FIELD EVALUATIONS OF HERBICIDES ON VEGETABLE, SMALL FRUIT, AND ORNAMENTAL CROPS, 2000, 2001, & 2002

Ron E. Talbert, Mike L. Lovelace,
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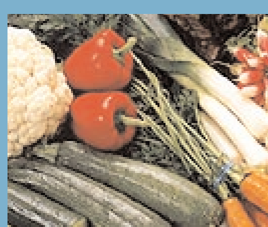
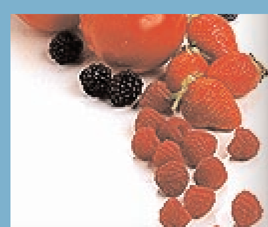


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R.E. Talbert, M.L. Lovelace, E.F. Scherder, and M.S. Malik[1]

INTRODUCTION

Field evaluations of herbicides provide the chemical industry, governmental agencies, such as IR-4, and the Arkansas Agricultural Experiment Station with an evaluation of herbicide performance on small fruit, vegetable, and ornamental crops grown under Arkansas conditions. This report provides a means for disseminating information to interested private and public service weed scientists.

GENERAL MATERIALS AND METHODS

Experiments at the Arkansas Agricultural Research and Extension Center (AAREC) in Fayetteville were conducted on southern pea, tomatoes, and ornamental species in 2000; table beets, winter squash, pecans, and ornamentals in 2001; and table beets, ornamental gourds, snapbeans, and grapes in 2002. At the Vegetable Substation near Kibler, experiments were conducted on 2000-2001 over-wintered spinach. Experiments were also conducted on southern peas and watermelon in 2001, overwinter spinach in 2001-2002 and watermelon, southern peas, southern greens, and overwinter spinach in 2002. Snap bean trials were conducted on a private farm near Fairview, Mo., in 2000, and near Lowell, Ark., and Newtonia, Mo. in 2001.

Trials at AAREC were conducted on a Captina silt loam with 1% organic matter and pH of 6.2. At the Vegetable Substation at Kibler, trials were conducted on a Roxana silt loam with 1% organic matter and pH of 6.9. Soil at the location near Lowell, Ark., was a Perridge silt loam with 0.5% organic matter and pH of 5.3. Tests at the cooperator site near Fairview, MO, were conducted on a Gerald silt loam with 1% organic matter, and tests at Newtonia, MO, were conducted on a Newtonia silt loam with 1% organic matter and pH of 5.9.

The experimental design for all experiments was a randomized complete block with four replications, unless stated otherwise. All liquid treatments were applied in 187 L/ha (20 gal/A) of water. Liquid herbicides were applied with a hand-held, carbon-dioxide pressurized sprayer. Granular herbicides were mixed with sand and applied using a granular applicator to ensure proper coverage. Preemergence (PRE) treatments were applied to the soil surface soon after planting and postemergence (POST) treatments were applied at various stages of crop growth after emergence. Environmental conditions of air temperature (C); soil temperature (C) at 8 cm deep; soil surface moisture as wet, moist, or dry; and percent relative humidity (RH) were recorded at each application.

Percentage of weed control by species was visually estimated: 0 represents no effect, and 100 represents complete control. Ranges for weed control are as follows: 70 to 79%, fair; 80 to 89%, good; and 90 to 100%, excellent. Weed control less than 70% is considered to be poor. Crop injury was assessed by visual estimation of percent injury: 0 represents no effect, and 100 represents complete plant kill. Crop injury ratings of less than 30% indicate crop tolerance. Crop yields are reported in metric tons per hectare unless stated oth-

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erwise. Least Significant Difference (LSD) values at the 0.05 level of significance were calculated for each set of treatment means.

Pertinent experimental details and a summary of results of each experiment follows and tabulated results are shown in accompanying tables. Additional abbreviations used in the tables are: cm, centimeter; COC, crop oil concentrate; cv, cultivar; fb, followed by; kg/ha, kilograms active ingredient per hectare; NS, not significant; pl, plants; TM, tank mix; V2, first trifoliolate stage of legume; v/v, volume per volume; WA, wetting agent; wk, week(s); MT/ha, metric tons per hectare.

SPECIFIC METHODS AND RESULTS, 2000

Evaluation of Ornamental Plant Responses to Various Herbicides, Fayetteville, 2000 (Table 1, Field-Grown Ornamentals and Table 2, Potted Field-Grown Ornamentals).

Flumioxazin (Valor) applied at 0.2, 0.4, and 0.8 kg/ha was evaluated in established and potted liriope and English ivy. Clopyralid (Stinger) was assessed on established liriope and euonymous at rates of 0.28, 0.56, and 1.1 kg/ha. Napropamide (Devrinol) applied at 4.5, 9, and 18 kg/ha was evaluated on established cannas. Oxyfluorfen/pendimethalin (Rout 3G) applied at 3.4, 6.8, and 13.6 kg/ha were evaluated on potted cannas. Oxadiazon/pendimethalin (Kansel Plus) was assessed on potted euonymous plants at 3.6, 7.3, and 11 kg/ha.

RESULTS: Some yellowing and leaf tip burn was observed on liriope plants treated with flumioxazin at 0.8 kg/ha, but no injury was observed on English ivy at any herbicide rate. With clopyralid, some stunting and yellowing was observed on liriope plants and very little discoloration was observed on the euonymous plants. Napropamide at 18 kg/ha slightly stunted the cannas, and no noticeable injury was observed at 4.5 and 9 kg/ha. Oxyfluorfen/pendimethalin was slightly injurious at the 13.6 kg/ha rate, only causing some minimal leaf burn to cannas and euonymous.

Preemergence Herbicide Evaluation in Snap Beans (*Phaseolus vulgaris* L.), Fairview, Mo., 2000 (Table 3).

Snap beans (cv. Bush Blue Lake 156) were planted 15 May 2000, in plots measuring 3 by 5.5 m with four rows spaced 75 cm apart. PRE treatments were applied two days after planting (air 26ºC; soil 27ºC, moist; RH 78%). Weed control and crop injury evaluations were made at 2, 4, and 7 wk after planting and yield data were taken approximately 8 wk after planting. Weeds present at this location included common lambsquarters (CHEAL), common ragweed (AMBEL), giant foxtail (SETFA), and Palmer amaranth (AMAPA).

RESULTS: PRE applications of lactofen or fomesafen at 0.22 kg/ha alone or TM with S-metolachlor at 0.75 kg/ha provided excellent season-long control of the weeds, while showing excellent snap bean safety (Table 1). Yields from these plots were also among the best yielding treatments. PRE applications of flufenacet at 0.34 and 0.67 kg/ha also controlled the weeds present and showed little snap bean injury. Flufenacet at 0.67 kg/ha was the highest yielding treatment, while flufenacet at 0.34 was among the highest yielding treatments. Flumetsulam at 71 g/ha and diclosulam at 35 g/ha applied PRE provided acceptable weed control, but caused some injury to the snap beans. Injury from the diclosulam was too excessive for the snap beans to recover, thus adversely affecting yield. Dimethenamid at 1.12 kg/ha PRE provided excellent weed control, which resulted good yields. PRE applications of clomazone at 0.56 kg/ha provided excellent control of SETFA, but poor control of AMAPA and CHEAL. Lack of weed control from clomazone resulted in poor yields.

Postemergence Herbicide Evaluation in Snap Beans (*Phaseolus vulgaris* L.), Fairview, Mo., 2000 (Table 4).

Snap beans (cv. Bush Blue Lake 156) were planted 15 May 2000, in plots measuring 3 by 5.5 m with four rows spaced 75 cm apart. POST treatments were applied 31 May when the snap beans were in the first trifoliate stage (air 28ºC; soil 26ºC, moist; RH 65%). Weed control and crop injury evaluations were made at 2 and 4 wk after application. Yield data were taken approximately 8 wk after planting. Weeds present at this location included common lambsquarters (CHEAL), common ragweed (AMBEL), giant foxtail (SETFA), and Palmer amaranth (AMAPA).

RESULTS: Imazamox applied at 0.027 and 0.036 kg/ha provided greater than 90% control of AMAPA, AMBEL, and SETFA, but only provided 60 to 75% control of CHEAL. Snap bean yield ranged from 10.3

to 11.3 MT/ha, and were among the highest yielding treatments. Imazamox may need to be tank-mixed with other herbicides to control CHEAL. Halosulfuron applied at 0.052 and 0.071 kg/ha provided 100% control of AMAPA and AMBEL, but control of CHEAL and SETFA was very poor. Tank mixing bentazon at 0.84 kg/ha with halosulfuron at 0.036 kg/ha improved control of CHEAL from 25 to 98%, but still did not adequately control SETFA. Imazethapyr at 0.036 tank-mixed with halosulfuron at 0.036 kg/ha provided greater than 98% control of AMAPA and AMBEL, while SETFA control was 85%. Control of CHEAL with this combination was inadequate. Fomesafen at 0.22 kg/ha tank-mixed with halosulfuron at 0.036 kg/ha did not greatly improve the spectrum of weed control over halosulfuron applied alone. This tank-mix combination was effective for control of AMAPA and AMBEL, but did not effectively control CHEAL and SETFA. Snap bean yields (7.4 to 7.7 MT/ha) when halosulfuron was applied were less because of inadequate weed control. Mixing halosulfuron with other herbicides improved snap bean yield due to improved weed control. AMAPA control was excellent with imazethapyr applied at 0.036 kg/ha, but control of AMBEL and SETFA only ranged from 81 to 88% control. Imazethapyr did not provide any suppression of CHEAL. Tank-mixing bentazon at 0.84 kg/ha and imazethapyr greatly enhanced the spectrum of weed control. Bentazon + imazethapyr provided greater than 93% control of all species by 5 WAT. Snapbean yields reflected weed control, with imazethapyr applied alone yielding 9.2 MT/ha and bentazon + imazethapyr yielding 11.8 MT/ha, which was among the highest yielding treatments in the trial. Snap bean yellowing and stunting was detected when chloransulam was applied at 0.18 kg/ha. Chloransulam gave greater than 90% control of AMAPA and AMBEL, but did not control CHEAL and SETFA. Chloransulam at 0.016 kg/ha + flumetsulam at 0.007 kg/ha also stunted and yellowed the snap beans. The addition of flumetsulam to chloransulam improved CHEAL and SETFA control over chloransulam applied alone, but control was still inadequate. Chloransulam does not appear to be a promising compound in snap beans due to injury potential and a limited weed spectrum. Flumiclorac applied at 0.03 kg/ha provided excellent pigweed control, but AMBEL and SETFA control was poor. Flumiclorac did provide some suppression of CHEAL, but overall, control was inadequate. A standard program of fomesafen at 0.22 kg/ha + bentazon at 0.84 kg/ha provided excellent control of all species except SETFA, and provided excellent snap bean yield (10 MT/ha).

Herbicide Evaluation in Southern Peas (*Vigna unguiculata* L.), Fayetteville, 2000 (Table 5).

Southern peas (cv. Encore) were planted 25 July 2000 in plots 2 by 6 m, with two rows spaced 1 m apart. PRE treatments were applied the same day as planting (air 23ºC; soil 25ºC, dry; RH 85%). POST treatments were applied 9 August (air 35ºC; soil 40ºC, moist; RH 56%). Crop injury and weed control was rated at 3 and 6 WAE. Weeds present included Palmer amaranth (AMAPA), goosegrass (ELEIN), and carpetweed (MOLVE). An early freeze killed plants before yields could be collected.

RESULTS: S-metolachlor applied at 1.12 kg/ha showed excellent crop safety and controlled AMAPA and ELEIN, but did not effectively control MOLVE (Table 5). Flufenacet applied at 0.28 kg/ha PRE provided excellent control of the weeds present, but did cause some early southern pea stunting. Halosulfuron applied at 0.029 kg/ha PRE showed moderate crop safety, but was much more injurious when applied POST. Furthermore, weed control seemed to be more consistent when applied PRE. Fomesafen applied PRE at 0.28 kg/ha alone or in combination with clomazone provided excellent weed control, but did not show acceptable crop safety. Imazapic applied at 0.07 kg/ha POST and imazamox applied at 0.039 kg/ha POST provided adequate control of AMAPA, ELEIN, and MOLVE, while causing little injury to the southern peas. Cloransulam applied at 0.02 kg/ha did not cause much southern pea injury, but did not effectively control the weeds present. The spectrum of cloransulam appears to be very minimal. Although crop injury and weed control was noted throughout the season, the observations are still somewhat inconclusive due the lack of yield data.

Herbicide Evaluation in Over-Wintered Spinach (*Spinachia oleracea* L.), Kibler, 2000-2001 (Table 6).

Spinach (cv. F-380) was planted 25 October 2000 in plots measuring 1.3 by 5 m, with each plot containing six rows spaced 23 cm apart. PRE treatments were applied 27 October 2000 (air 22ºC, soil 17ºC, moist; RH 90%). POST treatments were applied 21 November 2000 (air 16ºC, soil 14ºC, moist; RH 63%). Plots were harvested on 20 April 2001. Weed species present at Kibler included henbit (LAMAM), sibara (SIBVI), annual bluegrass (POANN), pineappleweed (MATMT), and shepherdspurse (CAPBP). Weed control ratings were taken at various intervals throughout the growing season and yield was determined in the spring of 2001.

RESULTS: Environmental conditions were very cool and wet after PRE treatments were applied. These environmental conditions seemed to be conducive for more excessive injury than had been seen in previous years. S-metolachlor applied at 0.56 kg/ha was the only treatment that had less than 10% injury. Weed control was greater than 90% for all species except MATMT, which was 85% by the end of the growing season. Spinach yield from S-metolachlor at 0.56 kg/ha was among the highest yielding treatments (9.1 MT/ha) in the trial. Increasing the rate of S-metolachlor did improve control of MATMT, but increased spinach injury which caused yields to decline. Linuron was also evaluated at 0.12, 0.24, and 0.36 kg/ha. At harvest, weed control was greater than 95% for all species but henbit (85% control), but injury ranged from 55 to 94% and greatly reduced yield, which ranged from 1.1 to 2.8 MT/ha. S-metolachlor + linuron provided greater than 98% control of all weed species, but injury at the end of the growing season ranged from 61 to 86% and decreased spinach yield. S-metolachlor applied at 0.56 kg/ha fb clopyralid provided excellent control of all weed species, but was very injurious to the spinach and caused substantial yield loss. S-metolachlor fb phenmedipham at 0.44 kg/ha also provided excellent control of all weed species, but caused 25% stunting. The excellent weed control coupled with little injury allowed for high spinach yields (10.7 MT/ha).

Various other herbicides not currently labeled in spinach were also evaluated. A new formulation of dimethenamid, dimethenamid-P, has shown promise for use in spinach although higher rates of each herbicide caused excessive injury. Excellent weed control was observed when dimethenamid-P was applied at 0.28 to 0.56 kg/ha, but injury potential at all rates was still very high. Injury ranged from 56 to 88% by the end of the season, which corresponded to low yields ranging from 6.5 to 2.4 MT/ha. Flufenacet applied at 0.33 and 0.67 kg/ha, quinclorac applied at 0.14 and 0.28 kg/ha, and clomazone applied at 0.11, 0.22, and 0.33 kg/ha were also evaluated. All showed promise by providing excellent weed control, but injury was excessive from all treatments.

Herbicide Evaluation in Tomato (*Lycopersicon esculentum* Mill), Fayetteville, 2000 (Table 7).

Tomatoes (cv. Mt. Supreme) were transplanted 7 July 2000 into 1- by 4-m plots at a spacing of 46 cm apart. There were four replications. PRE treatments were applied prior to transplanting (air 30ºC; soil 29ºC, moist; RH 65%) and POST treatments were applied on 3 August 2000 (air 28ºC; soil 29ºC, moist; RH 77%). Crop injury and yellow nutsedge (CYPES) control ratings were taken 3 and 6 wk after the initial herbicide applications.

RESULTS: Halosulfuron applied at 0.035 kg/ha PRE provided 79% control of CYPES, which was similar to control observed when halosulfuron was applied at 0.035 kg/ha POST. The greatest control of CYPES occurred with sequential applications of halosulfuron at 0.035 kg/ha, which was 93% at 6 WAT. Tomatoes showed excellent tolerance to all applications of halosulfuron.

Table 1. Response of Field-Grown Ornamentals to Various Herbicides, Fayetteville, 2001.

