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Sweet Corn Herbicide Study

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Abstract
Weed control in sweet corn is very important since the competition they create reduces yield and quality factors such as ear size and tip fill. Weeds filling row centers can also interfere with pest control sprays and make harvesting more difficult. Herbicides are an important tool in weed management programs and in April 2005, the EPA registered the use of Callisto in sweet corn. To help growers utilize this new product effectively, we looked at different combinations and application timings of Callisto with the herbicides Dual II Magnum and AAtrex 4L for crop safety and weed control effectiveness.

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Introduction

Weed control in sweet corn is very important since the competition they create reduces yield and quality factors such as ear size and tip fill. Weeds filling row centers can also interfere with pest control sprays and make harvesting more difficult. Herbicides are an important tool in weed management programs and in April 2005, the EPA registered the use of Callisto in sweet corn. To help growers utilize this new product effectively, we looked at different combinations and application timings of Callisto with the herbicides Dual II Magnum and AAtrex 4L for crop safety and weed control effectiveness.

Materials and Methods

This study followed a crop of soybeans and was located on a loamy sand soil with 2.5% organic matter and a soil pH of 6.2. The trial design was a randomized complete block with herbicide, the plots consisting of six rows 30 ft long. The selected cultivar was Providence. The trial was planted on May 3, 2005, with a JD 7000-row crop planter set at 30 in. row spacing and seeds placed approximately 1.5 in. deep. Stand counts were taken on June 1 and plots thinned to equal plant population of 24,200/acre or approximately one plant every 8.6 inches. Dry fertilizer (50 lb nitrogen [N] and 120 lb potassium [K_2O]) was broadcast and incorporated before planting. An additional 80 lb of N (urea) was broadcast over the top of the plants on June 3 and another 30 lb N applied through irrigation on June 29. Soil was kept uniformly moist by overhead irrigation and rainfall. Weed control after planting was due entirely to herbicide treatments—the plots were not cultivated or hoed. Herbicide treatments were applied with a CO_2 backpack sprayer at a pressure of 35 psi in a volume of water to equal a rate of 15 gallons/acre. Preemergence (PRE) treatments were applied on May 4, the day after planting, to a dry soil surface with sun shining and 55^{o}F air temperature. The plot area received 0.2 in. of rainfall on May 8 and 1.2 in. between May 11 and 14, helping to incorporate herbicide into the soil. Early postemergence (EARLY POST) treatments were applied on May 30 when corn was at the V3 stage of growth. Weather conditions were sunny, 72^{o}F, and soil and plant surfaces dry. Late postemergence herbicide treatments were applied on June 10 when corn was approximately 24 in. tall and at the V6 growth stage. Time of application was 10:00 a.m. with cloudy skies, moist soil surface, air 80^{o}F, and humid conditions with south winds at 3 to 5 mph. Primary weeds in the plot area were crabgrass, yellow foxtail, carpetweed, pigweed, velvetleaf, and lamb's quarter.

Results and Discussion

Applying Dual II Magnum PRE resulted in good grass control but plots full of broadleaf weeds, particularly velvetleaf, lamb's quarter, and pigweed. The weed competition was so strong that it cut yield by half and caused ears to be smaller with unfilled ear tips (Table 1). Additionally, when Callisto was used by itself, treated plots exhibited good broadleaf, but poor grass weed, control. Full-spectrum weed control was achieved in this study only when products were tank-mixed before application. Excellent, season-long weed control was obtained with the PRE treatments of Dual II Magnum + Callisto and Dual II Magnum + Callisto + AAtrex 4L. An important attribute of these treatments is their efficiency. They can be put on right after planting, while the prepared ground is still

weed-free, and they provide season-long weed control in one herbicide application. However, we also achieved excellent season-long weed control by applying Dual II Magnum PRE followed by an EARLY POST application of Callisto or Callisto + AAtrex 4L. These two EARLY POST treatments were very effective at killing any small broadleaf weeds present at the time of application. The Dual II Magnum + AAtrex 4L (applied either PRE or EARLY POST) treatment provided good weed control except for velvetleaf. It was quite obvious under the conditions of this study that Callisto was more effective at controlling velvetleaf than AAtrex 4L or Dual II Magnum.

