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Weed Control and Sweet Corn (*Zea mays* var. *rugosa*) Response in a No-till System with Cover Crops[1]

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Abstract. **Studies were conducted at the Main Agricultural Experiment Station in Fayetteville and the Vegetable Substation in Kibler, Arkansas, in 1992 and 1993 on the same plots to evaluate weed suppression by winter cover crops alone or in combination with reduced herbicide rates in no-till sweet corn and to evaluate cover crop effects on growth and yield of sweet corn. Plots seeded to rye plus hairy vetch, rye, or wheat had at least 50% fewer early season weeds than hairy vetch alone or no cover crop. None of the cover crops reduced population of yellow nutsedge. Without herbicides, hairy vetch did not suppress weeds 8 wk after cover crop desiccation. Half rates of atrazine and metolachlor (1.1 + 1.1 kg ai ha^{-1}) reduced total weed density more effectively in no cover crop than in hairy vetch. Half rates of atrazine and metolachlor controlled redroot pigweed, Palmer amaranth, and goosegrass regardless of cover crop. Full rates of atrazine and metolachlor (2.2 + 2.2 kg ai ha^{-1}) were needed to control large crabgrass in hairy vetch. Control of yellow nutsedge in hairy vetch was marginal even with full herbicide rates. Yellow nutsedge population increased and control with herbicides declined the second year, particularly with half rates of atrazine and metolachlor. All cover crops except hairy vetch alone reduced emergence, height, and yield of sweet corn. Sweet corn yields from half rates of atrazine and metolachlor equalled the full rates regardless of cover crops. Nomenclature. Atrazine, 6-chloro-*N*-ethyl-*N*′-(1-methylethyl)-1,3,5-triazine-2,4-diamine; metolachlor, 2-chloro-*N*-(2-ethyl-6-methylphenyl)-*N*-(2-methoxy-1-methylethyl) acetamide; yellow nutsedge (*Cyperus esculentus* L.) #[3] CYPES; redroot pigweed (*Amaranthus retroflexus* L.) # AMARE; large crabgrass (*Digitaria sanguinalis* L. Scop.) # DIGSA; goosegrass (*Eleusine indica* L. Gaertn.) # ELEIN; Palmer amaranth (*Amaranthus palmeri* S. Wats) # AMAPA; sweet corn, (*Zea mays* var. *rugosa* Bonaf.); rye (*Secale cereale* L.); wheat (*Triticum aestivum* L.); hairy vetch (*Vicia villosa* Roth.).**

Additional index words: **Allelopathy, conservation tillage, reduced herbicide rates, AMAPA, AMARE, CYPES, DIGSA, ELEIN.**

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[3]Letters following this symbol are a WSSA-approved computer code from the Composite List of Weeds, Revised 1989. Available from WSSA, 1508 West University Ave., Champaign, IL 61821-3133.

[4]Abbreviations: DIBOA, 2,4-dihydroxy-1,4-(2*H*)-benzoxazin-3-one; BOA, 2(3*H*)-benzoxazolinone; β-PLA, beta-phenyllactic acid; βG255-HBA, beta-hydroxybutyric acid; WAP, weeks after planting.

