Performance of Herbicides for Pumpkins, Plateau Experiment Station, 2000

Charles A. Mullins

Interpretative Summary

Pyrithiobac (Staple) caused too much crop injury, especially post emergence, for use on pumpkins. Halosulfuron (Sempra) controlled broadleaf weeds well, especially preemergence. Halosulfuron was weak for grass control. Flufenacet (Foe 5043) controlled grass and broadleaf weeds well. Flumioxazin (Valor) controlled all species except barnyard grass well.

S-dimethenamid (Outlook/Frontier) controlled all weed species well, even at the low rate, and showed considerable promise for pumpkins. S-metolachlor (Dual) controlled grasses well, but was weak for control of broadleaf weeds. Sulfentrazone (Authority) at 0.20 lb ai/A controlled all species well. Pumpkin yield and size were closely related to crop injury and weed control.

Introduction

Pumpkins are grown in large commercial acreage for the Halloween market in Tennessee. An estimated 3500 acres of pumpkins are produced in Tennessee, with over half on the Cumberland Plateau. Pumpkins have been a profitable crop in recent years, and acreage grown seems to expand each year. Weed control with hand labor is expensive, and labeled chemicals are not completely effective, especially for broadleaf weeds and nutsedge. Several new chemicals have been screened in trials, and show potential for use on pumpkins. An experiment was conducted at the Plateau Experiment Station at Crossville, TN in 2000 to evaluate performance of 14 herbicide treatments plus a weekly check on pumpkins.

Materials and Methods

The site was prepared for planting using conventional tillage on May 1. Fertilizer was broadcast at 400 lb/A of 15-15-15 before final disking on May 11. Plots were direct seeded with 'Appalachian' hybrid pumpkin on May 11. The seed source was Seedway, and lot number was 11950/204247. The seed lot had 95% germination. Plot size was 12 by 20 ft. One row, 20 ft long with 5 hills (3 seeds/hill) spaced 4 ft apart in the row was seeded down the middle of each plot. Experimental plot design was a randomized complete block with four replications. Each 12 by 20 ft plot was treated with the selected herbicide treatment. Preemergence treatments were applied on June 2. Post emergence treatments were applied on June 23. Herbicide treatments were applied in 27 gal of solution/A using a plot sprayer with a 12 ft boom equipped with 8004 flat fan nozzles. Compressed air was the pressure source and application pressure was 40 psi. Weed control treatments, source of herbicides, and herbicide lot numbers are presented in

Table 1.

Insect control was by esfenvalerate (Asana) at 0.01 lb ai/A on a 7 to 10 day frequency. Fungicides applied with the Asana were azoxystrobin (Quadris) at 0.25 lb ai/A alternated with a combination of chlorothalonil (Bravo) at 2.0 lb ai/A and myclobutanil (Nova) at 0.125 lb ai/A. Crop injury and weed control ratings by percentage were made on June 27 and July 20. All data were analyzed by analysis of variance methods, and means were separated by Duncan's multiple range tests at the 0.05 level.

Results and Discussion

The plot had been planted in pumpkins several times in recent years, but was in an annual rotation with other crops. The last pumpkin crop was grown in 1999. Prefar and Command had been used on the pumpkin crops, and redroot pigweed was one of the major weeds in the plot area. Prefar and Command do not control redroot pigweed well.

Halsulfuron post (Tmt. 03) was rated at causing 25% crop injury (Table 1). Flumiclorac (Tmt. 06) was rated at causing 8% crop injury while flumioxazin (Tmt. 7) crop injury was rated at 10%. Pyrithiobac preemergence (Tmt. 08) crop injury was rated at 25%, while pyrithiobac post emergence (Tmt. 09) was rated at 60% crop injury. This injury was so severe that the pumpkin plants failed to recover. Other herbicide treatments did not injure the pumpkin crop. None of the herbicides reduced germination or plant stand of pumpkins.