Treatment	Form.	Rate	Growth stage	Liriope injury 2 WAE	4 WAE	6 WAE	8 WAE	10 WAE	12 WAE	14 WAE
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Flumioxazin + NIS* fb	51 WDG	0.2	EPOST	0	0	0	0	0	0	0
Flumioxazin + NIS*	51 WDG	0.2	LPOST							
Flumioxazin + NIS* fb	51 WDG	0.4	EPOST	0	0	0	0	0	0	0
Flumioxazin + NIS*	51 WDG	0.4	LPOST							
Flumioxazin + NIS* fb	51 WDG	0.8	EPOST	20	10	5	0	15	5	5
Flumioxazin + NIS*	51 WDG	0.8	LPOST							
LSD (P=.05)				3	2	2	NS	2	2	2

Treatment	Form.	Rate	Growth stage	English ivy injury 2 WAE	4 WAE	6 WAE	8 WAE	10 WAE	12 WAE	14 WAE
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Flumioxazin + NIS* fb	51 WDG	0.2	EPOST	0	0	0	0	0	0	0
Flumioxazin + NIS*	51 WDG	0.2	LPOST							
Flumioxazin + NIS* fb	51 WDG	0.4	EPOST	0	0	0	0	0	0	0
Flumioxazin + NIS*	51 WDG	0.4	LPOST							
Flumioxazin + NIS* fb	51 WDG	0.8	EPOST	0	0	0	0	0	0	0
Flumioxazin + NIS*	51 WDG	0.8	LPOST							
LSD (P=.05)				NS	NS	NS	NS	NS	NS	NS

Treatment	Form.	Rate	Growth stage	Canna injury 2 WAE	4 WAE	6 WAE	8 WAE	10 WAE	12 WAE	14 WAE
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Napropamide + NIS* fb	50 DF	4.5	EPOST	0	0	0	0	0	0	0
Napropamide + NIS*	50 DF	4.5	LPOST							
Napropamide + NIS* fb	50 DF	9	EPOST	0	0	0	0	0	0	0
Napropamide + NIS*	50 DF	9	LPOST							
Napropamide + NIS* fb	50 DF	18	EPOST	5	3	1	0	3	1	0
Napropamide + NIS*	50 DF	18	LPOST							

continued

Table 1. Continued.

Treatment	Form.	Rate	Growth stage	Canna injury 2 WAE	4 WAE	6 WAE	8 WAE	10 WAE	12 WAE	14 WAE
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Napropamide fb	2 G	4.5	EPOST	0	0	0	0	0	0	0
Napropamide	2 G	4.5	LPOST							
Napropamide fb	2 G	9	EPOST	0	0	0	0	0	0	0
Napropamide	2 G	9	LPOST							
Napropamide fb	2 G	18	EPOST	5	3	0	0	3	0	0
Napropamide	2 G	18	LPOST							
LSD (P=.05)				2	1	NS	NS	1	1	NS

Treatment	Form.	Rate	Growth stage	Liriope injury 2 WAE	4 WAE	6 WAE	8 WAE
		(kg ai/ha)		(%)			
Untreated check				0	0	0	0
Clopyralid + NIS*	3 EC	0.28	EPOST	0	0	0	0
Clopyralid + NIS*	3 EC	0.56	EPOST	0	0	0	0
Clopyralid + NIS*	3 EC	1.12	EPOST	13	4	2	0
LSD (P=.05)				3	1	1	NS

Treatment	Form.	Rate	Growth stage	Euonymous injury 2 WAE	4 WAE	6 WAE	8 WAE
		(kg ai/ha)		(%)			
Untreated check				0	0	0	0
Clopyralid + NIS*	3 EC	0.28	EPOST	0	0	0	0
Clopyralid + NIS*	3 EC	0.56	EPOST	0	0	0	0
Clopyralid + NIS*	3 EC	1.12	EPOST	3	0	0	0
LSD (P=.05)				1	NS	NS	NS

* NIS was applied at 0.25% volume per volume of water.

Table 2. Response of Potted Field-Grown Ornamentals to Various Herbicides, Fayetteville, 2001.

			Growth	Liriope injury						
Treatment	Form.	Rate	stage	2 WAE	4 WAE	6 WAE	8 WAE	10 WAE	12 WAE	14 WAE
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Flumioxazin + NIS* fb	51 WDG	0.2	EPOST	0	0	0	0	0	0	0
Flumioxazin + NIS*	51 WDG	0.2	LPOST							
Flumioxazin + NIS* fb	51 WDG	0.4	EPOST	6	0	0	0	5	0	0
Flumioxazin + NIS*	51 WDG	0.4	LPOST							
Flumioxazin + NIS* fb	51 WDG	0.8	EPOST	20	10	5	0	15	5	5
Flumioxazin + NIS*	51 WDG	0.8	LPOST							
LSD (P=.05)				4	3	1	NS	3	1	1

			Growth	English ivy injury						
Treatment	Form.	Rate	stage	2 WAE	4 WAE	6 WAE	8 WAE	10 WAE	12 WAE	14 WAE
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Flumioxazin + NIS* fb	51 WDG	0.2	EPOST	0	0	0	0	0	0	0
Flumioxazin + NIS*	51 WDG	0.2	LPOST							
Flumioxazin + NIS* fb	51 WDG	0.4	EPOST	0	0	0	0	0	0	0
Flumioxazin + NIS*	51 WDG	0.4	LPOST							
Flumioxazin + NIS* fb	51 WDG	0.8	EPOST	0	0	0	0	0	0	0
Flumioxazin + NIS*	51 WDG	0.8	LPOST							
LSD (P=.05)				NS	NS	NS	NS	NS	NS	NS

			Growth	Canna injury						
Treatment	Form.	Rate	stage	2 WAE	4 WAE	6 WAE	8 WAE	10 WAE	12 WAE	14 WAE
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Oxyfluorfen + Pendimethalin fb	3 GR	3.4	EPOST	0	0	0	0	0	0	0
Oxyfluorfen + Pendimethalin	3 GR	3.4	LPOST							
Oxyfluorfen + Pendimethalin fb	3 GR	6.8	EPOST	0	0	0	0	0	0	0
Oxyfluorfen + Pendimethalin	3 GR	6.8	LPOST							
Oxyfluorfen + Pendimethalin fb	3 GR	13.6	EPOST	13	4	0	0	11	3	0
Oxyfluorfen + Pendimethalin	3 GR	13.6	LPOST							
LSD (P=.05)				3	1	NS	NS	3	1	NS

continued

Table 2. Continued.

Treatment	Form.	Rate	Growth stage	Euonymous injury 2 WAE	4 WAE	6 WAE	8 WAE	10 WAE	12 WAE	14 WAE
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Oxyfluorfen + Pendimethalin fb	1.62 GR	3.6	EPOST	0	0	0	0	0	0	0
Oxyfluorfen + Pendimethalin	1.62 GR	3.6	LPOST							
Oxyfluorfen + Pendimethalin fb	1.62 GR	7.2	EPOST	0	0	0	0	0	0	0
Oxyfluorfen + Pendimethalin	1.62 GR	7.2	LPOST							
Oxyfluorfen + Pendimethalin fb	1.62 GR	14.4	EPOST	9	3	0	0	5	1	0
Oxyfluorfen + Pendimethalin	1.62 GR	14.4	LPOST							
LSD (P=.05)				2	1	NS	NS	1	1	NS

Table 3. Preemergence Herbicide Evaluation in Snap Beans, Fairview, MO, 2000.

Treatment	Form.	Rate	Growth stage	Snap bean injury			Palmer amaranth control			Giant foxtail control		
				2 WAT	4 WAT	6 WAT	2 WAT	4 WAT	6 WAT	2 WAT	4 WAT	6 WAT
		(kg ai/ha)		(%)								
Untreated check				0	0	0	0	0	0	0	0	0
Hand-weeded check				0	0	0	100	100	94	100	100	100
Clomazone	3 ME	0.56	PRE	3	5	3	56	35	24	100	100	100
Diclosulam	84 WG	0.036	PRE	30	64	64	100	100	100	86	79	64
S-metolachlor	7.62 EC	0.75	PRE	3	0	0	100	100	100	100	99	99
Dimethenamid-P	8 EC	1.12	PRE	5	4	0	100	100	99	100	100	100
Flufenacet	60 WG	0.33	PRE	5	8	8	98	98	92	88	95	96
Flufenacet	60 WG	0.67	PRE	3	3	0	99	100	100	93	99	100
Lactofen	2 E	0.22	PRE	4	8	4	99	99	90	61	54	38
Fomesafen	2 L	0.22	PRE	0	0	0	99	96	93	92	91	84
Flumetsulam	80 WDG	0.071	PRE	10	22	28	98	100	98	88	84	68
S-metolachlor +	7.62 EC	0.75	PRE	5	3	0	100	100	100	99	100	99
Lactofen	2 E	0.22	PRE									
Clomazone +	3 ME	0.56	PRE	5	0	0	100	100	96	100	100	100
Lactofen	2 E	0.22										
LSD (P=.05)				6	10	10	4	7	8	8	8	12

continued

Table 3. Continued.

Treatment	Form.	Rate	Growth stage	Common ragweed control			Common lambsquarters control		Snap bean yield
				2 WAT	4 WAT	6 WAT	2 WAT	6 WAT	
		(kg ai/ha)		-----	-----	----- (%)	-----	-----	(MT/ha)
Untreated check				0	0	0	0	0	5.1
Hand-weeded check				100	100	100	100	100	10.3
Clomazone	3 ME	0.56	PRE	84	71	33	69	60	6.9
Diclosulam	84 WG	0.036	PRE	93	100	100	90	79	4.7
S-metolachlor	7.62 EC	0.75	PRE	85	56	34	93	93	6.6
Dimethenamid-P	8 EC	1.12	PRE	91	86	61	95	93	11.3
Flufenacet	60 WG	0.33	PRE	85	80	58	93	84	11.1
Flufenacet	60 WG	0.67	PRE	93	90	79	100	96	14.1
Lactofen	2 E	0.22	PRE	90	85	71	74	66	9.0
Fomesafen	2 L	0.22	PRE	95	89	70	53	29	11.4
Flumetsulam	80 WDG	0.071	PRE	90	97	90	100	94	9.7
S-metolachlor +	7.62 EC	0.75	PRE	97	94	91	99	96	11.2
Lactofen	2 E	0.22	PRE						
Clomazone +	3 ME	0.56	PRE	100	100	93	100	98	12.2
Lactofen	2 E	0.22							
LSD (P=.05)				6	11	15	15	16	2.6

Table 4. Postemergence Herbicide Evaluation in Snap Beans, Fairview, MO, 2000.

Treatment	Form.	Rate	Growth stage	Snap bean injury 2 WAT	Snap bean injury 4 WAT	Palmer amaranth control 2 WAT	Palmer amaranth control 4 WAT	Giant foxtail control 2 WAT	Giant foxtail control 4 WAT
		(kg ai/ha)		(%)					
Untreated check				0	0	0	0	0	0
Imazamox + NIS[1]	1 AS	0.027	V2	0	1	94	100	67	60
Imazamox + NIS	1 AS	0.038	VS	4	5	93	100	84	75
Halosulfuron + NIS	75 DF	0.053	V2	0	0	93	100	0	26
Halosulfuron + NIS	75 DF	0.072	V2	0	0	95	100	0	25
Halosulfuron +	75 DF	0.036	V2	4	3	94	100		
Bentazon + NIS	4 SL	0.84							
Halosulfuron +	75 DF	0.053	V2	6	5	97	100	93	98
Bentazon + NIS	4 SL	0.84							
Halosulfuron +	75 DF	0.036	V2	0	0	91	98	68	61
Imazethapyr + NIS	70 DF	0.036							
Halosulfuron +	75 DF	0.036	V2	11	0	97	100	81	75
Fomesafen + NIS	2 L	0.22							
Imazethapyr + NIS	70 DF	0.036	V2	0	0	93	100	21	0
Fomesafen + NIS	2 L	0.22	V2	11	0	79	80	91	91
Imazethapyr +	70 DG	0.036	V2	3	0	93	96	94	98
Bentazon + NIS	4 SL	0.84							
Cloransulam + COC[2]	84 WG	0.018	V2	10	6	84	90	18	0
Cloransulam +	84 WG	0.018	V2	14	16	78	73	43	40
Flumetsulam + COC	80 WDG	0.063							
Flumiclorac + COC	0.86 EC	0.03	V2	0	0	93	100	78	74
Bentazon +	4 SL	0.84	V2	13	3	95	96	93	99
Fomesafen + NIS	2 L	0.22							
LSD (P=.05)				4	6	5	8	7	8

continued

Table 4. Continued.

Treatment	Form.	Rate	Growth stage	Common ragweed control 2 WAT	Common ragweed control 4 WAT	Common lambsquarters control 2 WAT	Common lambsquarters control 4 WAT	Snap bean yield
		(kg ai/ha)		(%)				
Untreated check				0	0	0	0	7.1
Imazamox + NIS[1]	1 AS	0.027	V2	87	95	88	94	10.3
Imazamox + NIS	1 AS	0.038	VS	91	93	90	94	11.3
Halosulfuron + NIS	75 DF	0.053	V2	96	100	21	23	7.7
Halosulfuron + NIS	75 DF	0.072	V2	97	100	28	28	7.4
Halosulfuron +	75 DF	0.036	V2	95	100	64	63	10.8
Bentazon + NIS	4 SL	0.84						
Halosulfuron +	75 DF	0.053	V2	97	100	68	45	9.4
Bentazon + NIS	4 SL	0.84						
Halosulfuron +	75 DF	0.036	V2	94	100	84	85	9.7
Imazethapyr + NIS	70 DF	0.036						
Halosulfuron +	75 DF	0.036	V2	95	96	49	25	8.9
Fomesafen + NIS	2 L	0.22						
Imazethapyr + NIS	70 DF	0.036	V2	81	81	85	88	9.2
Fomesafen + NIS	2 L	0.22	V2	84	71	18	0	8.3
Imazethapyr +	70 DG	0.036	V2	93	97	88	93	11.8
Bentazon + NIS	4 SL	0.84						
Cloransulam + COC[2]	84 WG	0.018	V2	96	100	28	35	5.0
Cloransulam +	84 WG	0.018	V2	96	100	48	50	4.4
Flumetsulam + COC	80 WDG	0.063						
Flumiclorac + COC	0.86 EC	0.03	V2	14	0	15	19	7.3
Bentazon +	4 SL	0.84	V2	96	100	77	67	10.0
Fomesafen + NIS	2 L	0.22						
LSD (P=.05)				5	8	10	8	0.7

[1] NIS was applied at 0.25% volume per volume of water.
[2] COC was applied at 1% volume per volume of water.

Table 5. Herbicide Evaluation in Southern Peas, Fayetteville, 2000.

Treatment	Form.	Rate	Growth stage	Southern pea injury 3 WAT	Southern pea injury 6 WAT	Palmer amaranth control 3 WAT	Palmer amaranth control 6 WAT	Goosegrass control 3 WAT	Goosegrass control 6 WAT	Carpetweed control 3 WAT	Carpetweed control 6 WAT
		(kg ai/ha)		(%)							
Untreated check				0	0	0	0	0	0	0	0
S-metolachlor	7.62 EC	1.12	PRE	5	0	95	81	100	100	51	48
S-metolachlor +	7.62 EC	1.12	PRE	19	14	100	98	100	100	89	85
Flumetsulam	80 EG	0.07									
Diclosulam	84 DG	0.04	PRE	58	25	100	100	100	98	98	95
Flufenacet	60 DF	0.28	PRE	16	5	98	90	100	98	94	93
Halosulfuron	75 DF	0.029	PRE	11	3	94	85	70	43	73	49
Fomesafen	2 L	0.28	PRE	45	15	100	100	100	97	100	97
Clomazone +	3 ME	1.12	PRE	30	16	100	100	100	100	100	100
Fomesafen	2 L	0.28									
Clomazone fb	3 ME	1.12	PRE	24	25	50	88	100	100	49	43
Halosulfuron + NIS[1]	75 DF	0.029	POST								
Imazapic + NIS	70 DF	0.07	POST		6	0	93	0	86	0	89
Cloransulam + COC[2]	84 DF	0.02	POST		5	0	21	0	25	0	25
Imazamox + NIS	1 AS	0.04	POST		5	0	83	0	88	0	88
Halosulfuron + NIS	75 DF	0.029	POST		15	0	53	0	30	0	39
LSD (P=.05)				10	5	5	11	4	6	11	13

[1] NIS was applied at 0.25% volume per volume of water.
[2] COC was applied at 1% volume per volume of water.

Table 6. Herbicide Evaluation in Over-Wintered Spinach, Fayetteville, 2000.

			Growth	Spinach injury				Henbit control		
Treatment	Form.	Rate	stage	11/27/00	2/10/01	3/9/01	4/10/01	2/10/01	3/9/01	4/10/01
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Linuron	50 DF	0.11	PRE	54	88	85	53	86	95	85
Linuron	50 DF	0.22	PRE	61	90	80	65	100	100	93
Linuron	50 DF	0.33	PRE	90	100	99	94	100	100	98
S-metolachlor	7.62 EC	0.56	PRE	5	14	8	6	99	95	98
S-metolachlor	7.62 EC	0.8	PRE	21	29	20	29	100	100	100
S-metolachlor	7.62 EC	1.12	PRE	29	51	45	55	100	100	100
Dimethenamid-P	6 EC	0.28	PRE	34	49	56	56	100	100	100
Dimethenamid-P	6 EC	0.4	PRE	51	64	70	63	100	100	100
Dimethenamid-P	6 EC	0.56	PRE	49	74	88	80	100	100	100
S-metolachlor fb	7.62 EC	0.56	PRE	13	18	25	14	100	100	100
Phenmedipham	1.3 EC	0.45	EPOST							
S-metolachlor +	7.62 EC	0.56	PRE	44	61	79	61	100	100	100
linuron	50 DF	0.11								
S-metolachlor +	7.62 EC	0.56	PRE	84	90	93	86	100	100	100
linuron	50 DF	0.22								
S-metolachlor fb	7.62 EC	0.56	PRE	50	73	80	88	100	100	100
Clopyralid	3 EC	0.09	EPOST							
Flufenacet	60 WG	0.33	PRE	51	66	70	78	100	100	100
Flufenacet	60 WG	0.67	PRE	71	91	93	86	100	100	100
Quinclorac	75 DF	0.14	PRE	35	50	64	45	93	91	100
Quinclorac	75 EF	0.28	PRE	44	68	85	74	99	98	100
Clomazone	3 ME	0.11	PRE	66	88	99	91	100	100	100
Clomazone	3 ME	0.22	PRE	94	99	98	93	100	100	100
Clomazone	3 ME	0.33	PRE	95	99	99	96	100	100	100
LSD (P=.05)				13	10	12	13	3	4	4

continued.