INTRODUCTION

Conservation tillage has been practiced in field corn production for decades, primarily to reduce soil erosion. Omitting tillage does not reduce crop yields compared to tilled crops, but proper weed management with the use of herbicides becomes critical (6, 12). The use of cover crops in conservation tillage increases soil organic matter (16, 21) and conserves soil moisture (21). Rye, wheat, and hairy vetch are widely studied cover crops because of the potential of rye and wheat for weed suppression and the N contribution of vetch to soil. Conservation-tillage studies in corn used mostly rye and hairy vetch (or other legumes) as cover crops. Mowed rye cover provided better weed control than soybean (*Glycine max* (L.) Merr) stubble in no-till field corn plots (11). Desiccated rye residue gave excellent control of giant foxtail (*Setaria faberi Herrm.*), velvetleaf (*Abutilon theophrasti* Medicus), common lambsquarters (*Chenopodium album* L.), and smooth pigweed (*Amaranthus hybridus* L.) over four years of no-till soybeans (13). Allelochemicals in rye were identified as 2,4-dihydroxy-1,4-(2*H*)-benzoxazin-3-one (DIBOA)[4], 2(3*H*)-benzoxazolinone (BOA)[4], beta-phenyllactic acid (β-PLA)[4], and beta-hydroxybutyric acid (β-HBA)[4] (2, 20). DIBOA was most effective against monocots and BOA against dicots (2). β-PLA inhibited the hypocotyl and root growth of common lambsquarters and redroot pigweed (20). These allelochemicals also were phytotoxic to corn (11, 23). Wheat, on the other hand, exudes ferulic acid (14), which inhibited germination and root growth of pitted morningglory (*Ipomoea lacunosa* L.), common ragweed (*Ambrosia artemisiifolia* L.), crabgrass (*Digitaria sp.*), tall morningglory (*Ipomoea purpurea* (L.) Roth), and prickly sida (*Sida spinosa* L.) (14, 15, 20). The effect of a wheat cover crop on growth and yield of field or sweet corn is not known.

Hairy vetch residue also exudes allelochemicals that inhibit germination of some weeds (4, 25). Legumes such as subterranean clover (*Trifolium subterraneum* L.) used as living mulch provide excellent weed control and reduce weed biomass without reducing corn yields (10). Although allelopathic potential of hairy vetch and other leguminous cover crops has been demonstrated, some studies have shown that weed suppression by a legume cover crop was generally less than grass cover crops (24). However, legume cover crops are valued for their nutrient contribution to the soil. Fall-seeded hairy vetch increased soil NO_3-N concentration in the top 7.5 cm 50 to 64 d after corn planting in a growing season with normal rainfall (5). Crimson clover (*Trifolium incarnatum* L.) used as a cover crop improved corn grain yield under no-tillage compared to fallow treatment averaged over fertilizer rates of 0 to 150 kg ha^{-1} N (18). Sweet corn yield without N fertilizer following alfalfa (*Medicago sativa* L.) or rye plus hairy vetch was similar to yield of corn that received 156 kg N ha^{-1} following rye (7). Adding white clover to ryegrass improved both ground cover and weed suppression compared to either species alone (8), and the legume component provided residual N for the succeeding crop.

Weed suppression by cover crops may complement effectiveness of reduced-rate herbicide programs. Reduced rates of atrazine plus metolachlor provided acceptable weed control in conventional and no-tillage with or without hairy vetch or subterranean clover cover crops (3). With a rye cover crop, preemergence herbicide rates for no-till sweet corn, snap beans (*Phaseolus vulgaris* L.), and potatoes (*Solanum tuberosum* L.) could be reduced to ⅓ or ½ the standard recommended rate without loss in weed control, and postemergence herbicide applications could be delayed for 4 to 6 wk after transplanting tomatoes (24).

This study was conducted to 1) compare weed control by rye, hairy vetch, wheat, and rye plus hairy vetch in no-till sweet corn; 2) evaluate the efficacy of reduced rates of atrazine and metolachlor PRE in a no-tillage system with cover crops; and 3) evaluate effect of winter cover crops on growth and yield of sweet corn.