Barnyardgrass, fall panicum, clammy groundcherry, and redroot pigweed were the primary weeds in the pumpkin herbicide trial (Tables 3 and 4). Treatments of halsulfuron preemergence (Tmt. 02) and post emergence (Tmt. 03) were weak on grass and clammy groundcherry control. Control of redroot pigweed was satisfactory by halsulfuron both preemergence and post emergence. Flufenacet at 0.40 lb ai/A (Tmt. 04) and 0.80 lb ai/A (Tmt. 05) controlled grasses well. Control of broadleaf weeds was fair at the low rate and excellent at the higher rate. Flufenacet showed considerable promise for use on pumpkins. Flumiclorac (Tmt. 06) controlled redroot pigweed exceptionally well, but was weak on the other major species in the test area. Flumioxazin (Tmt. 07) was weak in controlling barnyardgrass, but controlled the other major species well. Crop injury was slight, and this herbicide shows potential for use on pumpkins, and will need to be mixed with a grass herbicide. Pyrithiobac (Tmts. 08 and 09) controlled redroot pigweed well. Crop injury, especially post emergence was severe with pyrithiobac, and this chemical has no value for pumpkins. Both rates of s-dimethenamid (Tmts. 10 and 11) controlled all weed species well. No crop injury was observed, and this herbicide showed tremendous potential for use on pumpkins. S-metolachlor (Tmt. 12) controlled grasses well, but was poor on broadleaf control. S-metolachlor has potential for use on pumpkins, especially when mixed with a herbicide that controls broadleaf weeds well. Sulfentrazone at 0.10 lb ai/A (Tmt. 13) controlled broadleaf weeds well, but was somewhat weak for control of grasses. Control of all species was excellent at the higher rate of 0.20 lb ai/A (Tmt. 14). No crop injury was evident, and sulfentrazone at the rate of 0.20 lb ai/A shows considerable potential for use on pumpkins. Ethalfluralin (Tmt. 15)was used as a check treatment. Control of both grasses and broadleaves was fair.

Pumpkins were harvested on September 7. Yields and pumpkin size (Tables 2, 3 and 4) were well related to crop injury and weed control.

Table 1. Weed control treatments, source of herbicides, and herbicide lot number for pumpkin herbicide trials at The University of Tennessee Plateau Experiment Station at Crossville, 2000.

Tmt No.	Herbicide - chemical name - followed by trade name	Rate -lb ai/A and time of application	Source	Lot numbe
01	untreated check			
02	halosulfuron - Sempra 75% DF	0.024 pre emergence	Gowan	GWN-306C
03	halosulfuron - Sempra 75% DF	0.024 post emergence	Gowan	GWN-306C
04	flufenacet - FOE 5043 60DF	0.40 preemergence	Bayer	9-03-0039
05	flufenacet - FOE 5043 60DF	0.80 preemergence	Bayer	9-03-0039
06	flumiclorac - Resource 0.86EC	0.04 post emergence	Valent	
07	flumioxazin - Valor 50DF	0.025 preemergence	Valent	VJK007WD
08	pyrithiobac - Staple 85DF	0.054 preemergence	DuPont	00219004
09	pyrithiobac - Staple 85DF	0.054 post emergence	Dupont	00219004
10	S-dimethenamid - Outlook/Frontier X2	0.66 preemergence	BASF	32007321

11	S-dimethenamid - Outlook/Frontier X2	1.32 preemergence	BASF	32007321
12	s-metolachlor - Dual Magnum 7.62	0.65 preemergence	Novartis	FL-992008
13	sulfentrazone - Authority 75DF	0.10 preemergence	FMC	FEB99EL012
14	sulfentrazone - Authority 75DF	0.20 preeemergence	FMC	FEB99EL012
15	ethalfluralin - Curbit 3EC	1.125 preemergence	United Agr Products	612587A2

Table 2. Effect of herbicides on crop injury and yield of pumpkins at The University of Tennessee Plateau Experiment Station at Crossville, 2000.

Tmt no.	Herbicide - chemical name	Crop injury - % on June 27	Crop injury - % on July 20	Total yield- no/plot.	Total yield - lb/plot	Aver pum wt - l
01	untreated check	0 b[z]	0 e	5.8 cd	37.1 g	6.7 f
02	halosulfuron	0 b	0 e	8.8 ab	112.2 cdef	12.4
03	halosulfuron	0 b	25 b	6.5 bcd	60.6 fg	9.0 e
04	flufenacet	1 b	0 e	7.8 abc	95.0 ef	12.4
05	flufenacet	5 b	0 e	9.8 a	179.2 a	18.4
06	flumiclorac	0 b	8 cd	8.0 abc	91.2 ef	11.3
07	flumioxazin	28 a	10 c	7.2 abc	99.2 ef	13.7
08	pyrithiobac	0 b	25 de	7.5 abc	106.4 def	14.4

