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Evaluation of New Sweet Corn Herbicides

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Introduction

Current weed control recommendations rely heavily on the use of multiple herbicide groups for broad spectrum weed control and preventing development of herbicide resistant weeds. Sweet corn growers, as compared with other specialty crop growers, are fortunate in this regard as they have a fairly diverse and growing list of herbicides from which to choose. Recently, the herbicides Acuron and Acuron Flexi from Syngenta, Anthem and Anthem Maxx from FMC, and Revulon Q from Dupont were approved for use in sweet corn. Ingredients in these products represent five different herbicide groups (HG). The purpose of this trial was to evaluate these new herbicides for sweet corn crop safety and weed control effectiveness to provide information on how they might best fit in a weed control program.

Materials and Methods

The trial was conducted on a Toolesboro sandy loam soil with 2.5 percent organic matter and soil pH of 6.5. Ground was prepared for planting by chisel plowing and disking. Normal cultural practices were followed for fertilization, irrigation, and pest control. Remedy, an Attribute II sweet corn hybrid from Syngenta, was planted at a rate of 27,700 seeds/acre on May 5. Trial design was a randomized complete block with three replications and individual plots were 15 ft wide by 25 ft long. Herbicide treatments were applied with a CO₂ small plot sprayer with 4 nozzle boom calibrated to apply spray solution at 22 gallon/acre. Herbicide products are described in Table 1 and herbicide treatments in Table 2. Crop preemergence (PRE) treatments were applied May 5 to a weed-free

soil surface right after planting and incorporated by 1 in. of rainfall on May 9. Early post (EPOST) treatments were applied May 30 when sweet corn was at the V4 growth stage and weeds were 3 to 4 in. tall and starting to grow vigorously. Weed pressure in control plots was strong and consisted of crabgrass, green foxtail, carpetweed, lambsquarter, purslane, morning glory, pigweed species (waterhemp, red root pigweed), and velvetleaf. Visual ratings on weed control were taken approximately three weeks after herbicide application and again before harvest on July 22. Control ratings were based on number of weeds in the treatment plot compared with the adjacent untreated area. Harvest data were taken from the center two plot rows July 27 to determine effects of herbicide treatment on sweet corn yield.

Results and Discussion

Herbicide treatment yields are presented in Table 2 and weed control ratings are presented in Table 3. Due to strong weed competition, untreated control plots produced few marketable sized ears while all herbicide treatments provided enough weed control to allow decent ear development. Generally, yield differences between herbicide treatments were not significant, although a couple of treatments showed some effects from weed competition. Treatment 5 (Anthem Maxx EPOST) and Treatment 8 (Zidua + Atrazine 4L PRE) were observed to have enough weed escapes to cause slightly smaller ears and less marketable yield than treatments with good-to-excellent weed control ratings.

Acuron and Acuron Flexi (Treatments 1 and 2) are premixes containing bicyclopyrone, mesotrione, and s-metolachlor. Acuron differs from Acuron Flexi by also containing atrazine. Both were applied PRE to a weed-free soil

surface and provided good, season-long, residual weed control with the exception of some morning glories. The addition of atrazine in Acuron improved morning glory control.

Treatment 9 demonstrated the effectiveness of split herbicide applications and using multiple herbicide groups (HG 5, 15, and 27) for weed control. The PRE application of Zidua plus Atrazine 4L provided early season control and the EPOST application of Armezon plus Atrazine 4L cleaned up escapes and late emerging weeds resulting in nearly weed-free plots at harvest.

Anthem Maxx (Treatment 5) is a premix of pyroxasulfone (same active ingredient as Zidua, provides residual weed control) and fluthiacet-methyl (same active ingredient as Cadet, burn down of emerged weeds). Anthem ATZ (Treatment 6) contains same ingredients plus atrazine. Anthem Maxx and Anthem ATZ caused some leaf spotting on the sweet corn foliage after EPOST application. However, it was felt this was mostly cosmetic as new

sweet corn leaf growth was normal. Anthem Maxx used EPOST did not provide satisfactory weed control (Table 3), possibly because weeds were at upper limits of recommended control size. Anthem ATZ, with the addition of atrazine to the premix, controlled emerged weeds somewhat better. It should be noted that both of these herbicides can be used preplant or crop preemergence in situations where residual weed control and weed burn-down is needed.

Revolun Q is a premix of nicosulfuron, mesotrione, and isoxadifen-ethyl, a crop safener. It will probably best be used in weed control programs with other herbicide products. One approach would be to apply residual herbicide PRE and then use Revulon Q EPOST to clean up missed and late emerging weeds. Used by itself, Revulon Q provided excellent control of carpetweed, lambsquarter, and velvetleaf. The addition of Atrazine 4L to the EPOST application of Revulon Q (Treatment 4) improved weed control of other weeds present, particularly purslane.