Our evaluation also included two tank-mix treatments of Dual II Magnum + Callisto and Dual II Magnum + Callisto + AArex 4L applied either EARLY POST or LATE POST (no PRE herbicide applied). The EARLY POST treatments were applied on May 30 when Providence was at the V3 growth stage (three-leaf collars present) and weeds were less than 3 in. tall, while the LATE POST treatments were applied on June 10 when Providence was at the V6 growth stage. The EARLY POST treatment worked reasonably well with observations at harvest noting that broadleaf weed control was excellent and grass control fair to good. Many of the small grass plants were stunted but not killed from this application timing. Dual II Magnum worked best when used as a weed preemergence herbicide in this study. Note that yields in Table 1 for the EARLY POST treatments were some of the best in the trial. When the LATE POST treatments were applied, both grass and broadleaf weeds were almost as high as the corn, 4 to 10 in. tall. This timing wouldn't normally occur in a grower's field except under extreme "rescue" circumstances. Not unexpectedly, because of the size of the weeds at application, grass control was poor and broadleaf control was only fair to possibly good in some plots. No visible herbicide injury was seen on sweet corn plants after these late treatments, but it is likely that the weed competition damaged yield.

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Table 1. Marketable yield and ear characteristics for herbicide treatments.

Preemergence (PRE) herbicide treatments	Postemergence herbicide treatments	Dozen ears/acre	Yield (cwt/A)	Husked Ear Weight (lb)	Husked Ear Length (in.)	Husked Ear Dia. (in.)	Husked Ear Tip fill
PRE (5/4)							
Dual II Magnum (1.33 pt)	None	831	69.1	.41	8.1	1.60	2.7
Callisto (6.0 oz)	None	1,721	145.9	.49	8.3	1.70	2.6
Dual II Magnum (1.33 pt) AAtrex 4L (2.0 pt)	None	1,585	142.5	.51	8.5	1.71	2.9
Dual II Magnum (1.33 pt) AAtrex 4L (1.0 pt) Callisto (6.0 oz)	None	1,914	180.3	.53	8.7	1.73	3.0
Dual II Magnum (1.33 pt) Callisto (6.0 oz)	None	1,991	182.6	.55	8.5	1.76	2.9
PRE & EARLYPOST (5/30)							
Dual II Magnum (1.33 pt)	AAtrex 4L (2.0 pt)[1]	1,798	154.3	.50	8.4	1.68	3.0
Dual II Magnum (1.33 pt)	Callisto (3.0 oz)[1]	2,011	194.2	.55	8.8	1.73	3.0
Dual II Magnum (1.33 pt)	AAtrex 4L (1.0 pt) Callisto (3.0 oz)[2]	2,107	201.8	.54	8.6	1.73	3.0
EARLYPOST (5/30)							
None	Dual II Mag (1.33 pt) Callisto (3.0 oz)[2]	2,069	187.5	.52	8.6	1.71	2.9
None	Dual II Mag (1.33 pt) AAtrex 4L (1.0 pt) Callisto (3.0 oz)[2]	2,011	183.3	.53	8.6	1.72	3.0
LATE POST (6/10)							
None	Dual II Mag (1.33 pt) Callisto (3.0 oz)[2]	1,624	134.8	.48	8.3	1.67	2.9
None	Dual II Mag (1.33 pt) AAtrex 4L (1.0 pt) Callisto (3.0 oz)[2]	1,779	159.2	.50	8.5	1.71	2.6
Average		1,787	161.3	.51	8.5	1.70	2.9
LSD 5%		372	36.9	.04	.3	.07	.1

[1]Crop oil concentrate added to equal 1.0% of spray volume (1 gal/100 gal).
[2]Non-ionic surfactant added to equal 0.25% of spray volume (1 qt/100 gal).
Dual II Magnum=s-metolachlor (7.64 lb active ingredient/gallon, 1.33 pt=1.27 lb a i).
AAtrex 4L=atrazine (4 lb active ingredient/gallon, 1.0 pt=0.5 lb a i).
Callisto=mesotrione (4 lb active ingredient/gallon, 3 oz=.09 lb a i).