09	pyrithiobac	0 b	60 a	4.2 d	29.0 g	6.8 f
10	s-dimethenamid	0 b	0 e	10.0 a	205.7 a	21.2 a
11	s-dimethenamid	0 b	0 e	9.8 a	160.6 abcd	16.1 bcd
12	s-metolachlor	0 b	0 e	8.0 abc	109.8 cdef	13.7 bcde
13	sulfentrazone	0 b	0 e	9.0 ab	163.8 abc	18.1 ab
14	sulfentrazone	0 b	0 e	9.75 a	168.7 ab	17.3 abc
15	ethalfluralin	0 b	0 e	8.8 ab	119.8 bcde	13.6 bcde

[z] Means within a column followed by the same letter are not significantly different at the 0.05 level of probability, Duncan's multiple range tests.

Table 3. Effect of herbicide treatments on weed control on July 20 in pumpkin herbicide trials at The University of Tennessee Plateau Experiment Station at Crossville, 2000.

Tmt. no.	Herbicide - chemical name	Barnyardgrass - % control on July 20	Fall panicum - % control on July 20	Clammy groundcherry - % control on July 20	Red roo pigweec control July 20
01	untreated check	0 g[z]	0 f	0 d	0 d
02	halosulfuron	20 ef	20 de	15 d	81 ab
03	halosulfuron	0 g	0 f	18 d	72 bc
04	flufenacet	90 ab	91 a	72 b	61 c
05	flufenacet	88 abc	90 a	91 ab	88 ab
06	flumiclorac	10 fg	10 ef	10 d	94 a
07	flumioxazin	49 d	95 a	96 a	87 ab

08	pyrithiobac	28 e	28 d	81 ab	97 a
09	pyrithiobac	0 g	0 f	40 c	81 ab
10	s-dimethenamid	92 a	91 a	90 ab	96 a
11	s-dimethenamid	96 a	95 a	94 ab	97 a
12	s-metolachlor	92 a	90 a	52 c	62 c
13	sulfentrazone	71 c	69 b	92 ab	95a
14	sulfentrazone	91 a	91 a	90 ab	92 a
15	ethalfluralin	72 bc	84 a	42 c	81 ab

[z] Means within a column followed by the same letter are not significantly different at the 0.05 level of probability, Duncan's multiple range tests.

Table 4. Effect of weed control treatments on percentage grass and broadleaf weed control on September 6 in pumpkin herbicide trials at The University of Tennessee Plateau Experiment Station at Crossville, 2000.

Tmt No.	Herbicide - chemical name	all grass % con.[y]	Fall panicum % con.	Crab-grass % con.	all Broad-leaf % con.	Red root pig weed % con.	Comm. rag-weed % con.	Cl gr ch %
01	untreated check	0 e[z]	0 d	0 d	0 e	0 d	0c	0
02	halosulfuron	86 ab	82 a	79 ab	70 c	74 ab	85 ab	18
03	halosulfuron	69 bc	65 ab	78 ab	42 d	35 c	100 a	0
04	flufenacet	100 a	100 a	100 a	42 d	28 c	95 a	60
05	flufenacet	100 a	100 a	98 a	90 ab	86 a	94 ab	91

06	flumiclorac	50 cd	45 bc	55 bc	62 c	52 bc	100 a	0 e
07	flumioxazin	95 ab	95 a	95 a	91 a	89 a	90 ab	100a
08	pyrithiobac	98 ab	99a	96 a	71 bc	94 a	65 b	75 ab
09	pyrithiobac	29 d	30 c	28 cd	56 cd	80 a	75 ab	0 e
10	s-dimethenamid	100 a	100 a	100 a	90 ab	94 a	89 ab	96 a
11	s-dimethenamid	100 a	100 a	100 a	98 a	80 a	96 a	100 a
12	s-metolachlor	100 a	100 a	100 a	56 cd	94 a	72 ab	64 b
13	sulfentrazone	97 ab	95 a	99 a	93 a	100 a	89 ab	92 a
14	sulfentrazone	100a	100 a	100 a	93 a	64 b	91 ab	99 a
15	ethalfluralin	100a	100 a	98 a	71 bc	92 a	74 ab	38 cd

[y] cont. is % control of prevalent species rated on Sept 6, 2000.

[z] Means within a column followed by the same letter are not significantly different at the 0.05 level of probability, Duncan's multiple range tests.

This research represents one season's data and does not constitute recommendations. After sufficient data is collected over the appropriate number of seasons, final recommendations will be made through research and extension publications.