Table 1. Herbicide product descriptions.

Herbicide	Formulation	Company	Active ingredient (herbicide group ¹)
Acuron	3.44 SC	Syngenta	atrazine (5), s-metolachlor (15), bicyclopyrone (27), mesotrione (27)
Acuron Flexi	3.26 SC	Syngenta	s-metolachlor (15), bicyclopyrone (27), mesotrione (27)
Anthem Maxx	4.3 SC	FMC	fluthiacet-methyl (14), pyroxasulfone (15)
Anthem ATZ	4.5 SE	FMC	atrazine (5), fluthiacet-methyl (14), pyroxasulfone (15)
Armezon	2.8 SC	BASF	topramezone (27)
Atrazine 4L	4 SL	MANA	atrazine (5)
Revolun Q	51.2 WDG	Dupont	nicosulfuron (2), mesotrione (27)
Zidua	85 WG	BASF	pyroxasulfone (15)

¹Herbicide group: 2 = ALS inhibitor, 5 = photosystem II inhibitor, 14 = PPO inhibitor, 15 = long-chain fatty acid inhibitor, 27 = HPPD inhibitor.

Table 2. Herbicide treatment descriptions and marketable yield of Remedy sweet corn.

Herbicide treatment	Rate per acre	Application timing ¹	Marketable yield		Husked ear	
			Dozen ears/acre	Yield cwt/acre	Ear wt (oz)	Length (in.)
1 Acuron	2.5 qt	PRE	1,334	110.3	7.8	8.1
2 Acuron Flexi	2.0 qt	PRE	1,344	105.0	7.9	8.3
3 Revulon Q	4.0 oz	EPOST	1,121	84.0	7.4	7.8
4 Revulon Q	4.0 oz	EPOST	1,324	107.2	7.9	8.1
Atrazine 4L	1.0 pt	EPOST				
5 Anthem Maxx	4.0 fl oz	EPOST	1,025	82.7	7.5	7.8
6 Anthem ATZ	2.0 pt	EPOST	1,134	87.6	7.7	7.9
7 Zidua 85WG	2.5 oz	EPOST				
Armezon	0.75 fl oz	EPOST	1,237	102.0	7.8	8.1
Atrazine 4L	1.0 pt	EPOST				
8 Zidua 85WG	2.5 oz	PRE	986	76.3	7.4	7.7
Atrazine 4L	2.0 pt	PRE				
9 Zidua 85WG	2.5 oz	PRE				
Atrazine 4L	2.0 pt	PRE	1,218	88.2	7.6	8.2
Armezon	0.75 fl oz	EPOST				
Atrazine 4L	1.0 pt	EPOST				
10 Untreated control			290	16.1	5.6	7.1
LSD 5%			344	26.3	0.7	0.4

¹PRE treatments applied May 5, EPOST treatments applied May 30.

Table 3. Herbicide treatment descriptions and weed control ratings.

Herbicide treatment	Rate per acre	Application timing ¹	Weed control ratings ²						
			Grass	CW	PUR	LQ	MG	PW	VL
1 Acuron	2.5 qt	PRE	E	E	E	E	G/E	E	E
2 Acuron Flexi	2.0 qt	PRE	E	E	E	E	F/G	E	E
3 Revulon Q	4.0 oz	EPOST	F	E	P	E	G	G	E
4 Revulon Q	4.0 oz	EPOST	G	E	G	E	G	E	E
Atrazine 4L	1.0 pt	EPOST							
5 Anthem Maxx	4.0 fl oz	EPOST	F	F	P/F	F	F	G	G
6 Anthem ATZ	2.0 pt	EPOST	F/G	E	E	E	G	E	E
7 Zidua 85WG	2.5 oz	EPOST							
Armezon	0.75 fl oz	EPOST	E	E	E	E	F/G	G/E	E
Atrazine 4L	1.0 pt	EPOST							
8 Zidua 85WG	2.5 oz	PRE	E	E	E	E	F/G	E	F/G
Atrazine 4L	2.0 pt	PRE							
9 Zidua 85WG	2.5 oz	PRE							
Atrazine 4L	2.0 pt	PRE	E	E	E	E	E	E	E
Armezon	0.75 fl oz	EPOST							
Atrazine 4L	1.0 pt	EPOST							
10 Control	---	---	P	P	P	P	P	P	P

¹PRE treatments applied May 5, EPOST treatments applied May 30.

²E = excellent, G = good, F = fair, P = poor, Grass = crabgrass and green foxtail, CW = carpetweed, PUR = purslane, LQ = lambsquarter, MG = morning glory, PW = pigweed, VL = velvetleaf.