WEED CONTROL AND CROP RESPONSE WITH HERBICIDES APPLIED IN CORN

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Introduction

Weed control is important in corn production to reduce competition to the crop and reduce the production of weed seeds for future crops. Field trials were conducted to evaluate postemergence herbicides for weed control and crop tolerance in furrow-irrigated field and sweet corn. Distinct is a selective postemergence herbicide providing control of annual broadleaf weeds in field corn. In general, field corn is very tolerant to Distinct application. However, temporary injury may result under conditions of crop stress or rapid growth. A trial was conducted to evaluate sweet corn tolerance to postemergence applications of Distinct. Two formulations of an experimental herbicide were evaluated for weed control and crop tolerance compared to currently registered herbicides in field corn.

Methods

General

The soil for the field trials was an Owyhee silt loam with a pH of 8.0, an organic matter content of 1.2 percent, and a cation exchange capacity of 15 meq/100g of soil. Plots measured 10 by 30 ft and were arranged in a randomized complete block having four replicates. Both trials were sidedressed on April 27 with 80 lbs N/acre as 46 percent urea, 8 lbs/acre Zn, and 1 lb/acre each of B, Cu, and Mn. Herbicide treatments were applied with a CO_2-pressurized backpack sprayer calibrated to deliver 20 gal/acre at 30 psi. Data were analyzed using ANOVA, and treatment means were separated using Fishers protected LSD (0.05).

Weed Control in Field Corn

A trial was conducted at the Malheur Experiment Station comparing registered and experimental herbicides for weed control and crop safety in field corn. Novartis variety 'NK N3030' field corn was planted with a John Deere model 71 Flexi Planter on May 1. Seed spacing was one seed every 7 inches on 30-inch rows. Percent corn injury and percent weed control were evaluated throughout the growing season. Corn yield was determined October 4 by harvesting ears from 15-ft sections of the center two rows in each plot. On November 13 harvested ears were threshed and dry weight of the grain recorded. Grain yields were adjusted for 12 percent moisture.

Treatments included an Aventis numbered product in two formulations, AE F130360 WG70 and AE F130360 WG62. AE F 130360 WG 70 was applied at 0.066 lb ai/acre and AE F130360 WG62 was applied at 0.068 lb ai/acre. All treatments when AE

F130360 WG70 or AE F130360 WG62 were applied alone or in tank mix combinations included methylated seed oil (MSO) at 1.0 percent v/v and 32 percent N as urea at 2.5 percent v/v. AE F130360 WG70 was applied in combination with Distinct, Outlook, or Callisto as a tank mix. Distinct was applied alone with MSO and 32 percent N. Steadfast and Basis were applied alone with a crop oil concentrate (COC) at 1.0 percent v/v and 32 percent N. Dual II Magnum was applied preemergence followed by Callisto, MSO, and 32 percent N postemergence. Preemergence applications occurred on May 3 and all postemergence applications occurred on May 29 to 8-inch corn.

Sweet Corn Tolerance to Distinct

A trial was established at the Malheur Experiment Station to evaluate sweet corn tolerance to Distinct herbicide. 'Golden Jubilee' sweet corn was planted in 30-inch rows at a population of 29,300 seeds per acre with a John Deere model 71 Flexi Planter on May 1. Sweet corn injury and weed control were evaluated throughout the season. Corn was harvested from 20-ft sections of the two middle rows in each plot on August 6. After total plot yields were determined, a subsample of 10 ears was taken from each sample, the husks were removed, and the weight recorded. The length and diameter of each ear also was measured.

Distinct was applied as a total postemergence treatment or following preplant-incorporated or preemergence applications. Preplant-incorporated treatments consisted of Eradicane (3.14 lb ai/acre) alone or Eradicane plus AAtrex (0.75 lb ai/acre) applied on April 30. Preemergence applications of Prowl (0.83 lb ai/acre) and Outlook (0.66 lb ai/acre) were applied on May 3. Postemergence treatments applied on May 29 consisted of Distinct applied at either 0.0875 or 0.175 lb ai/acre plus a non-ionic surfactant (NIS) (0.25 percent v/v) with or without 32 percent N (1.25 percent v/v) or Basagran (0.75 lb ai/acre).

