RESISTANCE TO ALS INHIBITORS IN SELECTED COMMON RAGWEED POPULATIONS FROM THE MIDWEST. Danman Zheng, William L. Patzoldt, and Patrick J. Tranel, Graduate Research Assistant, Graduate Research Assistant, and Associate Professor, Department of Crop Sciences, University of Illinois, Urbana, IL 61801.

Several common ragweed populations previously were reported resistant to the methyl ester of cloransulam, an acetolactate synthase (ALS)-inhibiting herbicide. Subsequent research revealed that resistance to cloransulam in at least one population was conferred by an altered herbicide target site; specifically, by a leucine-for-tryptophan substitution at amino acid position 574 of ALS. Research was conducted to determine if this substitution was correlated with resistance to ALS inhibitors in other common ragweed populations.

Sixteen plants from each of 22 common ragweed populations originating from eight Midwestern states were treated with either cloransulam at 17.5 g ai ha^{-1} plus 1% (by vol) COC and 2.5% (by vol) UAN, or imazamox at 44 g ae ha^{-1} plus 1% COC and 2.5% UAN. Dry weights were obtained 20 days after treatment and compared to eight plants from each population treated with 1% COC and 2.5% UAN only. A plant was considered resistant if its dry weight was at least 30% relative to the non-herbicide-treated controls. Each of the herbicide-treated plants also was assayed to determine whether its *ALS* alleles contained leucine or tryptophan codons at position 574 (designated L574 and W574 alleles, respectively) by using allele-specific primers in PCR reactions.

Based on herbicide efficacy data, the 22 common ragweed populations were classified into three groups: sensitive to both herbicides (six populations), resistant to both herbicides (ten populations), and resistant to imazamox but not to cloransulam (six populations). Of the 352 plants analyzed for cloransulam resistance, 21% (75) were resistant and all but two of these resistant plants contained at least one L574 allele. Of the 352 plants analyzed for imazamox resistance, 44% (156) were resistant; however, nearly half (74) of these resistant plants did not contain an L574 allele. Whether or not the L574 allele corresponded with imazamox resistance was population dependent. There were five populations in which the presence of L574 alleles corresponded with imazamox resistance on a plant-by-plant basis, and 11 populations in which one or more imazamox-resistant plants did not contain an L574 allele. Plants with imazamox resistance but without L574 alleles are being investigated further to determine if they contain ALS substitutions previously shown to confer imidazolinone-specific resistance. Summed across both herbicides, 1% (5) of the plants scored as sensitive unexpectedly contained an L574 allele. A conclusion from this study is that an L574 allele is the predominant basis for cloransulam resistance in common ragweed; however, other mechanisms of resistance to ALS inhibitors, particularly to imazamox (and likely other imidazolinones), are also frequent in common ragweed.

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