Table 6. Continued.

Treatment	Form.	Rate	Growth stage	Pineappleweed control 2/10/01	Pineappleweed control 3/9/01	Pineappleweed control 4/10/01	Shepherdspurse control 2/10/01	Shepherdspurse control 3/9/01	Shepherdspurse control 4/10/01
		(kg ai/ha)		(%)					
Untreated check				0	0	0	0	0	0
Linuron	50 DF	0.11	PRE	100	100	98	98	96	95
Linuron	50 DF	0.22	PRE	100	100	100	100	100	95
Linuron	50 DF	0.33	PRE	100	100	100	100	100	100
S-metolachlor	7.62 EC	0.56	PRE	90	89	85	98	98	95
S-metolachlor	7.62 EC	0.8	PRE	100	100	93	100	100	98
S-metolachlor	7.62 EC	1.12	PRE	100	100	96	100	100	94
Dimethenamid-P	6 EC	0.28	PRE	100	100	93	100	100	90
Dimethenamid-P	6 EC	0.4	PRE	100	100	98	100	100	100
Dimethenamid-P	6 EC	0.56	PRE	100	100	95	100	100	98
S-metolachlor fb	7.62 EC	0.56	PRE	100	100	100	100	100	100
Phenmedipham	1.3 EC	0.45	EPOST						
S-metolachlor +	7.62 EC	0.56	PRE	100	100	98	100	100	100
linuron	50 DF	0.11							
S-metolachlor +	7.62 EC	0.56	PRE	100	100	99	100	100	98
linuron	50 DF	0.22							
S-metolachlor fb	7.62 EC	0.56	PRE	100	100	100	100	100	91
Clopyralid	3 EC	0.09	EPOST						
Flufenacet	60 WG	0.33	PRE	100	100	99	100	100	100
Flufenacet	60 WG	0.67	PRE	100	100	99	100	100	100
Quinclorac	75 DF	0.14	PRE	51	54	75	90	90	66
Quinclorac	75 EF	0.28	PRE	64	71	83	94	89	53
Clomazone	3 ME	0.11	PRE	100	100	100	100	100	100
Clomazone	3 ME	0.22	PRE	100	100	100	100	100	100
Clomazone	3 ME	0.33	PRE	100	100	99	100	100	100
LSD (P=.05)				4	7	7	2	3	9

continued

Table 6. Continued.

Treatment	Form.	Rate	Growth stage	Annual bluegrass control 2/10/01	Annual bluegrass control 3/9/01	Annual bluegrass control 4/10/01	Sibara control 2/10/01	Sibara control 3/9/01	Sibara control 4/10/01	Spinach yield
		(kg ai/ha)		(%)						(MT/ha)
Untreated check				0	0	0	0	0	0	4.7
Linuron	50 DF	0.11	PRE	100	100	100	100	100	100	2.8
Linuron	50 DF	0.22	PRE	100	100	98	100	100	100	1.3
Linuron	50 DF	0.33	PRE	100	100	98	100	100	100	1.1
S-metolachlor	7.62 EC	0.56	PRE	98	98	96	100	99	95	9.1
S-metolachlor	7.62 EC	0.8	PRE	100	100	100	100	100	100	6.7
S-metolachlor	7.62 EC	1.12	PRE	99	99	100	100	100	100	5.5
Dimethenamid-P	6 EC	0.28	PRE	100	100	100	100	100	100	6.5
Dimethenamid-P	6 EC	0.4	PRE	100	100	100	100	100	100	4.3
Dimethenamid-P	6 EC	0.56	PRE	100	100	100	100	100	98	2.4
S-metolachlor fb	7.62 EC	0.56	PRE	100	100	100	100	100	100	10.7
Phenmedipham	1.3 EC	0.45	EPOST							
S-metolachlor +	7.62 EC	0.56	PRE	100	100	100	100	100	100	6.1
linuron	50 DF	0.11								
S-metolachlor +	7.62 EC	0.56	PRE	100	100	100	100	100	100	3.6
linuron	50 DF	0.22								
S-metolachlor fb	7.62 EC	0.56	PRE	100	100	100	100	100	99	3.1
Clopyralid	3 EC	0.09	EPOST							
Flufenacet	60 WG	0.33	PRE	100	100	100	100	100	100	4.9
Flufenacet	60 WG	0.67	PRE	100	100	100	100	100	100	1.6
Quinclorac	75 DF	0.14	PRE	68	75	89	19	23	30	8.9
Quinclorac	75 EF	0.28	PRE	68	73	86	29	45	54	6.8
Clomazone	3 ME	0.11	PRE	100	100	100	99	99	91	1.7
Clomazone	3 ME	0.22	PRE	100	100	100	100	100	96	1.1
Clomazone	3 ME	0.33	PRE	100	100	100	100	100	98	1.1
LSD (P=.05)				2	2	4	4	3	5	1.2

Table 7. Evaluation of Halosulfuron for Yellow Nutsedge Control in Tomatoes, Fayetteville, 2000.

Treatment	Form.	Rate	Growth stage	Tomato injury 3 WAT	Tomato injury 6 WAT	Yellow nutsedge control 3 WAT	Yellow nutsedge control 6 WAT
		(kg ai/ha)		(%)			
Untreated check				0	0	0	0
Halosulrufon	75 DF	0.035	PRE	0	0	76	79
Halosulfuron + NIS[1]	75 DF	0.035	POST	0	0	0	75
Halosulfuron fb	75 DF	0.035	PRE	0	0	73	93
Halosulfuron + NIS[1]	75 DF	0.035	POST				
LSD (P=.05)				NS	NS	5	5

[1] NIS was applied at 0.25% volume per volume of water in POST treatments.

SPECIFIC METHODS AND RESULTS, 2001

Evaluation of Clomazone Drift on Newly-Established Native Pecans, Fayetteville, 2001 (Table 8) and 2002 (Table 9).

An experiment was conducted in Fayetteville, Ark., in 2001 and 2002 to evaluate the potential hazard from drift to pecans using various formulations of clomazone. Command 3 ME, Command 4 EC, and propanil (Stam M4) + Command 3 ME were compared by direct application to seedling pecans. The standard rate of clomazone for this soil type was 0.45 kg/ha, which is the 1X rate. Command was also used at 0.1X and 0.01X rates. Propanil was applied at a 3.3 kg/ha rate. Two seedling pecan trees, 0.75- to 1-m tall, were utilized in each plot. Seedling pecans were transplanted on 2 April 2001. Pecan trees with 5 to 9 leaves were sprayed on 18 July 2001. The experiment was repeated on the same plants and spraying was done on 7 June 2002 on 6- to 12-leaf pecans. One plant was covered and the other plant was sprayed in order to differentiate foliar from soil uptake of clomazone. Plants were observed after the first week and every two weeks thereafter in 2001 and every week in 2002 to evaluate bleaching and overall phytotoxicity.

RESULTS: Slight bleaching (whitening of leaf veins) and some leaf necrosis were observed (maximum of 8%) from 1X rate of each clomazone formulation in 2001. In 2002 with more rainfall following treatment, bleaching symptoms from both formulations of clomazone were initially higher (25% from 3 ME formulation and 30% from 4 EC formulation) 1 week following treatment. Plants recovered later in the season. In both years both formulations caused similar injury symptoms. When sprayed with the tank mix of propanil and clomazone at a 1X rate, necrosis of leaves (maximum of 62%) was observed. Minor bleaching occurred with little or no injury at the 0.1X and 0.01X rates of both formulations applied alone or in a tank-mix with propanil. The untreated plots as well as the protected plants had no visual symptoms of clomazone injury from uptake, soil volatility, or drift. New leaf development was not affected by any treatment.

Herbicide Evaluation in Watermelon (*Citrullus linatus*) and Effects of Herbicide Carryover to Overwinter Spinach and Mustard Greens, Kibler, 2001 (Table 10).

Watermelons (cv. Crimson Sweet) were planted on 25 April 2001 in plots measuring 3.6 by 9.1 m, with each plot containing one row of watermelon plants spaced 1-m apart. PRE treatments were applied 26 April (air 31ºC; soil 32ºC, moist; RH 45%) and sprinkler irrigated on 27 April to activate the PRE herbicides. POST treatments were applied on 1 June (air 28ºC; soil 27ºC, moist, RH 60%) to 2- to 3-leaf watermelon plants. Crop injury and weed control were rated 2, 3, and 4 weeks after the initial treatment and plots were harvested weekly for three weeks beginning on 10 July. Weeds present included Palmer amaranth (AMAPA), goosegrass (ELEIN), and eclipta (ECLAL).

In the fall of 2001, overwinter spinach and mustard greens were planted into the preexisting watermelon plots to determine the carryover potential of clomazone, ethalfluralin, and halosulfuron. Spinach (cv. F-380) and mustard (cv. All Top) were planted 30 October 2001 in plots measuring 1.5 by 3.0 m for each species, with each plot containing six rows of both spinach and greens spaced 23-cm apart. Ratings were taken throughout the growing season to evaluate injury of spinach and mustard.

RESULTS: Clomazone applied PRE at 0.17 or 0.34 kg/ha was very safe for use in watermelons and provided excellent ELEIN and ECLAL control, but did not effectively control AMAPA (Table 10). Ethalfluralin applied PRE at 1.26 kg/ha provided excellent early season control of AMAPA, but control greatly declined to 69% by 4 WAT. Ethalfluralin was not effective for control of ELEIN or ECLAL. Clomazone at 0.17 kg/ha + ethalfluralin at 0.63 kg/ha did cause some early stunting. Control of ELEIN and ECLAL was excellent throughout the season, but AMAPA control declined to 65% by the end of the growing season. Adding halosulfuron at 0.018 kg/ha PRE to the clomazone + ethalfluralin combination provided excellent weed control of all species throughout the growing season, but also increased stunting to 11% by the end of the growing season. Increasing the rate of halosulfuron to 0.027 kg/ha applied PRE with clomazone + ethalfluralin did not increase weed control, but did result in increased injury (21% at 4 WAT). Halosulfuron applied at 0.036 kg/ha PRE in combination with clomazone + ethalfluralin again added no benefit of increased weed control, but did result in 18%

injury at 4 WAT. Halosulfuron applied POST at 0.018 kg/ha following a PRE treatment of clomazone at 0.17 kg/ha + ethalfluralin at 0.63 kg/ha caused 8% stunting by 4 weeks after initial treatment, which was less than injury from the PRE application of halosulfuron at the same rate, but provided less control of AMAPA (85% at 4 weeks after initial treatment). Increasing the rate of halosulfuron to 0.027 kg/ha POST following clomazone + ethalfluralin provided similar results as observed from halosulfuron applied at 0.018 kg/ha. Increasing the rate of halosulfuron POST to 0.036 kg/ha following the PRE treatment of clomazone + ethalfluralin caused 14% stunting, and slightly increased AMAPA control to 92%.

Greatest yields were observed from combinations of halosulfuron applied PRE in combination with clomazone + ethalfluralin. As halosulfuron rate increased from 0.018 to 0.036 kg/ha, yield increased from 14.1 to 16.3 MT/ha. Although some injury was observed from these treatments, yields were greater due to the increased AMAPA control. POST applications of halosulfuron following clomazone + ethalfluralin resulted in less yields than PRE applications due to lower pigweed control coupled with late season injury. As rate of halosulfuron increased from 0.018 to 0.036 kg/ha, yield decreased from 11.2 to 9.0 MT/ha. Ethalfluralin alone yielded 7.0 MT/ha and clomazone + ethalfluralin yielded 7.9 MT/ha, which was greater than the clomazone alone due to increased AMAPA control.

Spinach and greens are often planted following watermelon crops, thus there has been concern of carryover from herbicides used in watermelons into fall or overwinter spinach and greens. Spinach injury was not significant following any of the watermelon treatments. More injury was observed on greens, up to 23%, than spinach early, but most of the greens had recovered by the end of the growing season, with injury ranging up to 8%. Overall, injury was minimal and did not seem to greatly affect either the spinach or mustard greens.

Preemergence Herbicide Evaluation in Snap Beans, Lowell, 2001 (Table 11).

Snap beans (cv. KSI 960) were planted 9 May 2001 in plots measuring 3 by 5 m with four rows spaced 75 cm apart. PRE treatments were applied on 10 May 2001 (air 21ºC; soil 26ºC, moist; RH 100%). Weed control and crop injury evaluations were made 2, 4, and 6 wk after planting and yield data were taken at 8 wk after planting. Weeds present at this location included common lambsquarters (CHEAL) and Italian ryegrass (LOLMU) which was present prior to seedbed preparation and continued to grow in the snapbean crop.

RESULTS: Flumiclorac PRE caused serious stand losses and stunting of the snapbeans. Both dimethenamid-P and clomazone alone and in mixtures with fomesafen and lactofen caused noticeable early stunting, but the crop recovered and final yields were good. S-metolachlor mixed with lactofen also caused this noticeable early stunting, but with good recovery in crop yield. S-metolachlor alone or with fomesafen, and flufenacet alone gave outstanding control of the weeds and caused no crop injury. Fomesafen and lactofen alone did not control the Italian ryegrass and were not as effective on common lambsquarters as other treatments.

Postemergence Herbicide Evaluation in Snap Beans, Newtonia, Mo., 2001 (Table 12).

Snap beans (cv. Hercules) were planted 16 August 2001 in plots measuring 1.5 by 5 m with two rows spaced 75 cm apart. POST treatments were applied 4 September 2001 when the snap beans were in the two trifoliate stage (air 38ºC; soil 31ºC, moist; RH 80%). Weed control and crop injury evaluations were made at 1 and 4 wk after treatment (3 and 6 wk after emergence). Yield data were taken at 8 wk after planting. Weeds present included common lambsquarters (CHEAL, 8 cm tall at application) and giant foxtail (SETFA, 10 cm at application).

RESULTS: Flufenpyr was the only treatment causing serious snap bean injury. A number of treatments including fomesafen, fluazifop, acifluorfen, imazethapyr + fomesafen, imazamox + fomesafen, and halosulfuron + fomesafen caused some mild foliar burn symptoms from which the snap beans quickly recovered. The 0.56 kg/ha rate of acifluorfen cause more persistent stunting, but yield was not reduced. Broad spectrum weed control was obtained from the fomesafen + fluazifop mixture, as well as imazethapyr or imazamox alone or in combination with bentazon and fomesafen. Yield differences between treatments were not significant, but were improved as compared to the untreated check.

Herbicide Evaluation in Southern Peas (*Vigna unguiculata* L.) and Effects of Herbicide Carryover to Overwinter Spinach and Mustard, Kibler, 2001 (Table 13).

Southern peas (cv. Early Scarlet) were planted 15 June 2001 in plots 1.6 by 5.5 m. Plots consisted of two rows spaced 0.75-m apart. PRE treatments were applied the same day as planting (air 33ºC; soil 33ºC, moist; RH 45%). POST treatments were applied 10 July 2001 (air 27ºC; soil 26ºC, moist; RH 65%) to V3 southern pea plants. Crop injury and weed control was rated throughout the growing season and plots were harvested on 5 September 2001. Weeds present included goosegrass (ELEIN), Palmer amaranth (AMAPA), red sprangletop (LEFFI), and hophornbeam copperleaf (ACCOS).

In the fall of 2001, overwinter spinach and mustard greens were planted into the preexisting southern pea plots to determine the carryover potential of these herbicides. Spinach (cv. F-380) and mustard (cv. All Top) were planted 30 October 2001 in plots measuring 1.5 by 3.0 m for each species, with each plot containing six rows of both spinach and greens spaced 23-cm apart. Ratings were taken throughout the growing season to evaluate injury to spinach and mustard.

RESULTS: Little southern pea response was seen from the various herbicides (Table 13). Sulfentrazone applied PRE at 0.45 kg/ha, caused up to 19% injury; acifluorfen applied at 0.56 kg/ha POST, caused up to 14% injury; and flufenpyr applied at 0.39 kg/ha POST, caused 10% injury. Overall, good control of ELEIN and LEFFI was observed from the PRE treatments. Halosulfuron applied PRE alone at 0.029 and 0.036 kg/ha and sulfentrazone applied at 0.22 kg/ha PRE alone did not effectively control ELEIN (59 to 61% control) and LEFFI (53 to 74% control). POST treatments that did not follow a PRE were overall less effective controlling ELEIN and LEFFI than the PRE treatments. Imazamox applied at 0.039 kg/ha was the most effective POST treatment for control of ELEIN, 89%, and LEFFI, 83%. Addition of bentazon at 0.84 kg/ha to imazamox reduced control of both ELEIN and LEFFI, which indicates some antagonism may be occurring. Flufenpyr applied POST did not effectively control ELEIN or LEFFI. Clomazone applied PRE at 0.56 kg/ha plus flumioxazin applied PRE at 0.036 kg/ha, sulfentrazone applied PRE at 0.45 kg/ha, clomazone applied PRE at 0.56 kg/ha plus sulfentrazone applied PRE at 0.28 kg/ha, pendimethalin applied PRE at 0.56 kg/ha plus imazethapyr applied PRE at 0.07 kg/ha, and pendimethalin applied PRE at 0.56 kg/ha followed by acifluorfen POST at 0.56 kg/ha were treatments that provided adequate season long control of AMAPA. All other treatments resulted in control less than 90% by the end of the growing season. Clomazone applied PRE at 0.56 kg/ha plus flumioxazin applied PRE at 0.036 kg/ha, sulfentrazone applied PRE at 0.22 and 0.45 kg/ha, clomazone applied PRE at 0.56 kg/ha plus sulfentrazone applied PRE at 0.28 kg/ha, pendimethalin applied PRE at 0.56 kg/ha plus imazethapyr applied PRE at 0.07 kg/ha, and pendimethalin applied PRE at 0.56 kg/ha followed by acifluorfen POST at 0.28 and 0.56 kg/ha were treatments that provided adequate season long control of ACCOS. All other treatments resulted in control less than 90% by the end of the growing season.

