INTERACTIONS BETWEEN MESOTRIONE AND ATRAZINE IN A VELVETLEAF BIOTYPE WITH METABOLISM-BASED ATRAZINE RESISTANCE. Andrew J. Woodyard, Josie A. Hugie, and Dean E. Riechers, Graduate Students, and Associate Professor, Department of Crop Sciences, University of Illinois, Urbana, IL 61801.

The joint activity of mesotrione and atrazine can display synergistic effects on the control of both triazine-sensitive (TS) and site of action-based triazine-resistant (TR) broadleaf weeds in a tank mix. However, little is known about this interaction in weed biotypes displaying metabolism-based atrazine resistance (AR). The first objective of this study was to evaluate a preemergence application of atrazine followed by a postemergence application of mesotrione for potential interactions in both site of action-based TR redroot pigweed and metabolism-based atrazine-resistant (AR) velvetleaf. Results from these sequential experiments demonstrated that synergism was detected in reducing biomass of the TR redroot pigweed but was not observed in the AR velvetleaf with metabolism-based resistance. The second objective was to evaluate the joint activity of mesotrione and atrazine in a tank mix on the AR velvetleaf biotype. Greenhouse studies and whole-plant chlorophyll fluorescence imaging were used to determine if synergism is achievable in the metabolism-based AR biotype. Greenhouse studies indicated that synergism resulted from a tank mix with a constant mesotrione rate of 3.2 g ai ha^{-1} in mixture with atrazine ranging from 126 to 13,440 g ai ha^{-1} in the AR velvetleaf. Chlorophyll fluorescence imaging also revealed a synergistic interaction in the AR velvetleaf when 3.2 g ai ha^{-1} of mesotrione was paired with 126 g ai ha^{-1} of atrazine beginning 36 h after treatment and persisting through 72 h.

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