Results

Weed Control in Field Corn

On June 14, all treatments except Dual II Magnum applied preemergence followed by Callisto had crop injury that was significantly greater than the untreated check (Table 1). AE F130360 WG70 plus Distinct ranked among the highest in injury (25 percent) and showed significantly higher injury than AE F130360 WG70 plus Outlook and Steadfast or Basis alone. All treatments with either AE F130360 WG70 or AE F130360 WG62 had injury ratings between 19 and 25 percent. On June 28, 30 days after treatment (DAT), Steadfast, Distinct, and AE F130360 WG70 applied alone provided significant crop injury (15-23 percent).

On June 28, redroot pigweed control ranged from good to excellent (82-97 percent) with all treatments (Table 1). The addition of AE F130360 WG70 to Distinct significantly increased both redroot pigweed and barnyardgrass control compared to Distinct applied alone. Outlook provided greater control of redroot pigweed compared with Callisto when both were applied in a tank-mix with AE F130360 WG70. However, with the same treatment combinations Callisto provided greater control of common

lambsquarters than Outlook. Only Dual II Magnum followed by Callisto and AE F130360 WG70 plus Callisto provided common lambsquarters control above 90 percent. AE F130360 WG70, Steadfast, and Basis when applied alone provided poor control of common lambsquarters (47-62 percent). Hairy nightshade control with Basis was significantly lower than all other treatments except Steadfast. All treatments that included either AE F130360 WG70 or AE F130360 WG62 provided good barnyardgrass control (88-96 percent). Dual II Magnum followed by Callisto and Distinct applied alone did not adequately control barnyardgrass.

All treatments increased yield significantly over the untreated check. There were no statistical differences in yield between any of the herbicide treatments.

Sweet Corn Tolerance to Distinct

Crop injury was apparent with all treatments on June 15 (17 DAT) and June 28 (30 DAT) (Table 2). In general, crop injury from postemergence applications of Distinct was similar regardless of rate. Injury was greater on both evaluation dates when 32 percent N was added to postemergence applications of Distinct (0.088 and 0.175 lb ai/acre) plus NIS following Eradicane plus AAtrex. Injury was greater on June 28 with the addition of 32 percent N to Distinct (0.175 lb ai/acre) plus NIS and with 32 percent N added to Distinct (0.175 lb ai/acre) plus NIS following a preplant-incorporated application of Prowl plus Outlook.

Regardless of Distinct rate, weed control was similar with total postemergence treatments of Distinct plus NIS (Table 2). However, when 32 percent N was added to these treatments, both redroot pigweed and common lambsquarters control was greater with Distinct at the higher rate of 0.175 lb ai/acre. In general, weed control was greater with treatments including preplant-incorporated or preemergence applications compared to total postemergence treatments.

Corn yield with postemergence treatments was among the lowest with Distinct (0.088 lb ai/acre) plus NIS and was most likely due to poor barnyardgrass control (Table 2). The addition of 32 percent N to this treatment increased yield by 37 cwt/acre. Corn yields from herbicide treatments ranged from 135 to 184 cwt/acre and were greatest with postemergence treatments including 32 percent N and treatments including either a preemergence or preplant-incorporated application followed by a postemergence application. There were no differences in cob diameter among treatments (data not shown). Cob length was generally greater with postemergence treatments including 32 percent N and treatments including either a preemergence or preplant-incorporated application followed by a postemergence application.

Table 1. Weed control and grain yield in field corn, Malheur Experiment Station, Oregon State University, Ontario, OR, 2001.