Although weed control differences were observed, few differences existed in yields between treatments. S-metolachlor applied at 1.12 kg/ha PRE, halosulfuron applied at 0.029 kg/ha PRE, imazamox applied at 0.04 kg/ha POST, and imazamox applied at 0.04 kg/ha plus bentazon applied at 0.84 kg/ha POST gave yields significantly lower than the best yielding treatment. Furthermore, these treatments did not yield higher than the untreated check. No injury was detected in these plots, therefore, low yields are attributed to lack of weed control.

Spinach and mustard greens are often planted following southern pea, and there have been concerns of carryover from herbicides used in southern peas. A few herbicides showed potential to carryover and damage spinach and greens crops. Flufenacet applied at 0.33 and 0.67 kg/ha PRE to southern peas caused 21 to 24% injury early to spinach but was reduced to 9 to 11% by the end of the growing season. Sulfentrazone applied at 0.22 and 0.45 kg/ha PRE and sulfentrazone applied at 0.28 kg/ha plus clomazone applied at 0.56 kg/ha PRE caused 61 to 74% injury to spinach early, but declined to 29 to 35% by the end of the growing season. Pendimethalin at 0.56 kg/ha plus imazethapyr at 0.07 kg/ha PRE caused 70% injury to the spinach early and 39% by the end of the growing season. The southern pea herbicides seemed to have less of an effect on greens. By the end of the growing season, pendimethalin at 0.56 kg/ha plus imazethapyr PRE at 0.07 kg/ha was the only treatment that caused substantial injury (28%) to greens.

Herbicide Evaluation in Over-Wintered Spinach, Kibler, 2001-2002 (Table 14).

Spinach (cv. F-380) was planted on 18 October 2001 in plots measuring 1.3 by 5 m with each plot containing six rows spaced 23 cm apart. PRE treatments were applied 18 October 2001 (air 18ºC, soil 17ºC, moist; RH 95%). POST treatments were applied 23 November 2001 (air 9ºC; soil 7ºC, moist). There was significant spinach stand loss due to soil-borne diseases causing variability, poor stands, and no yields were taken. Weeds present at time of POST application at Kibler included henbit (LAMAM, 5 cm), pineappleweed (MATMT, 2 cm), and cutleaf eveningprimrose (OEOLA, 2 cm). Spinach injury based on reduced growth and stands and weed control ratings were taken once in the fall on 23 November 2001, and twice the following spring on 1 February 2002 and 21 March 2002.

RESULTS: Due to seedling disease problems it was difficult to evaluate damage to the spinach from the herbicide treatments. However, there was no observable damage from S-metolachlor, fluroxypyr, clopyralid, or clethodim. Dimethenamid-P, thiobencarb, flufenacet, quinclorac, and low rates of linuron or clomazone all may have caused some early stunting, but by spring, the spinach had recovered and injury rating dropped below 30%. Severe injury was observed from the high rate of linuron, CGA-362622, and napropamide.

Herbicide Evaluation in Winter Squash (*Cucurbita maxima* Duch.), Fayetteville, 2001 (Table 15).

Winter squash (var. Super Butternut) was planted on 10 May 2001, into plots measuring 3 by 9.1 m, with each plot containing one row of winter squash spaced 0.3-m apart. PRE treatments were applied immediately after planting (air 25ºC; soil 27ºC, moist; RH 80%). POST treatments were applied to 2- to 3-leaf plants on 8 June 2001 (air 32ºC; soil 34ºC, moist; RH 58%). Crop injury and weed control was rated 2, 4, 6, and 10 weeks after emergence and plots were harvested 12 August 2001. Weed present included Palmer amaranth (AMAPA), fall panicum (PANDI), Venice mallow (HIBTR), and yellow nutsedge (CYPES).

RESULTS: No injury was noted with clomazone applied PRE at 0.33 kg/ha, ethalfluralin applied PRE at 1.26 kg/ha, or the combination of clomazone applied PRE at 0.17 kg/ha + ethalfluralin applied PRE at 0.63 kg/ha (Table 12). Clomazone provided excellent control of PANDI, but did not provide sufficient control of the other weed species. Ethalfluralin provided greater than 90% control of PANDI and AMAPA, but control of HIBTR and CYPES was poor. Halosulfuron applied PRE in combination with clomazone + ethalfluralin caused some injury but increased weed control. Halosulfuron applied PRE at 0.018 to 0.036 with clomazone + ethalfluralin caused early injury ranging from 26 to 53%, but plants recovered by the end of the season with injury ranging from 5 to 15%. Control of PANDI and AMAPA was 100% with all rates of halosulfuron in combination with clomazone + ethalfluralin. Control of HIBTR ranged from 88 to 93% and control of CYPES ranged from 80 to 86% with halosulfuron applied PRE in combination with clomazone + ethalfluralin. POST applications of halosulfuron caused much less injury than PRE applications and resulted in greater weed control. All weed control ratings were greater than 90% when halosulfuron was applied POST following PRE applications of clomazone + ethalfluralin with the exception of halosulfuron applied POST at 0.018 kg/ha following clomazone + ethalfluralin, which provided 80% control of CYPES by the end of the growing season.

Yield ranged from 4.0 to 4.6 MT/ha when plots were treated with clomazone at 0.33 kg/ha PRE, ethalfluralin at 1.26 kg/ha PRE, and the combination of clomazone at 0.17 kg/ha + ethalfluralin at 0.63 PRE. Halosulfuron applied PRE in combination with clomazone + ethalfluralin at 1.26 kg/ha reduced yield, ranging from 1.6 to 2.4 MT/ha, which was probably due to extensive injury caused early in the growing season. Although plants seemed to recover from PRE applications of halosulfuron, plant growth was delayed. POST treatments of halosulfuron following the PRE application of clomazone + ethalfluralin were among the highest yielding treatments. Halosulfuron applied at 0.036 kg/ha POST following clomazone + ethalfluralin tended to reduce yields compared to lower rates of halosulfuron POST. Halosulfuron appears to complement the existing weed control options, but must be used carefully due to squash sensitivity.

Herbicide Evaluation in Sweet Potatoes (*Ipomoea batatas* L.), Newtonia, Mo., 2001 (Table 16)

Sweet potato slips (cv. Beauregard) were transplanted on 16 May 2001 into plots 2 by 4 m. Each plot contained two bedded rows spaced 1-m apart and plant spacing within each row was 0.3 m. POST-transplant (PRE to weeds) treatments were applied 18 May (air 27º; soil 29º, wet; RH 95%). LATE POST-transplant treatments were applied on 20 June (25º; soil 27º, moist; RH 68%) to sweet potato plants with 0.25-m runners. Crop injury and weed control were rated 2, 4, 6, 8, and 12 weeks after the initial treatments and plots were harvested on 20 September 2001. Weeds present included common lambsquarters (CHEAL), goosegrass (ELEIN), and velvetleaf (ABUTH).

RESULTS: Clomazone applied POST-transplant at 0.56 kg/ha did not cause injury to sweet potatoes, but increasing the rate of clomazone to 1.12 POST transplant resulted in early season stunting (Table 10). Clomazone provided similar control of ELEIN and ABUTH regardless of rate, but increasing the rate of clomazone from 0.56 kg/ha to 1.12 kg/ha increased control of CHEAL from 59 to 89% by 12 WAT. Flufenacet is a new herbicide marketed by Bayer for use in corn, soybeans and wheat, but also has potential in many vegetable crops. Flufenacet was slightly injurious to sweet potatoes when applied POST transplant, but caused slightly more injury throughout the growing season when applied at 0.9 kg/ha compared to 0.45 kg/ha. Flufenacet applied at 0.45 kg/ha provided 85% control of ELEIN, 74% control of CHEAL, and 88% control of ABUTH, but increasing the rate of flufenacet resulted in increased control. The prepackaged combination of flufenacet/metribuzin applied 0.56 POST-transplant caused similar injury to that observed from flufenacet alone, and the addition of metribuzin appeared to improve control of CHEAL and ABUTH. Tank-mix combinations of clomazone + flufenacet and clomazone + flufenacet/metribuzin did not increase injury over flufenacet or flufenacet/metribuzin alone, but the addition of the clomazone improved control of all species to 100%. S-metolachlor applied at 0.75 and 1.5 kg/ha POST-transplant caused some early stunting, but no injury was noted by 12 WAT. Dimethenamid-P applied at 0.56 POST transplant caused some minor injury early, but increasing the rate to 1.12 kg/ha increased the level of injury to 20% by 2 WAT and declined to 8% by 12 WAT. S-metolachlor also provided better control of CHEAL and ABUTH than dimethenamid-P. Halosulfuron was also evaluated in programs with clomazone due to the lack of grass control provided by halosulfuron. Halosulfuron applied POST transplant at 0.036 kg/ha caused up to 28% injury 3 WAT but declined to 8% 12 WAT. Halosulfuron applied LATE POST transplant caused up to 40% injury and declined to 15% by 12 WAT. Although sweet potato injury was observed, weed control was excellent. Napropamide applied at 2.24 kg/ha POST transplant appeared to be safe, but ABUTH was the only weed effectively controlled. The standard program of clomazone applied at 0.56 kg/ha POST transplant follow by sethoxydim applied at 0.42 kg/ha LATE POST was similar to control from clomazone applied alone at 0.56 kg/ha.

Flufenacet applied alone or in combination with clomazone POST transplant resulted in the highest sweet potato yields, ranging from 40 to 47 MT/ha. Treatments containing flufenacet/metribuzin yielded less, probably due to injury observed from the addition of metribuzin. The excellent weed control and good sweet potato tolerance to S-metolachlor also resulted in very good yields, ranging from 39 MT/ha when S-metolachlor was applied at 0.75 kg/ha to 41 MT/ha when applied at 1.5 kg/ha. Yields from dimethenamid-P treatments were less than S-metolachlor due to less weed control and less crop safety. Clomazone alone or followed by sethoxydim resulted in low yields ranging from 31 to 37 kg/ha due to reduced weed control. The addition of halosulfuron POST transplant or LATE POST transplant to clomazone programs did improve weed control, but yields were reduced due to injury.

Evaluation of S-Metolachlor and Dimethenamid-P in Table Beets (*Beta vulgaris* L.), Fayetteville, 2001 (Table 17).

Table beets (cv. Detroit Dark Red) were planted on 2 April 2001 into plots measuring 2 by 4 m. Each plot contained two bedded rows spaced 1-m apart and two rows of table beets were planted on each row at a rate of 40 seed per m row. Treatments were applied at the 2- to 3-leaf stage on 25 April 2001 (air 18ºC; soil 19ºC, moist; RH 70%). Due to the presence of many weeds at application and the lack of postemergence control from the herbicides sprayed, row 1 was not weeded and row 2 was hand-weeded before application. Crop injury and weed control was rated 4, 6, and 8 weeks after treatments (WAT) and plots were harvested on 22 June 2001. Weeds present included common lambsquarters (CHEAL), cutleaf eveningprimrose (OEOLA), and henbit (LAMAM).

RESULTS: Control of all weed species in row 1 (unweeded) was poor when treated with dimethenamid-P at 0.74 kg/ha, but control of all species was greatly improved in row 2 (hand weeded before spraying)(Table 11). Control of OEOLA was still inadequate in row 2. Dimethenamid-P applied at 0.74 kg/ha at the 2- to 3- leaf stage did not cause injury to either row of the table beets. Increasing the rate of dimethenamid-P to 1.48 kg/ha caused some slight injury, 7% by 6 WAT. The increased rate improved weed control. Control of CHEAL was 87% in the non-weeded when treated with 1.48 kg/ha compared to 65% control when treated with 0.74 kg/ha. Control of OEOLA and LAMAM was also improved when rate of dimethenamid was increased, but overall, control was still inadequate in row 1. Control of all species in the weeded row was excellent when treated with dimethenamid-P at 1.48 kg/ha. Similar trends were observed when table beets were treated with S-metolachlor. Overall, S-metolachlor was slightly more injurious to table beets and provided lower weed control than dimethenamid-P. Pyrazon, a herbicide currently labeled in table beets, was the best overall treatment. No injury was observed and weed control was excellent in both rows when applied at 4.1 kg/ha. Some injury was noted (10%) when cycloate was applied at 4.5 kg/ha. Control in the weeded row was excellent for all species but very poor in the unweeded row.

Pyrazon applied at 4.1 kg/ha, and cycloate applied at 4.5 kg/ha were superior treatments. Results indicate that dimethenamid-P and S-metolachlor do not have an adequate ability to control weeds that have emerged. Yields were much improved in the weeded row due to the lack of competition from emerged weeds. No differences were detected in yield between dimethenamid-P or S-metolachlor at any rate. Dimethenamid-P and S-metolachlor show potential for use in table beets, but it is important to apply these materials before weeds have emerged.

Table 8. Evaluation of Clomazone Drift on Newly Established Native Pecans, Fayetteville, 2001.

Treatment	Form.	Rate	Growth stage	Pecan chlorosis 1 WAT	2 WAT	4 WAT	6 WAT	8 WAT	10 WAT
		(kg ai/ha)		(%)					
Untreated check				0	0	0	0	0	0
Clomazone	3 ME	0.45	5- to 9-lf	3	4	5	5	0	0
Clomazone	3 ME	0.045	5- to 9-lf	1	2	2	1	0	0
Clomazone	3 ME	0.0045	5- to 9-lf	1	1	1	1	0	0
Clomazone	4 EC	0.45	5- to 9-lf	3	5	8	6	0	0
Clomazone	4 EC	0.045	5- to 9-lf	1	3	4	4	0	0
Clomazone	4 EC	0.0045	5- to 9-lf	0	1	1	0	0	0
Clomazone +	3 ME	0.45	5- to 9-lf	2	5	7	12	2	0
propanil	4 EC	3.3							
Clomazone +	3 ME	0.045	5- to 9-lf	2	4	4	4	0	0
propanil	4 EC	0.33							
Clomazone +	3 ME	0.0045	5- to 9-lf	3	3	3	2	0	0
propanil	4 EC	0.033							
LSD (P=.05)				NS	3	4	6	1	NS

continued

Table 8. Continued.

Treatment	Form.	Rate	Growth stage	Pecan injury 1 WAT	2 WAT	4 WAT	6 WAT	8 WAT	10 WAT
		(kg ai/ha)		(%)					
Untreated check				0	0	0	0	0	0
Clomazone	3 ME	0.45	5- to 9-lf	2	0	0	0	0	0
Clomazone	3 ME	0.045	5- to 9-lf	2	0	0	0	0	0
Clomazone	3 ME	0.0045	5- to 9-lf	0	0	0	0	0	0
Clomazone	4 EC	0.45	5- to 9-lf	3	0	0	0	0	0
Clomazone	4 EC	0.045	5- to 9-lf	0	0	0	0	0	0
Clomazone	4 EC	0.0045	5- to 9-lf	0	0	0	0	0	0
Clomazone +	3 ME	0.45	5- to 9-lf	39	62	39	24	10	3
propanil	4 EC	3.3							
Clomazone +	3 ME	0.045	5- to 9-lf	2	4	5	3	0	0
propanil	4 EC	0.33							
Clomazone +	3 ME	0.0045	5- to 9-lf		2	3	2	0	0
propanil	4 EC	0.033							
LSD (P=.05)				5	5	6	4	1	1

Table 9. Evaluation of Clomazone Drift on 2-Year-Old Native Pecans, Fayetteville, 2002.

Treatment	Form.	Rate	Growth stage	Pecan chlorosis 1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	7 WAT
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Clomazone	3 ME	0.45	6- to 12-lf	25	18	18	10	11	10	10
Clomazone	3 ME	0.045	6- to 12-lf	11	8	6	8	5	5	5
Clomazone	3 ME	0.0045	6- to 12-lf	0	1	0	1	0	0	0
Clomazone	4 EC	0.45	6- to 12-lf	30	20	15	15	14	14	13
Clomazone	4 EC	0.045	6- to 12-lf	14	11	14	10	8	8	8
Clomazone	4 EC	0.0045	6- to 12-lf	6	4	3	3	4	3	3
Clomazone +	3 ME	0.45	6- to 12-lf	20	15	13	10	8	9	9
propanil	4 EC	3.3								
Clomazone +	3 ME	0.045	6- to 12-lf	10	12	11	6	6	5	5
propanil	4 EC	0.33								
Clomazone +	3 ME	0.0045	6- to 12-lf	5	9	6	6	6	4	4
propanil	4 EC	0.033								
LSD (P=.05)				11	8	7	6	7	6	6

continued

Table 9. Continued.

