

TECHNIQUES TO EVALUATE SWEET CORN TOLERANCE TO NICOSULFURON AND MESOTRIONE. Dean S. Volenberg, Tim L. Trower, Chris M. Boerboom, and William F. Tracy, Postdoctoral Research Associate, Research Specialist, Professor, and Professor, Univ. of Wisconsin-Madison, Madison, WI 53706.

Few effective herbicide options exist for Midwest sweet corn producers. Although there are numerous effective herbicide options for field corn, these herbicides may severely injure sweet corn. Nicosulfuron is the only postemergence grass herbicide labeled for use in sweet corn. However, nicosulfuron is only labeled for use on 37 hybrids of processing sweet corn. Another herbicide option for sweet corn producers is mesotrione once it becomes labeled for use in sweet corn. Sweet corn hybrids have tolerance to mesotrione when applied preemergence, whereas certain sweet corn hybrids are injured when mesotrione is applied postemergence. Several field studies have examined sweet corn hybrid tolerance to nicosulfuron and mesotrione and identified tolerant sweet corn hybrids. A limitation of these tolerance studies is that they perpetuate field studies, which are often influenced greatly by environmental conditions and may provide inconsistent results. These studies also fail to provide critical information to sweet corn breeders so they can make selections that have known levels of herbicide tolerance. Therefore, our objectives were to develop techniques which could consistently differentiate tolerant and susceptible sweet corn hybrids to nicosulfuron and mesotrione.

A ragdoll technique was evaluated as a technique to distinguish tolerant and susceptible sweet corn hybrids to nicosulfuron. The hybrids tested were Bonus, GG202, GG214, GH2547, 2038, Merit, and SS Jubilee. Twenty five seeds of each hybrid were soaked in 0, 1, 2, 4, 6, and 8 ppm ai nicosulfuron for 24 h at  $25\pm 1$  C. After 24 h, the remaining solution was drained from the seeds. Seeds were placed equidistant on two layers of water-saturated #38 germination paper (25.5 x 38.5 cm) and then covered with another sheet of water saturated germination paper. Sheets containing seeds were rolled up and placed in a  $25\pm 1$  C growth chamber for 5 d. Hypocotyl length was quantified. The hypocotyl lengths were compared against the length of nontreated hypocotyls and Fishers protected LSD was used to separate treatment means. The experiment was repeated three times.

A field study across different environments was conducted to determine if specific mesotrione treatments could consistently distinguish tolerant and susceptible sweet corn hybrids. The hybrids tested were SS Jubilee, Dynamo, GH1861, 610, GH2547, and Bonus. Sweet corn hybrids were treated at the V2 stage with mesotrione at 0.1, 0.2, and 0.3 kg ha<sup>-1</sup> containing 1% v/v crop oil concentrate (COC) or 1% v/v COC and 2.5% v/v urea-ammonium nitrate (UAN). A visual assessment of percent chlorosis as compared with the nontreated control was taken 4 to 6 d after application. The experiment was repeated three times.

The ragdoll technique consistently distinguished nicosulfuron-tolerant from-susceptible sweet corn hybrids. Bonus and GG214 were the most tolerant, whereas Merit was the most susceptible at all concentrations of nicosulfuron. Nicosulfuron at 1 ppm provided the greatest separation among hypocotyl lengths. The order from most to least tolerant at 1 ppm was Bonus>GG214>GG202>SS Jubilee>2038>2547>Merit.

Mesotrione at 0.3 kg ha<sup>-1</sup> with adjuvants of COC and UAN was consistent in distinguishing tolerant and susceptible sweet corn hybrids. The addition of UAN at 2.5% v/v to the spray solution increased the severity of mesotrione chlorosis to sweet corn. However, without the addition of UAN to the spray solution, it was more difficult to distinguish tolerant from susceptible hybrids. GH2547, 610, and Bonus had greater mesotrione tolerance than SS Jubilee, GH1861, and Dynamo.

In the future, we propose to develop F<sub>2</sub>, S<sub>1</sub>, and S<sub>2</sub> populations from these hybrids and study the inheritance of herbicide tolerance using the above techniques. Information on inheritance can then be provided to breeders in the sweet corn industry.