBA AND GLYPHOSATE. Stephen C. Weller, Ben Alkire, Triston Tucker and Greg Kruger Professor, Research Associate and Graduate Research Assistants, Purdue University, West Lafayette, IN 47907.

Simulated drift studies with either dicamba or glyphosate were conducted in 2007 in Indiana to assess the potential for damage from off-site movement of these two herbicides. The study used tomato cultivar 611 which is a commonly grown processing variety of tomato in the Midwestern US. Experiments were initiated to gather more quantitative data relating to the time of drift related to crop growth stage and any effects the timing of drift or the amount of drift had on crop growth, development, and yield.

Tomato plants were transplanted on May 3, 2007 and simulated drift treatments were made to separate groups of plants 20 and 48 days after transplanting. These timing were selected based on usual spray dates of these herbicides in agronomic crops. These timings were also selected to determine what effect herbicide drift had on tomatoes that had recovered from transplant shock (20 DAP) or had initiated flowering (48 DAP). Dicamba and glyphosate treatments were 0.33X, 0.1X, 0.033X, 0.001X, 0.003X and .0001X with X being the normal use rate for either herbicide. Dicamba X rate was 0.56 kg/ha (1.18L ae/ha) and glyphosate X rate was 0.875 kg/ha (1.48 ae L/ha). The glyphosate formulation used did not contain any additives. AMS and non-ionic surfactant were added to each drift concentration spray at 2.8 kg/ha and 0.25% respectively. All sprays were applied over the top of the tomatoes with a CO_2 pressurized backpack sprayer at 270 L/ha spray volume at 165 kPa. The experiment was a split plot with timing being the main plot and rate being the subplot. Measurements taken were crop injury at 1 and 2 weeks after treatment and final crop yield.

Timing of the drift incident was a significant factor for both herbicides as was rate response. Glyphosate applied to plants 20 DAP caused greater visual injury but less loss of fruit yield at all drift rates than treatments applied at 48DAP. Injury was observed as plant death at 0.33X and severe yellowing of the plants up to 0.01X for both timings. Reduction in ripe fruit at the time of harvest was most severe for the 48 DAP treatment. For instance, a 50% reduction in ripe fruit at time of harvest required a rate of 0.18X at 20 DAP but only a 0.04X rate at 48 DAP. Dicamba pattern of plant injury, primarily epinasty, was apparent at both application timings at all rates but more severe at rates above 0.003X. As with glyphosate, the pattern of yield loss was greater with 48 DAP treatments than from 20 DAP treatments. The biggest difference between the two herbicides was that dicamba drift at 48 DAP caused more severe yield loss at much lower rates than glyphosate. A 50% reduction in ripe fruit was caused by a drift rate of 0.01X at 48 DAP while at 20 DAP a rate of 0.11X was required. Results of this study show that timing of drift is important in the total amount of fruit yield reduction observed. Drift early in the season causes problems, however, a drift incident at the time of flower formation results in the greatest delay in fruit maturity and loss of fruit yield.

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