Treatment	Rate*	Timing†	Corn injury		Weed control‡				Corn yield
			6-14	6-28	Redroot pigweed	Lambs-quarters	Hairy nightshade	Barnyard-grass	
	lb ai/acre		%		%				bu/acre
AE F130360 WG70 + MSO + 32 % N	0.033 1.0% + 2.5%	POST	19	15	93	58	91	92	170
AE F130360 WG61 + MSO + 32 % N	0.034 1.0% + 2.5%	POST	22	11	89	77	88	88	174
AE F130360 WG70 + Distinct + MSO + 32 % N	0.033 0.175 1.0% + 2.5%	POST	25	9	91	88	93	89	192
Distinct + MSO + 32 % N	0.17 1.0% + 2.5%	POST	19	19	85	88	90	9	186
AE F130360 WG70 + Outlook + MSO + 32 % N	0.033 0.64 1.0% + 2.5%	POST	18	6	92	78	96	96	177
AE F130360 WG70 + Callisto + MSO + 32 % N	0.033 0.063 1.0% + 2.5%	POST	21	1	82	91	93	89	189
Steadfast + COC + 32 % N	0.03 1.0% + 2.5%	POST	16	23	97	47	80	96	170
Basis + COC + 32 % N	0.01 1.0% + 2.5%	POST	17	13	97	62	73	85	187
Dual II Magnum + Callisto	1.3 0.094	PRE POST	4	0	86	97	92	73	197
Untreated	--	--	0	0	0	0	0	0	117
LSD (0.05)			6	11	5	11	14	12	28

*Methylated seed oil (MSO) and crop oil concentrate (COC) were applied at 1.0 percent v/v and 32 percent N was applied at 2.5 percent v/v.

†Preemergence (PRE) application was made on May 3 and postemergence applications were made on May 29.

‡Weed control evaluations were taken on June 28, 30 days after postemergence (POST) applications.

Table 2. Crop injury, weed control, and yield with Distinct in sweet corn, Malheur Experiment Station, Oregon State University, Ontario, OR, 2001.

Treatment	Rate*	Timing†	Sweet corn injury		Weed control‡			Corn yield§	Ear length
			6-15	6-28	Redroot pigweed	Lambs-quarters	Barnyard-grass		
	lb ai/acre		%		%			cwt/acre	inches
Distinct + NIS	0.088+ 0.25%	POST	8	12	83	93	31	135	17.2
Distinct + NIS + 32 % N	0.088 + 0.25% + 1.25%	POST	10	9	80	87	40	172	17.5
Distinct + NIS	0.175 + 0.25%	POST	12	11	87	92	46	157	17.2
Distinct + NIS + 32 % N	0.175 + 0.25% + 1.25%	POST	19	21	93	94	64	165	17.6
Eradicane + AAtrex Distinct + NIS	3.14 + 0.75 0.088 + 0.25%	PPI POST	3	4	99	100	100	169	18.1
Eradicane + AAtrex Distinct + NIS + 32 % N	3.14 + 0.75 0.088 + 0.25% + 1.25%	PPI POST	17	11	99	100	95	168	17.7
Eradicane + AAtrex Distinct + NIS	3.14 + 0.75 0.175 + 0.25%	PPI POST	12	5	100	100	95	171	18.1
Eradicane + AAtrex Distinct + NIS + 32 % N	3.14 + 0.75 0.175 + 0.25% + 1.25%	PPI POST	20	14	100	100	100	172	17.7
Prowl + Outlook Distinct + NIS	0.83 + 0.66 0.088 + 0.25%	PRE POST	5	4	97	99	96	174	18.1
Prowl + Outlook Distinct + NIS + 32 % N	0.83 + 0.66 0.088 + 0.25% + 1.25%	PRE POST	12	7	100	100	99	184	18
Prowl + Outlook Distinct + NIS	0.83 + 0.66 0.175 + 0.25%	PRE POST	10	7	99	100	100	174	18
Prowl + Outlook Distinct + NIS + 32 % N	0.83 + 0.66 0.175 + 0.25% + 1.25%	PRE POST	16	21	100	100	100	175	17.6
Distinct + Basagran + NIS	0.175 + 0.75 + 0.25%	POST	10	7	90	98	50	146	17.8
Eradicane Distinct + NIS + 32 % N	3.14 0.175 + 0.25% + 1.25%	PPI POST	19	16	100	100	100	168	17.8
Untreated	--	--	0	0	0	0	0	61	16.2
LSD (0.05)			7	6	6	5	29	20	0.7

*Non-ionic surfactant (NIS) was applied at 0.25 percent v/v and 32 percent N at 1.25 percent v/v.

†Preplant-incorporated (PPI), preemergence (PRE), and postemergence applications were made on April 30, May 3, and May 29, respectively.

‡Weed control evaluations were taken on June 28, 30 days after postemergence (POST) applications.

§Corn yield and ear lengths were taken on August 7.