Treatment	Form.	Rate	Growth stage	Pecan injury 1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	7 WAT
		(kg ai/ha)		(%)						
Untreated check				0	0	0	0	0	0	0
Clomazone	3 ME	0.45	6- to 12-lf	6	6	5	5	4	3	3
Clomazone	3 ME	0.045	6- to 12-lf	3	2	2	2	3	3	3
Clomazone	3 ME	0.0045	6- to 12-lf	3	1	1	1	0	0	0
Clomazone	4 EC	0.45	6- to 12-lf	4	8	6	6	6	4	4
Clomazone	4 EC	0.045	6- to 12-lf	1	3	4	4	3	3	3
Clomazone	4 EC	0.0045	6- to 12-lf	2	2	1	2	1	1	1
Clomazone +	3 ME	0.45	6- to 12-lf	25	28	33	28	25	15	9
propanil	4 EC	3.3								
Clomazone +	3 ME	0.045	6- to 12-lf	8	10	10	8	13	8	8
propanil	4 EC	0.33								
Clomazone +	3 ME	0.0045	6- to 12-lf	5	3	3	3	3	3	4
propanil	4 EC	0.033								
LSD (P=.05)				7	5	6	5	9	4	5

Table 10. Herbicide Evaluation in Watermelons and Carryover Effect to Fall Greens, Kibler, 2001.

Treatment	Form.	Rate	Growth stage	Watermelon injury 2 WAT	Watermelon injury 3 WAT	Watermelon injury 4 WAT	Palmer amaranth control 2 WAT	Palmer amaranth control 3 WAT	Palmer amaranth control 4 WAT	Goosegrass control 2 WAT	Goosegrass control 3 WAT	Goosegrass control 4 WAT
		(kg ai/ha)		(%)								
Untreated check				0	0	0	0	0	0	0	0	0
Clomazone	3 ME	0.17	PRE	2	0	0	49	13	10	100	100	100
Clomazone	3 ME	0.34	PRE	6	1	0	84	44	15	100	100	100
Ethalfluralin	3 EC	1.26	PRE	0	0	0	100	84	69	50	29	0
Clomazone +	3 ME	0.17	PRE	10	4	3	98	80	65	100	100	100
ethalfluralin	3 EC	0.63										
Clomazone +	3 ME	0.17	PRE	21	19	11	100	97	93	100	100	99
ethalfluralin +	3 EC	0.63										
halosulfuron	75 EF	0.027										
Clomazone +	3 ME	0.17	PRE	34	26	21	100	98	96	100	100	99
ethalfluralin +	3 EC	0.63										
halosulfuron	75 DF	0.027										
Clomazone +	3 ME	0.17	PRE	50	34	18	100	100	98	100	100	99
ethalfluralin +	3 EC	0.63										
halosulfuron	75 DF	0.036										
Clomazone +	3 ME	0.17	PRE	3	0	7	99	88	85	100	100	100
ethalfluralin fb	3 EC	0.63										
halosulfuron + NIS[1]	75 DF	0.016	POST									
Clomazone +	3 ME	0.17	PRE	5	0	12	100	88	86	100	100	99
ethalfluralin fb	3 EC	0.63										
halosulfuron + NIS[1]	75 DF	0.024	POST									
Clomazone +	3 ME	0.17	PRE	5	0	15	100	89	92	100	100	99
ethalfluralin fb	3 EC	0.63										
halosulfuron + NIS[1]	75 DF	0.032	POST									
LSD (P=.05)				7	6	5	5	8	6	3	3	4

continued

Table 10. Continued.

			Growth	Eclipta control	Watermelon	Spinach injury		Mustard[2] injury	
Treatment	Form.	Rate	stage	2 WAT	yield	11/15/01	3/21/02	11/15/01	3/21/02
		(kg ai/ha)		(%)	(MT/ha)	(%)			
Untreated check				0	0.2	5	2	5	2
Clomazone	3 ME	0.17	PRE	100	0.2	0	0	5	0
Clomazone	3 ME	0.34	PRE	100	0.7	7	3	23	8
Ethalfluralin	3 EC	1.26	PRE	0	7.0	2	3	6	0
Clomazone +	3 ME	0.17	PRE	100	7.9	10	4	8	2
ethalfluralin	3 EC	0.63							
Clomazone +	3 ME	0.17	PRE	99	14.1	0	0	0	0
ethalfluralin +	3 EC	0.63							
halosulfuron	75 EF	0.027							
Clomazone +	3 ME	0.17	PRE	100	15.9	5	2	13	4
ethalfluralin +	3 EC	0.63							
halosulfuron	75 DF	0.027							
Clomazone +	3 ME	0.17	PRE	100	16.3	5	2	15	5
ethalfluralin +	3 EC	0.63							
halosulfuron	75 DF	0.036							
Clomazone +	3 ME	0.17	PRE	100	11.2	0	0	15	5
ethalfluralin fb	3 EC	0.63							
halosulfuron + NIS[1]	75 DF	0.016	POST						
Clomazone +	3 ME	0.17	PRE	100	9.4	7	2	17	4
ethalfluralin fb	3 EC	0.63							
halosulfuron + NIS[1]	75 DF	0.024	POST						
Clomazone +	3 ME	0.17	PRE	100	9.0	5	2	16	5
ethalfluralin fb	3 EC	0.63							
halosulfuron + NIS[1]	75 DF	0.032	POST						
LSD (P=.05)				3	4.2	6	3	9	5

[1] NIS was applied at 0.25% volume to volume of water.
[2] Fall-planted follow crop.

Table 11. Preemergence Herbicide Evaluation in Snap Beans, Lowell, Ark., 2001.

Treatment	Form.	Rate	Growth stage	Snap bean injury			Common lambsquarters control		Italian ryegrass control		Snap bean yield
				2 WAE	4 WAE	6 WAE	4 WAE	6 WAE	4 WAE	6 WAE	8 WAE
		(kg ai/ha)		(%)							(MT/ha)
Untreated check				0	0	0	0	0	0	0	9.5
S-metolachlor	7.62 EC	1.4	PRE	9	6	5	91	84	100	100	12.4
Dimethenamid-P	6 EC	0.56	PRE	18	13	5	91	89	100	100	12.4
Dimethenamid-P	6 EC	1.12	PRE	14	10	8	98	96	100	100	14.2
Clomazone	3 ME	1.12	PRE	14	13	7	99	99	99	100	14.1
Flufenacet	60 WG	0.33	PRE	6	5	5	92	84	99	93	14.3
Flufenacet	60 WG	0.67	PRE	3	3	3	98	90	100	100	15.1
Fomesafen	2 L	0.22	PRE	5	4	2	85	80	30	8	14.3
Lactofen	2 E	0.22	PRE	5	4	2	89	69	28	0	14.0
S-metolachlor +	7.62 EC	0.75	PRE	5	5	3	96	95	100	100	17.2
fomesafen	2 L	0.22									
S-metolachlor +	7.62 EC	0.75	PRE	18	9	8	98	96	100	100	13.5
lactofen	2 E	0.22									
Dimethenamid-P +	6 EC	0.56	PRE	20	15	10	98	98	100	100	14.7
fomesafen	2 L	0.22									
Dimethenamid-P +	6 EC	0.56	PRE	30	16	6	100	95	100	100	14.2
lactofen	2 E	0.22									
Clomazone +	3 ME	0.56	PRE	13	8	5	96	96	98	98	14.0
fomesafen	2 L	0.22									
Clomaone +	3 ME	0.56	PRE	15	11	6	100	99	100	99	13.4
lactofen	2 E	0.22									
Clomazone +	3 ME	0.56	PRE	74	50	41	99	98	100	100	8.4
flumiclorac	51 WDG	0.036									
LSD (P=.05)				10	7	6	8	9	5	4	2.6

Table 12. Postemergence Herbicide Evaluation in Snap Beans, Newtonia, MO, 2001.

Treatment	Form.	Rate	Growth stage	Snap bean injury 3 WAE	Snap bean injury 6 WAE	Common lambsquarters control 3 WAE	Common lambsquarters control 6 WAE	Giant foxtail control 3 WAE	Giant foxtail control 6 WAE	Snap bean yield 8 WAE
		(kg ai/ha)		(%)						(MT/ha)
Untreated check				0	0	0	0	0	0	4.2
Fomesafen	2 L	0.22	V3	0	0	91	90	29	18	9.4
Fomesafen +	2 L	0.22	V3	0	0	94	95	70	64	7.3
bentazon	4 EC	0.84								
Fomesafen: fluazifop	1.41 WC	0.39	V3	9	3	94	93	96	94	6.2
Acifluorfen	2 AS	0.28	V3	9	4	94	93	21	5	5.1
Acifluorfen	2 AS	0.56	V3	19	13	97	95	41	20	6.4
Acifluorfen + safener	2 AS	0.28	V3	8	3	90	88	21	10	5.0
Acifluorfen + safener	2 AS	0.56	V3	16	10	95	95	35	19	6.7
Imazethapyr + NIS[1]	2 AS	0.07	V3	0	0	81	74	94	95	6.1
Imazethapyr +	2 AS	0.07	V3	0	0	89	88	91	89	8.7
bentazon + NIS	4 EC	0.84								
Imazethapyr +	2 AS	0.07	V3	11	6	94	93	79	70	5.3
fomesafen + NIS	2 L	0.22								
Imazamox + NIS	1 AS	0.04	V3	0	0	81	78	93	94	7.5
Imazamox +	1 AS	0.04	V3	0	0	91	88	90	86	6.8
bentazon + NIS	4 EC	0.84								
Imazamox +	1 AS	0.04	V3	8	1	94	93	90	89	6.2
fomesafen + NIS	2 L	0.22								
Halosulfuron + NIS	75 DF	0.04	V3	0	0	29	35	0	0	6.6
Halosulfuron +	75 DF	0.04	V3	0	0	74	73	23	4	5.1
bentazon + NIS	4 EC	0.84								
Halosulfuron +	75 DF	0.04	V3	8	3	89	88	19	4	7.1
fomesafen + NIS	2 L	0.22								
Cloransulam + COC[2]	84 DF	0.018	V3	6	3	20	6	19	5	6.1
Flufenpyr + COC	57.6 WDG	0.2	V3	49	31	91	93	69	60	6.4
Flufenpyr + COC	57.6 WDG	0.4	V3	58	44	95	94	85	86	5.2
Flumiclorac + NIS	0.86 EC	0.03	V3	5	3	76	70	9	0	6.3
LSD (P=.05)				5	4	6	6	6	6	1.0

[1] NIS was applied at 0.25% volume to volume of water.
[2] COC was applied at 1% volume to volume of water.

Table 13. Herbicide Evaluation in Southern Peas, Kibler, 2001.

Treatment	Form.	Rate	Growth stage	Southern pea injury			Goosegrass control			Red sprangletop control		
				2 WAE	4 WAE	7 WAE	2 WAE	4 WAE	7 WAE	2 WAE	4 WAE	7 WAE
		(kg ai/ha)		(%)								
Untreated check				0	0	0	0	0	0	0	0	0
S-metolachlor	7.62 EC	1.12	PRE	0	0	0	100	99	93	100	99	96
Halosulfuron	75 DF	0.029	PRE	0	0	0	50	60	60	71	65	53
Halosulfuron	75 DF	0.036	PRE	0	0	0	85	70	59	85	84	74
Clomazone	3 ME	0.56	PRE	0	0	0	100	100	95	100	100	96
Clomazone +	3 ME	0.56	PRE	0	0	0	100	100	98	100	100	98
halosulfuron	75 DF	0.029										
Clomazone +	3 ME	0.56	PRE	0	0	0	100	100	99	100	100	99
flumioxazin	51 WDG	0.036	PRE									
Dimethenamid-P	6 EC	0.56	PRE	0	0	0	95	95	95	98	98	96
Flufenacet	60 WG	0.33	PRE	0	0	0	99	98	96	100	99	96
Flufenacet	60 WG	0.67	PRE	0	0	0	96	96	93	100	100	95
Sulfentrazone	75 DF	0.22	PRE	0	0	0	84	84	61	89	80	60
Sulfentrazone	75 DF	0.45	PRE	13	19	14	98	96	93	95	95	91
Clomazone +	3 ME	0.56	PRE	0	0	0	100	100	99	100	100	99
sulfentrazone	75 DF	0.28										
Pendimethalin +	3.3 EC	0.84	PRE	0	0	0	99	98	94	100	100	94
imazethapyr	2 AS	0.07										
Pendimethalin fb	3.3 EC	0.56	PRE	0	5	0	100	99	95	100	99	95
acifluorfen	2 L	0.28	POST									
Pendimethalin fb	3.3 EC	0.56	PRE	0	14	6	95	95	94	100	100	98
acifluorfen	2L	0.56	POST									
Imazamox + NIS[1]	1 AS	0.04	POST	0	0	0	0	91	89	0	93	83
Imazamox +	1 AS	0.04	POST	0	0	0	0	85	79	0	85	63
bentazon + NIS	4 SL	0.84										
Flufenpyr + NIS	58 WDG	0.18	POST	0	5	0	0	75	70	0	75	40
Flufenpyr + NIS	58 WDG	0.36	POST	0	10	5	0	63	68	0	76	26
LSD (P=.05)				1	2	2	4	6	5	4	5	6

continued

Table 13. Continued.

Treatment	Form.	Rate	Growth stage	Palmer amaranth control 2 WAE	Palmer amaranth control 4 WAE	Palmer amaranth control 7 WAE	Hophornbeam copperleaf control 2 WAE	Hophornbeam copperleaf control 4 WAE	Hophornbeam copperleaf control 7 WAE
		(kg ai/ha)		(%)					
Untreated check				0	0	0	0	0	0
S-metolachlor	7.62 EC	1.12	PRE	85	79	73	61	56	53
Halosulfuron	75 DF	0.029	PRE	89	83	79	88	88	83
Halosulfuron	75 DF	0.036	PRE	85	79	74	64	73	78
Clomazone	3 ME	0.56	PRE	81	76	68	74	65	50
Clomazone +	3 ME	0.56	PRE	94	90	86	61	51	46
halosulfuron	75 DF	0.029							
Clomazone +	3 ME	0.56	PRE	100	100	100	99	100	100
flumioxazin	51 WDG	0.036	PRE						
Dimethenamid-P	6 EC	0.56	PRE	90	88	88	61	69	59
Flufenacet	60 WG	0.33	PRE	94	84	79	78	79	83
Flufenacet	60 WG	0.67	PRE	81	60	45	75	85	89
Sulfentrazone	75 DF	0.22	PRE	88	84	84	98	94	93
Sulfentrazone	75 DF	0.45	PRE	100	100	99	100	100	99
Clomazone +	3 ME	0.56	PRE	100	99	99	100	100	99
sulfentrazone	75 DF	0.28							
Pendimethalin +	3.3 EC	0.84	PRE	100	96	94	70	60	53
imazethapyr	2 AS	0.07							
Pendimethalin fb	3.3 EC	0.56	PRE	86	84	83	59	90	91
acifluorfen	2 L	0.28	POST						
Pendimethalin fb	3.3 EC	0.56	PRE	93	90	94	59	88	96
acifluorfen	2L	0.56	POST						
Imazamox + NIS[1]	1 AS	0.04	POST	0	54	40	0	75	76
Imazamox +	1 AS	0.04	POST	0	66	79	0	61	74
bentazon + NIS	4 SL	0.84							
Flufenpyr + NIS	58 WDG	0.18	POST	0	86	89	0	95	90
Flufenpyr + NIS	58 WDG	0.36	POST	0	81	85	0	98	91
LSD (P=.05)				5	7	7	6	7	7

continued

Table 13. Continued.

Treatment	Form.	Rate	Growth stage	Southern pea yield	Spinach injury 11/15/01	Spinach injury 3/21/02	Mustard[2] injury 11/15/01	Mustard[2] injury 3/21/02
		(kg ai/ha)		(MT/ha)	(%)			
Untreated check				1.2	0	0	0	0
S-metolachlor	7.62 EC	1.12	PRE	1.5	0	0	3	1
Halosulfuron	75 DF	0.029	PRE	1.4	6	1	15	5
Halosulfuron	75 DF	0.036	PRE	1.8	10	3	10	5
Clomazone	3 ME	0.56	PRE	1.9	5	1	3	0
Clomazone +	3 ME	0.56	PRE	2.1	10	3	1	0
halosulfuron	75 DF	0.029						
Clomazone +	3 ME	0.56	PRE	2.1	13	6	10	3
flumioxazin	51 WDG	0.036						
Dimethenamid-P	6 EC	0.56	PRE	1.8	11	4	3	0
Flufenacet	60 WG	0.33	PRE	2.1	24	11	14	5
Flufenacet	60 WG	0.67	PRE	1.6	21	9	9	3
Sulfentrazone	75 DF	0.22	PRE	2.2	64	29	13	3
Sulfentrazone	75 DF	0.45	PRE	2.0	74	35	18	6
Clomazone +	3 ME	0.56	PRE	1.9	61	33	15	6
sulfentrazone	75 DF	0.28						
Pendimethalin +	3.3 EC	0.84	PRE	2.2	70	39	53	28
imazethapyr	2 AS	0.07						
Pendimethalin fb	3.3 EC	0.56	PRE	2.0	13	4	1	0
acifluorfen	2 L	0.28	POST					
Pendimethalin fb	3.3 EC	0.56	PRE	2.3	8	3	9	1
acifluorfen	2L	0.56	POST					
Imazamox + NIS[1]	1 AS	0.04	POST	1.6	13	4	16	6
Imazamox +	1 AS	0.04	POST	1.5	10	3	10	1
bentazon + NIS	4 SL	0.84						
Flufenpyr + NIS	58 WDG	0.18	POST	2.0	8	1	6	1
Flufenpyr + NIS	58 WDG	0.36	POST	1.8	4	1	4	1
LSD (P=.05)				0.5	14	7	10	6

[1] NIS was applied at 0.25% volume per volume of water.

