

**Investigations on the Interactions of Acetolactate Synthase (ALS)-Inhibiting
Herbicides with Growth Regulator and non ALS-Inhibiting Herbicides
in Corn (*Zea mays*) and Selected Weeds**

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(ABSTRACT)

Herbicide combinations are common in corn production in the United States to control broadleaf and grass weed species. Studies were conducted in 1995 and 1996 to: (1) investigate the interactions of 2,4-D and dicamba with halosulfuron-methyl on common lambsquarters and common ragweed control in corn, (2) determine the effect of 2,4-D on the foliar absorption, translocation, and metabolism of ¹⁴C halosulfuron-methyl in common lambsquarters, (3) examine the interactions of 2,4-D, dicamba, and ALS-inhibitor herbicides with rimsulfuron plus thifensulfuron-methyl (RT) and with sethoxydim on giant foxtail, common ragweed, and common lambsquarters control in corn. Combinations of halosulfuron-methyl with 2,4-D or dicamba were generally additive in their effects on common lambsquarters and common ragweed control, and were occasionally synergistic on common lambsquarters. Synergistic herbicide interactions in the greenhouse were observed with 2,4-D (17 g/ha) and halosulfuron-methyl (18 g/ha) and 2,4-D (70 g/ha) in combination with halosulfuron-methyl at 4.5 and 36 g/ha, respectively. Absorption and translocation of ¹⁴C-halosulfuron-methyl were not influenced by the addition of 2,4-D, with absorption increasing with time. Three unknown halosulfuron-methyl metabolites (M1, M2, and M3) with R_f values of 0.0, 0.97, and 0.94, respectively, were isolated. The addition of 2,4-D increased the level of M3 at the 18 g/ha halosulfuron-methyl rate, which may contribute to common lambsquarters phytotoxicity. Antagonism on giant foxtail control was observed with all combinations of RT and 2,4-D. Tank mixtures of RT with flumetsulam plus clopyralid plus 2,4-D, atrazine, 2,4-D, and dicamba plus atrazine controlled giant foxtail greater than or equal to 78% 65 (DAT). RT mixed with flumetsulam plus clopyralid plus 2,4-D injured corn 26%, and yields were reduced 34% when compared to RT alone. Giant foxtail control from sethoxydim tank-mixed with bentazon plus atrazine with urea ammonium nitrate (UAN), or with ALS-inhibiting herbicides except halosulfuron-methyl in combination with 2,4-D was 24% lower when averaged over treatments. Yields of sethoxydim-resistant (SR) corn treated with sethoxydim mixed with combinations of sulfonyleurea herbicides plus 2,4-D were low, with the exception of the combination halosulfuron-methyl with sethoxydim and 2,4-D. These studies indicate that thoroughly understanding postemergence (POST) corn herbicide tank mixtures is crucial for effective weed management.