[2] Fall-planted follow crop.

Table 14. Herbicide Evaluation in Over-Wintered Spinach, Kibler, 2001-2002.

Treatment	Form.	Rate	Growth stage	Spinach injury			Henbit control		Pineappleweed control		Cutleaf eveningprimrose control	
				11	2	3	2	3	2	3	2	3
		(kg ai/ha)		(%)								
Untreated check				0	0	0	0	0	0	0	0	0
Linuron	50 DF	0.075	PRE	59	46	31	0	0	78	58	55	39
Linuron	50 DF	0.15	PRE	80	63	51	0	0	93	85	55	44
S-metolachlor	7.62 EC	0.56	PRE	16	8	4	94	90	71	59	68	38
Dimethenamid-P	6 EC	0.25	PRE	40	28	15	96	95	81	74	90	83
Dimethenamid-P	6 EC	0.5	PRE	55	44	31	98	99	98	91	89	89
Thiobencarb	8 EC	1.5	PRE	31	24	10	75	50	0	0	33	8
Thiobencarb	8 EC	3.0	PRE	53	43	26	73	54	0	0	44	25
Flufenacet	60 WG	0.3	PRE	55	34	14	96	93	98	91	100	98
Quinclorac	75 DF	0.125	PRE	55	36	25	53	23	19	9	53	39
Clomazone	3 ME	0.05	PRE	46	35	23	100	95	81	70	54	35
Clomazone	3 ME	0.1	PRE	83	75	53	100	95	100	94	90	85
CGA-362622	75 DF	0.0046	PRE	100	91	83	100	94	90	85	100	98
CGA-362622	75 DF	0.007	PRE	100	93	88	100	99	94	89	100	100
Napropamide	75 WP	4.0	PRE	98	94	89	94	88	16	4	74	55
Napropamide	75 WP	8.0	PRE	100	96	93	99	91	15	4	21	4
Fluroxypyr	1.5 EC	0.024	POST	23	16	8	26	0	13	0	18	5
Fluroxypyr	1.5 EC	0.048	POST	33	20	10	53	35	18	0	56	38
S-metolachlor fb	7.62 EC	0.56	PRE	11	9	4	100	99	95	90	99	96
phenmedipham	1.3 EC	0.4	POST									
S-metolachlor +	7.62 EC	0.56	PRE	54	43	28	100	99	93	85	91	86
linuron	50 DF	0.075										
S-metolachlor +	7.62 EC	0.56	PRE	81	73	60	100	96	96	91	95	89
linuron	50 DF	0.15										
S-metolachlor fb	7.62 EC	0.56	PRE	13	9	3	100	96	99	95	98	93
clopyralid	3 EC	0.08	POST									
S-metolachlor fb	7.62 EC	0.56	PRE	13	8	1	100	98	96	91	95	86
clethodim	2 EC	0.03	POST									
S-metolachlor fb	7.62 EC	0.56	PRE	11	8	3	100	96	98	93	95	88
clethodim	2 EC	0.06	POST									
LSD (P=.05)				7	9	10	8	9	6	7	10	10

Table 15. Herbicide Evaluation in Winter Squash, Fayetteville, 2001.

Treatment	Form.	Rate	Growth stage	Squash injury 2 WAE	Squash injury 4 WAE	Squash injury 6 WAE	Squash injury 10 WAE	Yellow nutsedge control 2 WAE	Yellow nutsedge control 4 WAE	Yellow nutsedge control 6 WAE	Yellow nutsedge control 10 WAE
		(kg ai/ha)		(%)							
Untreated check				0	0	0	0	0	0	0	0
Clomazone	3 ME	0.34	PRE	0	0	0	0	0	0	0	0
Ethalfluralin	3 EC	1.25	PRE	0	0	0	0	23	19	15	10
Clomazone +	3 ME	0.17	PRE	0	0	0	0	26	20	15	13
ethalfluralin	3 EC	0.63									
Clomazone +	3 ME	0.17	PRE	26	14	10	5	91	89	85	80
ethalfluralin +	3 EC	0.63									
halosulfuron	75 DF	0.018	PRE								
Clomazone +	3 ME	0.17	PRE	44	28	16	11	95	93	88	84
ethalfluralin +	3 EC	0.63									
halosulfuron	75 DF	0.027									
Clomazone +	3 ME	0.17	PRE	53	16	26	15	97	94	91	86
ethalfluralin +	3 EC	0.63									
halosulfuron	75 DF	0.036									
Clomazone +	3 ME	0.17	PRE	0	8	5	3	23	88	83	80
ethalfluralin fb	3 EC	0.63									
halosulfuron + NIS[1]	75 DF	0.016	POST								
Clomazone +	3 ME	0.17	PRE	0	9	6	3	26	91	96	96
ethalfluralin fb	3 EC	0.63									
halosulfuron + NIS	75 DF	0.024	POST								
Clomazone +	3 ME	0.17	PRE	0	19	15	9	24	86	95	95
ethalfluralin fb	3 EC	0.63									
halosulfuron + NIS	75 DF	0.032	POST								
LSD (P=.05)				7	6	6	4	4	5	5	4

continued

Table 15. Continued.

Treatment	Form.	Rate	Growth stage	Fall panicum control 2 WAE	Fall panicum control 4 WAE	Fall panicum control 6 WAE	Fall panicum control 10 WAE	Palmer amaranth control 2 WAE	Palmer amaranth control 4 WAE	Palmer amaranth control 6 WAE	Palmer amaranth control 10 WAE
		(kg ai/ha)		(%)							
Untreated check				0	0	0	0	0	0	0	0
Clomazone	3 ME	0.34	PRE	100	100	100	100	33	36	34	34
Ethalfluralin	3 EC	1.25	PRE	100	90	90	90	100	91	93	93
Clomazone +	3 ME	0.17	PRE	100	100	100	100	100	100	100	100
ethalfluralin	3 EC	0.63									
Clomazone +	3 ME	0.17	PRE	100	100	100	100	100	100	100	100
ethalfluralin +	3 EC	0.63									
halosulfuron	75 DF	0.018	PRE	100	100	100	100	100	100	100	100
Clomazone +	3 ME	0.17	PRE	100	100	100	100	100	100	100	100
ethalfluralin +	3 EC	0.63									
halosulfuron	75 DF	0.027									
Clomazone +	3 ME	0.17	PRE	100	100	100	100	100	100	100	100
ethalfluralin +	3 EC	0.63									
halosulfuron	75 DF	0.036									
Clomazone +	3 ME	0.17	PRE	100	100	100	100	100	100	100	100
ethalfluralin fb	3 EC	0.63									
halosulfuron + NIS[1]	75 DF	0.016	POST								
Clomazone +	3 ME	0.17	PRE	100	100	100	100	100	100	100	100
ethalfluralin fb	3 EC	0.63									
halosulfuron + NIS	75 DF	0.024	POST								
Clomazone +	3 ME	0.17	PRE	100	100	100	100	100	100	100	100
ethalfluralin fb	3 EC	0.63									
halosulfuron + NIS	75 DF	0.032	POST								
LSD (P=.05)				3	3	3	3	2	4	2	2

continued

Table 15. Continued.

Treatment	Form.	Rate	Growth stage	Venice mallow control 2 WAE	4 WAE	6 WAE	10 WAE	Squash yield 12 WAE
		(kg ai/ha)		----- (%) -----				(MT/ha)
Untreated check				0	0	0	0	1.4
Clomazone	3 ME	0.34	PRE	90	80	75	69	4.6
Ethalfluralin	3 EC	1.25	PRE	74	60	46	38	4.0
Clomazone +	3 ME	0.17	PRE	88	85	80	73	3.6
ethalfluralin	3 EC	0.63						
Clomazone +	3 ME	0.17	PRE	99	99	94	89	1.6
ethalfluralin +	3 EC	0.63						
halosulfuron	75 DF	0.018						
Clomazone +	3 ME	0.17	PRE	100	100	98	93	1.9
ethalfluralin +	3 EC	0.63						
halosulfuron	75 DF	0.027						
Clomazone +	3 ME	0.17	PRE	100	99	95	88	2.4
ethalfluralin +	3 EC	0.63						
halosulfuron	75 DF	0.036						
Clomazone +	3 ME	0.17	PRE	95	98	96	90	6.4
ethalfluralin fb	3 EC	0.63						
halosulfuron + NIS[1]	75 DF	0.016	POST					
Clomazone +	3 ME	0.17	PRE	99	99	100	100	8.7
ethalfluralin fb	3 EC	0.63						
halosulfuron + NIS	75 DF	0.024	POST					
Clomazone +	3 ME	0.17	PRE	98	99	100	100	4.7
ethalfluralin fb	3 EC	0.63						
halosulfuron + NIS	75 DF	0.032	POST					
LSD (P=.05)				6	6	5	4	0.8

[1] NIS was applied at 0.25% volume per volume of water.

Table 16. Herbicide Evaluation in Sweet Potatoes, Newtonia, MO, 2001.

			Growth	Sweet potato injury					Goosegrass control				
Treatment	Form.	Rate	stage	2 WAT	4 WAT	6 WAT	8 WAT	12 WAT	2 WAT	4 WAT	6 WAT	8 WAT	12 WAT
		(kg ai/ha)		(%)									
Untreated check				0	0	0	0	0	0	0	0	0	0
Clomazone	3 ME	0.56	POST tr.[1]	4	4	0	0	0	100	100	98	98	90
Clomazone	3.ME	1.12	POST tr.	11	10	5	1	0	100	100	100	94	90
S-metolachlor	7.62 EC	0.75	POST tr.	8	5	0	0	0	100	100	100	96	93
S-metolachlor	7.62 EC	1.5	POST tr.	13	8	0	1	0	100	100	100	100	100
Dimethenamid-P	6 EC	0.56	POST tr.	6	6	3	0	0	100	100	100	99	98
Dimethenamid-P	6 EC	1.12	POST tr.	16	20	15	8	8	100	100	100	100	100
Flufenacet	60 WG	0.45	POST tr.	10	10	8	3	0	100	99	100	93	85
Flufenacet	60 WG	0.9	POST tr.	14	13	13	8	5	100	100	100	99	94
Flufenacet + metribuzin	68 WG	0.56	POST tr.	13	13	13	10	8	100	100	100	95	88
Napropamide	50 DF	2.24	POST tr.	6	3	0	0	0	93	88	83	79	78
Clomazone +	3 ME	0.56	POST tr.	11	10	6	5	1	100	100	100	100	100
flufenacet	60 WG	0.45											
Clomazone +	3 ME	0.56	POST tr.	23	23	26	20	10	100	100	100	100	100
flufenacet + metribuzin	68 WG	0.56											
Clomazone +	3 ME	0.56	POST tr.	23	25	28	18	8	100	100	100	100	100
hallosulfuron	75 DF	0.036											
Clomazone fb	3 ME	0.56	POST tr.	5	4	40	23	15	100	100	100	100	100
halosulfuron + NIS[2]	75 DF	0.036	LATE POST tr.										
Clomazone +	3 ME	0.56	LATE POST tr.	0	0	0	0	0	100	100	100	100	100
sethoxydim + COC[3]	1.5 EC	0.42											
LSD (P=.05)				4	4	3	3	3	1	2	2	5	4

continued

Table 16. Continued.

Treatment	Form.	Rate	Growth stage	Common lambsquarters control 2 WAT	4 WAT	6 WAT	8 WAT	12 WAT	Velvetleaf control 2 WAT	4 WAT	6 WAT	8 WAT	12 WAT	Sweet potato yield
		(kg ai/ha)		----	----	----	----	----	(%)	----	----	----	----	(MT/ha)
Untreated check				0	0	0	0	0	0	0	0	0	0	25.9
Clomazone	3 ME	0.56	POST tr.[1]	100	98	88	75	59	100	100	100	100	100	31.0
Clomazone	3.ME	1.12	POST tr.	100	100	99	94	89	100	100	100	100	100	37.4
S-metolachlor	7.62 EC	0.75	POST tr.	99	99	3	88	84	100	100	100	100	100	39.2
S-metolachlor	7.62 EC	1.5	POST tr.	100	100	95	90	88	100	100	99	99	98	41.1
Dimethenamid-P	6 EC	0.56	POST tr.	100	93	85	79	75	99	98	93	85	75	34.4
Dimethenamid-P	6 EC	1.12	POST tr.	99	95	90	85	81	98	98	90	88	80	37.5
Flufenacet	60 WG	0.45	POST tr.	99	93	86	78	74	100	100	95	91	88	46.6
Flufenacet	60 WG	0.9	POST tr.	100	94	90	83	76	100	100	100	100	100	40.4
Flufenacet + metribuzin	68 WG	0.56	POST tr.	100	100	100	99	99	100	100	100	100	100	38.0
Napropamide	50 DF	2.24	POST tr.	100	95	91	86	85	100	99	100	100	100	36.6
Clomazone + flufenacet	3 ME 60 WG	0.56 0.45	POST tr.	100	100	100	100	100	100	100	100	100	100	41.4
Clomazone + flufenacet + metribuzin	3 ME 68 WG	0.56 0.56	POST tr.	100	100	100	100	100	100	100	100	98	98	35.1
Clomazone + halosulfuron	3 ME 75 DF	0.56 0.036	POST tr.	100	100	100	100	100	100	100	100	100	100	35.5
Clomazone fb halosulfuron + NIS[2]	3 ME 75 DF	0.56 0.036	POST tr. LPOST tr.	100	100	100	100	100	100	100	100	100	100	35.8
Clomazone + sethoxydim + COC[3]	3 ME 1.5 EC	0.56 0.42	LPOST tr.	95	85	100	70	60	100	100	100	100	100	32.9
LSD (P=.05)				2	4	5	6	6	2	3	3	3	4	6.8

[1] POST tr. = POST transplant, applied 2 days after transplanting sweet potato; LPOST tr. = late POST transplant, applied 35 days after transplanting sweet potato.
[2] NIS was applied at 0.25% volume per volume of water.
[3] COC was applied at 1% volume per volume of water.

Table 17. Evaluation of S-metoalchlor and Dimethenamid-P in Table Beet, Fayetteville, 2001.

Treatment	Form.	Rate	Growth stage	Table beets injury 2 WAT	Table beets injury 4 WAT	Table beets injury 6 WAT	Common lambsquarters control 2 WAT	Common lambsquarters control 4 WAT	Common lambsquarters control 6 WAT	Cutleaf eveningprimrose control 2 WAT	Cutleaf eveningprimrose control 4 WAT	Cutleaf eveningprimrose control 6 WAT	Henbit control 2 WAT	Table beet yield
		(kg ai/ha)		(%)										(MT/ha)
ROW 1 - weeds present at application														
Untreated check				0	0	0	0	0	0	0	0	0	0	3.1
Dimethenamid-P	6 EC	0.74	2-lf	5	5	0	85	77	65	53	23	10	42	4.1
Dimethenamid-P	6 EC	1.48	2-lf	13	10	7	90	87	87	47	18	17	58	5.6
S-metolachlor	7.62 EC	0.75	2-lf	8	8	5	95	75	57	27	10	10	27	4.5
S-metolachlor	7.62 EC	1.5	2-lf	13	12	12	80	57	42	53	22	12	47	5.2
Pyrazon	67.7 DF	4.1	2-lf	0	0	0	97	95	93	95	95	100	93	10.7
Cycloate	6 EC	4.5	2-lf	12	10	10	88	57	25	68	27	10	50	5.6
LSD (P=.05)				6	4	3	10	11	15	12	6	8	12	2.5
ROW 2 - hand-weeded prior to application														
Untreated check				0	0	0	95	90	88	93	93	90	95	8.0
Dimethenamid-P	6 EC	0.74	2-lf	5	5	0	97	95	93	83	77	73	93	11.3
Dimethenamid-P	6 EC	1.48	2-lf	13	10	7	100	100	100	100	98	97	97	12.2
S-metolachlor	7.62 EC	0.75	2-lf	8	8	5	98	97	98	97	77	67	92	10.5
S-metolachlor	7.62 EC	1.5	2-lf	13	12	12	100	98	98	98	82	67	97	10.9
Pyrazon	67.7 DF	4.1	2-lf	0	0	0	97	100	100	100	100	100	100	16.7
Cycloate	6 EC	4.5	2-lf	12	10	10	100	100	98	93	90	87	95	14.1
LSD (P=.05)				8	4	3	4	5	6	7	11	15	5	3.6

SPECIFIC METHODS AND RESULTS, 2002

Evaluation of Herbicides for Ornamental Gourd, Fayetteville, 2002 (Table 18).

Ornamental gourd (var. Apple Gourd) were hand-planted 1 ft apart in a single row spaced 6.7 ft apart for each plot on 16 July 2002. PRE treatments were applied immediately after planting (air 83ºF; soil 85ºF, moisture adequate; RH 58%). POST treatments were applied to 2- to 3-leaf gourd plants on 12 August 2002 (air 76ºF; soil 73ºF, moisture adequate; RH 78%). Weeds present included: yellow nutsedge - 4 to 5 in, 10/sq ft; goosegrass - 2 to 3 in, 5/sq ft; and johnsongrass - 5 to 6 in, 10/sq ft.

RESULTS: Gourd was tolerant to the 2.5 pt/acre of Strategy PRE, but the 2 X rate caused slight (21%) early injury, from which they rapidly recovered. Sandea at 0.33 oz/acre PRE caused 21 to 30% early stunting of gourd with recovery to 11% at 8 wk after planting and 0.67 oz/acre PRE caused 41 to 45% stunting with recovery to 20% stunting at 8 wk after planting. The sequential treatment with Sandea at 0.33 oz/acre early POST maintained the stunting at 30% throughout the 8 wk period after planting. The higher rate of Sandea applied sequentially PRE followed by POST severely stunted the gourd (65%). Basagran applied POST caused some slight symptoms (11% at 1 pt/acre and 14% at 1 qt/acre). Strategy at 2.5 pt/acre was very effective in goosegrass control. Sandea was very effective in yellow nutsedge control with the low rate PRE giving 76% control after 8 wk and the high rate applied sequentially PRE followed by POST giving 100% control. Select controlled the johnsongrass early, but a repeat treatment would have been needed to maintain control. The experiment was eventually lost to the heavy johnsongrass infestation and was not harvested.

Herbicide Evaluation in Snap Beans, Fayetteville, 2002 (Table 19).

Snap beans (cv. Hercules) were planted 25 April 2002, in conventionally tilled plots measuring 6.67 by 17 ft with two rows spaced 40 in apart. PRE treatments were applied the same day following planting (air 48ºF; soil 46ºF, moist; RH 52%). Weed control and crop injury evaluations were made at 3, 5, and 7 wk after planting, and yields were taken approximately 8 wk after planting. Weeds present at this location included common lambsquarters (CHEAL), yellow nutsedge (CYPES), carpetweed (MOLVE), Palmer amaranth (AMAPA), eclipta (ECLAL), and goosegrass (ELEIN).

RESULTS: There seemed to be good tolerance of snap beans to several of the experimental herbicides: dimethenamid-P, PRE; fomesafen, PRE; imazethapyr, PRE; halosulfuron, PRE and POST; acifluorfen (Ultra Blazer), POST; imazamox POST; imazamox + bentazon, POST; imazamox + fomesafen, POST; halosulfuron + bentazon, POST; halosulfuron + fomesafen, POST; fluicloric, POST; and chloransulam, POST. Acifluorfen (Blazer), POST; flufenpyr, POST; and carfentrazone caused excessive injury. Halosulfuron was outstanding on yellow nutsedge, but dimethenamid-P, imazethapyr, bentazon, imazamox, chloransulam, flufenpyr, and S-metolachlor were also good. Dimethenamid-P treatments, clomazone + pendimethalin, and chloransulam gave lower yields than standard treatments. Good yields resulted, where injury was low, and weed control was excellent with S-metolachlor, PRE; imazethapyr, PRE; S-metolachlor + halosulfuron, PRE; imazamox + fomesafen, POST; halosulfuron, POST; halosulfuron + bentazon, POST; halosulfuron + fomesafen, POST; and S-metolachlor, PRE fb imazamox, halosulfuron, or fomesafen POST.

Evaluation of Herbicide Programs in Southern Peas, Kibler, 2002 (Table 20).

Southern peas (cv. Early Scarlet) were planted 16 June 2002 in plots 1.6 by 5.5 m. Plots consisted of two rows spaced 0.75-m apart. PRE treatments were applied 19 July (air 75ºF; soil 72ºF, moist; RH 68%). POST treatments were applied 10 June 2002 (air 83ºF; soil 81ºF, moist; RH 56%) to V4 southern pea plants. Crop injury and weed control was rated throughout the growing season and plots were harvested on 29 August 2002. Weeds present included goosegrass (ELEIN), Palmer amaranth (AMAPA), and carpetweed (MOLVE).

RESULTS: Some herbicides caused serious injury to the southernpea (Table 16). Sulfentrazone applied PRE at 0.2 lb/acre caused up to 36%, sulfentrazone at 0.4 lb/acre caused up to 76% injury. Mild symptoms, 5 to 11% injury were noticed from halosulfuron PRE, metolachlor PRE, First Rate POST, and flufenpyr POST. All treatments, except imazamox alone POST (63 to 65%), imazamox mixed with bentazon POST (79%), and flufenpyr POST (81%) gave excellent control of Palmer amaranth (96 to 100% control). All treatments except halosulfuron, imazamox, and flufenpyr gave >90% control of goosegrass. High yielding treatments included metolachlor PRE, Outlook PRE, clomazone + flumioxazin PRE, flufenacet PRE, and pendimethalin PRE fb acifluorfen (Ultra Blazer) POST.

Herbicide Evaluation in Fall Greens, Kibler, 2002 (Table 21).

Collard (cv. Champion), kale (cv. Premier), mustard (cv. Southern Giant Curled), and turnip (cv. All Top) greens were planted 3 September 2002 in four rows on 5 ft beds, spaced 7 in apart, each row with one of the four crops. Plots were 20 ft long. PRE treatments were applied 4 September (air 86ºF; soil 84ºF, moist; RH 48%) and POST treatments were applied 25 September (air 82ºF; soil 81ºF, moist; RH 56%) when the greens were all 2 to 6 in. tall.

RESULTS: The major interest in this test was to determine the tolerances of the southern greens to the various herbicide treatments. Trifluralin and DCPA are the current standard herbicides for all of these crops and these treatments were used to compare the crop injury ratings and crop yield from the experimental treatments. Trifluralin fb DCPA was also well tolerated by the various greens. All four greens crops were generally tolerant to sulfentrazone at 0.075 lb/acre PRE, thiobencarb at 1.5 to 3 lb/acre PRE, S-metolachor at 0.5 lb/acre PRE, and pendimethalin at 0.25 PRE fb clopyralid at 0.1 to 0.2 lb/acre POST. There was insufficient tolerance by the various greens to sulfentrazone at 0.15 lb/acre PRE, pendimethalin at 0.5 and 1 lb/acre PRE, S-metolachlor at 1 lb/acre PRE, and dimethenamid-P at 0.5 and 1 lb/acre PRE. The crops treated with pendimethalin at 0.25 lb/acre were not injured early, but the addition of oxyfluorfen at 0.125 and 0.25 lb/acre POST caused some mild injury to collard, mustard and turnip, but kale seemed more tolerant.

Evaluation of S-Metolachlor and Dimethenamid-P in Table Beets, Fayetteville, 2002 (Table 22).

Table beets (cv. Detroit Dark Red) were planted on 1 April 2002 into plots measuring 2 by 4 m. Each plot contained three rows spaced 30-cm apart at a rate of 40 seed per m row. Treatments were applied at the 2- to 3-leaf stage on 30 April 2002 (air 17ºC; soil 17ºC, moist; RH 70%). Crop injury and weed control was rated 2, 3, and 6 weeks after treatments (WAT) and plots were harvested on 1 July 2002. Weeds present included common lambsquarters (CHEAL), cutleaf eveningprimrose (OEOLA), and yellow nutsedge (CYPES).

RESULTS: Pyrazon, the industry standard, gave excellent control of all weeds and beet yields were the highest. There was slight retardation in beet growth from the higher rate of dimethenamid-P and S-metolachlor, but beet yields were not reduced compared to lower rates. Dimethenamid-P and S-metolachlor gave fair control of common lambsquarters, especially at the higher rate, but very poor control of cutleaf eveningprimrose.

Herbicide Evaluation in Grapes, Fayetteville, 2002 (Table 23).

Three-year-old Concord grapes were used to evaluate promising herbicides. Plots were 30 ft long with a 4 ft treated swath of the 12 ft row spacing. There were 3 grape plants per plot with 4 replications. All treatments were initially applied in a mixture of paraquat at 0.9 lb/acre on 29 April. The repeat POST treatments were applied 15 May.

RESULTS: There were no observable responses of the grape vines to any treatment indicating excellent tolerance. Crabgrass control was excellent from all treatments through 5 wk, then some treatments began to break lose efficiency. Azafenidin at 0.5 to 1 lb/acre applied in April, and azafenidin at 0.375 lb/acre repeated in April and May were the most persistent treatments. The 1 lb/acre treatment was also very effective on bermudagrass throughout the growing season. The untreated check and the low rate of flumioxazin, 0.5 lb/acre, were the only treatments with significantly lower yields than the other treated plots. Inexplicably, flumioxazin at 0.375 lb/acre repeated, gave significantly greater yields than any other treatments.

Table 18. Herbicide Evaluation in Ornamental Gourds, Fayetteville, 2002.

			Growth	Gourd injury			Yellow nutsedge control		
Treatment	Form.	Rate	stage	2 WAE	4 WAE	6 WAE	2 WAE	4 WAE	6 WAE
				(%)					
Untreated check				0	0	0	0	0	0
Strategy[1]	2.1 EC	2.5 pt/acre	PRE	8	1	0	0	0	0
Strategy	2.1 EC	5 pt/acre	PRE	21	6	1	0	0	0
Strategy fb	2.1 EC	2.5 pt/acre	PRE	6	0	0	0	0	0
Select + COC[2]	2 EC	1 qt/acre	POST						
Strategy +	2.1 EC	2.5 pt/acre	PRE	30	19	11	89	80	76
Sandea	75 DF	0.33 oz/acre							
Strategy +	2.1 EC	2.5 pt/acre	PRE	45	29	20	95	91	89
Sandea	75 DF	0.67 oz/acre							
Strategy +	2.1 EC	2.5 pt/acre	PRE	21	33	28	91	96	94
Sandea fb	75 DF	0.33 oz/acre							
Sandea + NIS[3]	75 DF	0.33 oz/acre	POST						
Strategy +	2.1 EC	.25 pt/acre	PRE	41	68	65	96	100	100
Sandea fb	75 DF	0.67 oz/acre							
Sandea + NIS	75 DF	0.67 oz/acre	POST						
Strategy fb	2.1 EC	2.5 pt/acre	PRE	6	11	3	0	64	51
Basagran + COC	4 SL	1 pt/acre	POST						
Strategy fb	2.1 EC	2.5 pt/acre	PRE	6	14	8	0	80	61
Basagran + COC	4 SL	1 qt/acre	POST						
LSD (P=.05)				5	4	4	2	4	4

continued

Table 18. Continued.

Treatment	Form.	Rate	Growth stage	Goosegrass control 2 WAE	Goosegrass control 4 WAE	Goosegrass control 6 WAE	Johnsongrass control 2 WAE	Johnsongrass control 4 WAE	Johnsongrass control 6 WAE
				(%)					
Untreated check				0	0	0	0	0	0
Strategy	2.1 EC	2.5 pt/acre	PRE	94	84	80	94	66	20
Strategy	2.1 EC	5 pt/acre	PRE	96	93	84	94	66	21
Strategy fb	2.1 EC	2.5 pt/acre	PRE	93	96	93	96	91	76
Select + COC[2]	2 EC	1 qt/acre	POST						
Strategy +	2.1 EC	2.5 pt/acre	PRE	94	83	71	95	59	16
Sandea	75 DF	0.33 oz/acre							
Strategy +	2.1 EC	2.5 pt/acre	PRE	94	83	70	96	69	13
Sandea	75 DF	0.67 oz/acre							
Strategy +	2.1 EC	2.5 pt/acre	PRE	93	84	73	96	66	20
Sandea fb	75 DF	0.33 oz/acre							
Sandea + NIS[3]	75 DF	0.33 oz/acre	POST						
Strategy +	2.1 EC	.25 pt/acre	PRE	94	85	70	95	61	15
Sandea fb	75 DF	0.67 oz/acre							
Sandea + NIS	75 DF	0.67 oz/acre	POST						
Strategy fb	2.1 EC	2.5 pt/acre	PRE	93	83	71	98	61	15
Basagran + COC	4 SL	1 pt/acre	POST						
Strategy fb	2.1 EC	2.5 pt/acre	PRE	95	84	73	93	64	19
Basagran + COC	4 SL	1 qt/acre	POST						
LSD (P=.05)				4	5	5	4	12	9

[1] Strategy contains ethylfluralin 1.6 lb/gal + clomazone 0.5 lb/gal; Sandea contains halosulfuron, 75%; and Basagran contains bentazon, 4 lb/gal.

[2] COC was applied at 1% volume per volume of water.

[3] NIS was applied at 0.25% volume per volume of water.

Table 19. Herbicide Evaluation ins Snap Beans, Fayetteville, 2002.

Treatment	Form.	Rate	Growth stage	Snap bean injury 5-14	Snap bean injury 5-29	Snap bean injury 6-13	Yellow nutsedge control 5-14	Yellow nutsedge control 5-29	Yellow nutsedge control 6-13	Common lambsquarters control 5-14	Common lambsquarters control 5-29	Common lambsquarters control 6-13	Carpetweed control 5-14	Carpetweed control 5-29	Carpetweed control 6-13
		(lb/acre)		(%)											
Untreated check				0	0	0	0	0	0	0	0	0	0	0	0
S-Metolachlor	7.62 EC	0.5	PRE	0	0	0	90	84	81	95	93	95	83	78	78
Dimethenamid-P	6 EC	0.5	PRE	0	0	0	86	76	73	100	100	96	68	59	54
Dimethenamid-P	6 EC	1.0	PRE	0	0	0	95	86	81	100	99	98	79	71	63
Clomazone + pendimethalin	3 ME 3.3 EC	0.25 0.5	PRE	0	0	0	46	36	31	100	100	99	65	65	61
Fomesafen	2 L	0.25	PRE	0	0	0	70	61	55	100	98	96	98	95	94
Imazethapyr	70 DF	0.036	PRE	0	0	0	96	95	91	100	100	99	100	100	98
Halosulfuron	75 DF	0.032	PRE	0	0	0	100	100	99	100	100	100	98	91	93
S-Metolachlor + halosulfuron	7.62 EC 75 DF	0.5 0.032	PRE	0	0	0	100	100	100	100	100	100	100	100	98
Fomesafen + NIS[1] + AG-98	2 L	0.2	POST	0	0	0	0	74	66	0	71	59	0	99	95
Fomesafen + bentazon + COC[2]	2 L 4 EC	0.2 0.75	POST	0	0	0	0	93	89	0	96	100	0	100	99
Acifluorfen + NIS	2 EC	0.25	POST	10	6	4	0	45	36	0	95	95	0	91	94
Acifluorfen + NIS	2 EC	0.5	POST	25	16	13	0	43	26	0	95	94	0	94	95
Imazamox + NIS	1 L	0.036	POST	0	0	0	0	90	81	0	95	93	0	61	50
Imazamox + bentazon + NIS	1 L 4 EC	0.036 0.75	POST	0	0	0	0	94	93	0	95	95	0	64	56
Imazamox + fomesafen + NIS	1 L 2 L	0.035 0.2	POST	0	0	0	0	91	88	0	97	95	0	95	99
Halosulfuron + NIS	75 DF	0.032	POST	0	0	0	0	95	99	0	86	85	0	30	24
Halosulfuron + bentazon + NIS	75 DF 4 EC	0.032 0.75	POST	0	0	0	0	95	98	0	93	93	0	46	36
Halosulfuron + fomesafen + NIS	75 DF 2 L	0.032 0.2	POST	0	0	0	0	93	93	0	93	89	0	95	99
Chloransulam + COC	84 DF	0.016	POST	0	5	3	0	88	81	0	41	31	0	71	74
Flufenpyr + COC	57.6 WDG	0.18	POST	0	46	33	0	93	94	0	100	100	0	100	100
Flufenpyr + COC	57.6 WDG	0.36	POST	0	78	61	0	95	97	0	100	100	0	100	100

continued

Table 19. Continued.

Treatment	Form.	Rate	Growth stage	Snap bean injury 5-14	Snap bean injury 5-29	Snap bean injury 6-13	Yellow nutsedge control 5-14	Yellow nutsedge control 5-29	Yellow nutsedge control 6-13	Common lambsquarters control 5-14	Common lambsquarters control 5-29	Common lambsquarters control 6-13	Carpetweed control 5-14	Carpetweed control 5-29	Carpetweed control 6-13
		(lb/acre)		(%)											
Flumiclorac + COC	0.86 EC	0.027	POST	0	6	4	0	40	30	0	93	88	0	29	28
S-Metolachlor fb carfentrazone + NIS	7.62 EC 2 EC	0.5 0.025	PRE POST	0	73	56	91	94	90	100	100	99	98	99	95
S-Metolachlor fb halosulfuron + NIS	7.62 EC 75 DF	0.5 0.032	PRE POST	0	0	0	93	100	99	100	100	98	98	98	95
S-Metolachlor fb imazamox + NIS	7.62 EC 1 L	0.5 0.036	PRE POST	0	0	0	91	97	96	100	100	99	100	100	100
S-Metolachlor fb fomesafen + NIS	7.62 EC 2 L	0.5 0.2	PRE POST	0	0	0	91	98	95	100	100	100	100	100	100
LSD (P=.05)				1	4	3	4	6	9	0	5	8	4	8	10

continued

Table 19. Continued.

Treatment	Form.	Rate	Growth stage	Palmer amaranth control 5-14	Palmer amaranth control 5-29	Palmer amaranth control 6-13	Eclipta control 5-14	Eclipta control 5-29	Eclipta control 6-13	Goosegrass control 5-14	Goosegrass control 5-29	Goosegrass control 6-13	Snap bean yield
		(lb/acre)		(%)									(MT/ha)
Untreated check				0	0	0	0	0	0	0	0	0	5.3
S-Metolachlor	7.62 EC	0.5	PRE	99	96	95	95	93	90	100	100	100	9.5
Dimethnaamid-P	6 EC	0.5	PRE	100	94	94	100	98	95	100	100	100	7.6
Dimethenamid-P	6 EC	1.0	PRE	99	96	95	100	100	99	100	100	100	7.9
Clomazone + pendimethalin	3 ME 3.3 EC	0.25 0.5	PRE	100	94	94	100	98	95	100	100	100	7.5
Fomesafen	2 L	0.25	PRE	100	99	96	94	89	86	98	94	91	8.9
Imazethapyr	70 DF	0.036	PRE	100	100	100	100	100	98	98	93	93	9.7
Halosulfuron	75 DF	0.032	PRE	100	100	100	100	100	100	23	18	16	8.5
S-Metolachlor + halosulfuron	7.62 EC 75 DF	0.5 0.032	PRE	100	100	100	93	86	81	100	100	100	9.0
Fomesafen + NIS[1]	2 L	0.2	POST	0	97	98	0	100	99	0	79	73	7.8

continued

Table 19. Continued.

Treatment	Form.	Rate	Growth stage	Palmer amaranth control 5-14	Palmer amaranth control 5-29	Palmer amaranth control 6-13	Eclipta control 5-14	Eclipta control 5-29	Eclipta control 6-13	Goosegrass control 5-14	Goosegrass control 5-29	Goosegrass control 6-13	Snap bean yield
		(lb/acre)		(%)									(MT/ha)
Fomesafen +	2 L	0.2	POST	0	99	100	0	96	94	0	83	74	8.6
bentazon + COC[2]	4 EC	0.75											
Acifluorfen + NIS	2 EC	0.25	POST	0	97	96	0	59	50	0	26	20	8.2
Acifluorfen + NIS	2 EC	0.5	POST	0	91	95	0	71	61	0	53	43	6.8
Imazamox + NIS	1 L	0.036	POST	0	96	98	0	70	70	0	89	94	8.9
Imazamox +	1 L	0.036	POST	0	100	100	0	83	76	0	98	100	8.4
bentazon + NIS	4 EC	0.75											
Imazamox +	1 L	0.035	POST	0	100	100	0	95	91	0	90	90	10.0
fomesafen + NIS	2 L	0.2											
Halosulfuron + NIS	75 DF	0.032	POST	0	95	94	0	100	98	0	6	5	9.6
Halosulfuron +	75 DF	0.032	POST	0	96	96	0	100	96	0	8	10	9.0
bentazon + NIS	4 EC	0.75											
Halosulfuron +	75 DF	0.032	POST	0	100	100	0	100	99	0	81	84	9.4
fomesafen + NIS	2 L	0.2											
Chloransulam + COC	84 DF	0.016	POST	0	86	83	0	91	91	0	41	39	6.5
Flufenpyr + COC	57.6 WDG	0.18	POST	0	100	100	0	100	100	0	83	75	1.1
Flufenpyr + COC	57.6 WDG	0.36	POST	0	100	100	0	100	100	0	90	85	0.8
Flumiclorac + COC	0.86 EC	0.027	POST	0	31	23	0	33	31	0	18	6	5.6
S-Metolachlor fb	7.62 EC	0.5	PRE	100	100	100	100	100	99	100	100	100	0.3
carfentrazone + NIS	2 EC	0.025	POST										
S-Metolachlor fb	7.62 EC	0.5	PRE	100	100	100	100	100	100	100	100	100	9.4
halosulfuron + NIS	75 DF	0.032	POST										
S-Metolachlor fb	7.62 EC	0.5	PRE	100	100	100	100	100	100	100	100	100	9.1
imazamox + NIS	1 L	0.036	POST										
S-Metolachlor fb	7.62 EC	0.5	PRE	100	100	100	100	100	100	100	100	100	9.0
fomesafen + NIS	2 L	0.2	POST										
LSD (P=.05)				1	4	5	2	5	7	3	8	10	1.1

Table 20. Evaluation of Herbicide Programs in Southern Peas, Kibler, Ark., 2002.

Treatment	Form.	Rate	Growth stage	Southern pea injury 7-10	Southern pea injury 8-2	Southern pea injury 8-28	Palmer amaranth control 7-10	Palmer amaranth control 8-2	Palmer amaranth control 8-28	Goosegrass control 7-10	Goosegrass control 8-2	Goosegrass control 8-28	Southern pea yield
		(lb/acre)		(%)									(MT/ha)
Untreated check				0	0	0	0	0	0	0	0	0	2.3
S-metolachlor	7.62 EC	0.5	PRE	0	0	0	100	100	100	100	100	100	3.2
Dimethenamid-P	6 EC	0.5	PRE	0	0	0	99	99	98	100	100	100	2.3
Dimethenamid-P	6 EC	1.0	PRE	4	03	1	100	100	100	100	100	99	2.5
Halosulfuron	75 DF	0.024	PRE	0	0	0	99	99	98	79	70	61	2.5
Halosulfuron	75 DF	0.047	PRE	5	3	1	99	98	98	83	78	69	1.9
S-metolachlor + halosulfuron	7.62 EC 75 DF	0.5 0.026	PRE	5	3	1	100	99	99	100	100	100	2.6
S-metolachlor fb halosulfuron + NIS[1]	7.62 EC 75 DF	0.5 0.026	PRE POST	11	10	9	100	100	100	100	100	100	0.8
Clomazone + flumioxazin	3 ME 51 WDG	0.5 0.032	PRE	0	0	0	99	98	96	100	100	100	2.7
Flufenacet	60 WG	0.3	PRE	0	0	0	99	98	98	100	100	100	2.8
Flufenacet	60 WG	0.6	PRE	0	0	0	100	99	99	100	100	100	3.0
Sulfentrazone	75 DF	0.2	PRE	36	31	21	100	100	100	98	98	95	1.9
Sulfentrazone	75 DF	0.4	PRE	76	66	61	100	100	100	100	100	100	0.2
Clomazone + sulfentrazone	3 EC 75 DF	0.5 0.25	PRE	48	40	34	100	100	100	100	100	100	1.0
Pendimethalin + imazethapyr	3.3 EC 2 EC	0.75 0.063	PRE	0	0	0	100	100	100	100	100	100	2.9
Pendimethalin fb acifluorfen	3.3 EC 2 EC	0.5 0.25	PRE POST	0	0	0	99	99	98	93	90	86	2.6
Pendimethalin fb acifluorfen	3.3 EC 2 EC	0.5 0.5	PRE POST	0	0	0	100	100	100	91	90	85	2.3
S-metolachlor fb chloransulam + COC[2]	7.62 EC 84 DF	0.5 0.016	PRE POST	0	10	9	100	100	100	100	100	99	2.0
S-metolachlor fb chloransulam + COC	7.62 EC 84 DF	0.5 0.032	PRE POST	0	8	8	100	100	100	100	100	100	2.3
Imazamox + NIS	1 EC	0.036	POST	0	0	0	0	63	51	0	90	83	1.7

continued

Table 20. Continued.

Treatment	Form.	Rate	Growth stage	Southern pea injury 7-10	Southern pea injury 8-2	Southern pea injury 8-28	Palmer amaranth control 7-10	Palmer amaranth control 8-2	Palmer amaranth control 8-28	Goosegrass control 7-10	Goosegrass control 8-2	Goosegrass control 8-28	Southern pea yield
		(lb/acre)		(%)									(MT/ha)
Imazamox + NIS	1 EC	0.072	POST	0	0	0	0	64	55	0	93	90	1.5
Imazamox + bentazon + NIS	1 EC 4 EC	0.036 0.75	POST	0	0	0	0	79	71	21	89	83	2.0
Flufenpyr + NIS	58 WDG	0.18	POST	0	5	0	0	79	68	0	80	66	1.9
Flufenpyr + NIS	58 WDG	0.36	POST	0	10	5	0	81	65	20	81	71	1.7
LSD (P=.05)				3	3	3	2	10	11	17	6	8	0.7

Table 21. Herbicide Evaluation in Fall Greens, Kibler, 2002.

				Collard			Kale			Mustard			Turnip		
			Growth	Injury		Yield	Injury		Yield	Injury		Yield	Injury		Yield
Treatment	Form.	Rate	stage	2 WAE	8 WAE	8 WAE	2 WAE	8 WAE	8 WAE	2 WAE	8 WAE	8 WAE	2 WAE	8 WAE	8 WAE
		(lb/acre)		---- (%) ----		(MT/ha)	---- (%) ----		(MT/ha)	---- (%) ----		(MT/ha)	---- (%) ----		(MT/ha)
Trifluralin	4 EC	0.5	PPI	5	3	5.8	3	15	5.6	6	0	8.1	14	5	17.1
Untreated check				0	0	4.7	0	0	4.9	0	0	8.1	0	0	16.3
DCPA	75 DF	8.0	PRE	28	18	3.2	12	12	6.3	22	8	8.6	38	12	15.7
Sulfentrazone	75 DF	0.075	PRE	33	25	3.6	10	9	6.7	19	0	10.2	43	26	13.6
Sulfentrazone	75 DF	0.15	PRE	70	65	1.8	50	14	5.5	48	5	10.7	63	35	12.0
Pendimethalin	3.3 EC	0.5	PRE	33	40	3.8	38	21	6.3	48	19	6.9	45	24	14.5
Pendimethalin	3.3 EC	1.0	PRE	98	86	0.2	83	68	1.9	88	91	0.9	54	26	13.0
Pendimethalin +	3.3 EC	0.5	PRE	58	45	2.8	74	59	2.5	85	96	0.3	71	60	8.0
DCPA	75 DF	3.0													
Thiobencarb	8 EC	1.5	PRE	35	30	4.0	11	3	7.1	23	6	8.2	21	23	15.4
Thiobencarb	8 EC	3.0	PRE	21	26	4.5	16	0	8.1	27	10	7.7	33	62	7.4
Trifluralin fb	4 EC	0.5	PPI	26	5	4.8	0	4	5.9	11	40	4.7	8	5	17.5
DCPA	75 DF	4.0	PRE												
S-metolachlor	7.62 EC	0.5	PRE	18	15	4.7	8	13	7.8	24	10	7.7	24	28	13.1
S-metolachlor	7.62 EC	1.0	PRE	54	50	2.5	25	0	8.5	65	35	5.1	68	34	16.4
Dimethenamid	6 EC	0.5	PRE	46	44	3.1	28	3	8.3	73	41	4.9	73	41	11.1
Dimethenamid	6 EC	1.0	PRE	74	88	1.0	80	14	5.1	90	64	3.4	80	54	8.4
Dimethenamid	6 EC	0.5	POST	79	0	1.3	0	64	2.0	0	94	0.4	0	65	7.0
Pendimethalin fb	3.3 EC	0.25	PRE	6	15	5.8	9	9	6.0	11	5	8.5	6	8	18.2
clopyralid	3 EC	0.1	POST												
Pendimethalin fb	3.3 EC	0.25	PRE	20	15	5.4	10	15	5.3	9	0	10.0	11	30	12.5
clopyralid	3 EC	0.2	POST												
Pendimethalin fb	3.3 EC	0.25	PRE	40	28	3.5	9	19	4.8	34	56	3.9	31	41	11.4
oxyfluorfen	2 EC	0.125	POST												
Pendimethalin fb	3.3 EC	0.25	PRE	36	7	3.1	6	28	4.3	7	52	3.4	8	52	8.8
oxyfluorfen	2 EC	0.25	POST												
LSD (P=.05)				23	16	1.8	12	26	2.5	16	18	2.4	21	26	5.0

Table 22. Evaluation of S-metolachlor and Dimethenamid-P on Table Beets, Fayetteville, 2002.

Treatment	Form.	Rate	Growth stage	Table beet injury			Common lambsquarters control			Cutleaf eveningprimrose control			Yellow nutsedge control	Table beet yield	
				2 WAT	5 WAT	7 WAT	2 WAT	5 WAT	7 WAT	2 WAT	5 WAT	7 WAT	8 WAT	9 WAT	9 WAT
		(lb/acre)		-------	-------	-------	-------	-------	(%)	-------	-------	-------	-------	(no.)	(MT/ha)
Untreated check				0	0	0	0	0	0	0	0	0	0	16	3.3
Dimethenamid-P	6 EC	0.66	2-lf	0	0	0	81	71	64	38	23	10	11	42	17.3
Dimethenamid-P	6 EC	1.32	2-lf	13	10	6	91	86	83	49	33	23	19	40	21.4
S-Metolachlor	7.62 EC	0.67	2-lf	5	3	0	81	59	43	26	10	9	23	48	16.0
S-Metolachlor	7.62 EC	1.34	2-lf	14	11	11	95	78	64	45	23	13	38	42	17.4
Pyrazon	67.6 DF	3.65	2-lf	0	0	0	96	95	93	95	95	99	86	69	34.0
Cycloate	6 EC	4.0	2-lf	11	10	9	71	55	26	45	26	10	16	44	16.2
LSD (P=.05)				3	3	2	7	8	8	6	3	3	3	10	3.6

Table 23. Herbicide Evaluation in Grapes, Fayetteville, 2002.

Treatment	Form.	Rate	Growth stage	Grape injury 5-15	Grape injury 6-4	Grape injury 6-18	Grape injury 7-1	Grape injury 8-2	Bermudagrass control 5-15	Bermudagrass control 6-4	Bermudagrass control 6-18	Bermudagrass control 7-1	Bermudagrass control 8-2
		(lb/acre)		(%)									
Untreated check				0	0	0	0	0	0	0	0	0	0
Flumioxazin	50 WP	0.5	PRE	0	0	0	0	0	38	34	26	21	18
Flumioxazin	50 WP	1.0	PRE	0	0	0	0	0	79	73	66	61	58
Flumioxazin fb	50 WP	0.25	PRE	0	0	0	0	0	31	35	30	19	10
flumioxazin	50 WP	0.25	POST										
Flumioxazin fb	50 WP	0.375	PRE	0	0	0	0	0	64	69	60	46	28
flumioxazin	50 WP	0.375	POST										
Azafenidin	80 DF	0.5	PRE	0	0	0	0	0	93	94	80	71	53
Azafenidin	80 DF	1.0	PRE	0	0	0	0	0	91	100	100	97	96
Azafemidin fb	80 DF	0.25	PRE	0	0	0	0	0	50	58	46	35	25
azafenidin	80 DF	0.25	POST										
Azafenidin fb	80 DF	0.375	PRE	0	0	0	0	0	66	71	61	55	40
azafenidin	80 DF	0.375	POST										
Sulfentrazone	75 DG	0.25	PRE	0	0	0	0	0	23	13	3	0	0
Sulfentrazone	75 DF	0.375	PRE	0	0	0	0	0	38	23	13	1	0
Simazine +	90 DF	2.0	PRE	0	0	0	0	0	20	11	0	0	0
oryzalin	4 EC	3.0	PRE										
Clopyralid	3 EC	0.3	POST	0	0	0	0	0	0	18	10	0	0
LSD (P=.05)				0	0	0	0	0	5	6	7	7	7

continued

Table 23. Continued.

Treatment	Form.	Rate	Growth stage	Large crabgrass control 5-15	6-4	6-18	7-1	8-2	Grape yield
		(lb/acre)		----------	----------	----------	----------	---------- (%)	----------
Untreated check				0	0	0	0	0	9.1
Flumioxazin	50 WP	0.5	PRE	100	88	70	60	56	9.3
Flumioxazin	50 WP	1.0	PRE	100	93	88	83	81	14.6
Flumioxazin fb	50 WP	0.25	PRE	100	93	78	68	63	13.2
flumioxazin	50 WP	0.25	POST						
Flumioxazin fb	50 WP	0.375	PRE	100	88	81	73	65	18.3
flumioxazin	50 WP	0.375	POST						
Azafenidin	80 DF	0.5	PRE	100	100	98	97	91	12.1
Azafenidin	80 DF	1.0	PRE	100	100	100	98	97	13.1
Azafemidin fb	80 DF	0.25	PRE	98	96	91	91	86	13.2
azafenidin	80 DF	0.25	POST						
Azafenidin fb	80 DF	0.375	PRE	98	96	95	91	91	14.9
azafenidin	80 DF	0.375	POST						
Sulfentrazone	75 DG	0.25	PRE	97	95	88	78	69	14.5
Sulfentrazone	75 DF	0.375	PRE	98	95	94	89	83	16.8
Simazine +	90 DF	2.0	PRE	97	95	91	84	73	14.2
oryzalin	4 EC	3.0	PRE						
Clopyralid	3 EC	0.3	POST	0	95	83	79	60	11.1
LSD (P=.05)				1	2	3	4	5	2.5

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