MATERIALS AND METHODS

The experiment was conducted in 1992 and 1993 at the Main Agricultural Experiment Station in Fayetteville on a Captina silt loam (fine, silty, mixed, mesic Typic Fragiudult) with 1.5% organic matter and 6.5 pH and at the Vegetable Research Sub-Station in Kibler on a Roxana silt loam soil (thermic, typic, Udifluvent, Entisol) with 1.2% organic matter and 6.9 pH. Rye, wheat, hairy vetch, and rye plus hairy vetch (2:1 mix v/v) were seeded into tilled soil at 123, 123, 22, and 39 + 15 kg ha^{-1}, respectively, in four replications of 6-m by 4.2-m plots. Cover crops were seeded October 9 and 10, 1991, and September 29 and 25, 1992, in Fayetteville and Kibler, respectively. A treatment without cover crop was the standard. Paraquat (1,1′-dimethyl-4,4′-bipyridinium ion) at 0.84 kg ha^{-1} was used to desiccate cover crops in the spring when rye and wheat were booting and vetch was starting to bloom, between April 17 and May 4, in the various experiments. The no-cover crop plot was disked twice before planting sweet corn, but no cultivation was done during the growing season. 'Merit' sweet corn was seeded into the standing, desiccated cover crop and tilled plots using a single-row no-till planter[5], 2 to 3 wk after desiccation at 11 seeds m^{-1} on rows spaced 1 m apart. Corn was replanted in Fayetteville in 1993 4 wk after cover crop desiccation because of hail damage. Glyphosate [*N*-(phosphonomethyl) glycine] tank mixed with bentazon [3-(1-methylethyl)-(1*H*)-2,1,3-benzothiadiazin-4 (3*H*)-one 2,2-dioxide] was sprayed broadcast before sweet corn emergence to suppress yellow nutsedge. The experiment in Kibler also was replanted 2 wk after the first planting (5 wk after desiccation) because of poor emergence resulting from high moisture and low soil temperature. Four weed control treatments (unweeded, handweeded, and half and full rates of atrazine plus metolachlor) were compared. Herbicides were applied in 187 L ha^{-1} in strips across cover crops. Each subplot area was 1 m wide by 4.2 m long. Cover crops and herbicide treatments were established in the same plots both years. Urea nitrogen fertilizer was sidedressed to corn plants at 56 kg N ha^{-1} about one month after planting in both locations in 1992. In 1993, basal fertilizer was applied at 45-90-0 kg NPK ha^{-1} in Fayetteville and 56-0-45 kg NPK ha^{-1} in Kibler. In addition, nitrogen fertilizer was sidedressed at 78 kg N ha^{-1} in both locations when corn plants were about 30 cm tall. Corn was irrigated as needed at 6.3 cm water ha^{-1} per application. Drip irrigation was used in Fayetteville, and overhead irrigation was used in Kibler. Carbaryl (1-naphthyl *N*-methylcarbamate) and methomyl [S-methyl *N*-[(methylcarbamoyl)oxy]thioacetimidate] were applied as needed for fall armyworms and corn earworms.

Sweet corn emergence, soil moisture, weed counts m^{-2}, weed control ratings, plant heights, and yield (number and weight of ears) were recorded. Crop emergence was recorded 2 wk after planting. In 1993, emergence data were taken from the first sweet corn planting. Duplicate soil samples (two cores, 2 cm diameter, 10 cm depth) were taken from the cover crop mainplots at cover crop desiccation and at sweet corn planting at both locations in 1992 only. Wet and oven-dry weights of soil samples were recorded for moisture determination. Weeds were counted by species from 1 m^2 per plot 5 wk after cover crop desiccation. Weed control was evaluated visually 4, 6, 8, and 10 wk after cover crop desiccation using a 0 to 100 scale with 0 = no control and 100 = complete control. Plant heights were measured from ground level to the tip of four random plants per plot. Sweet corn was harvested 72 to 76 d after planting in Fayetteville and Kibler in 1992 and at 67 to 68 days after planting in 1993. Fresh corn ears were counted and weighed. Data were analyzed for variance using Statistical Analysis System (SAS)[6] software. Significant means ($P \leq 0.05$) were separated by least significant differences (LSD).

RESULTS AND DISCUSSION

Sweet corn emergence. Sweet corn emergence was not affected by weed control treatment but was affected by cover crop (Table 1). No injury from metolachlor was observed. Weed control by cover crop interaction was not significant. Rye, wheat, and rye plus hairy vetch reduced sweet corn emergence 43 to 63% compared to no cover crop. Hairy vetch alone had no effect on sweet corn stand. It is suggested that stand reduction was probably due to allelopathy of rye and wheat cover crops (1, 15), physical impediment to seeding and emergence, and lower temperatures in plots with cover crops early in the growing season. Subsequent observations of soil temperatures in related experiments at the same locations indicated 2 to 7 C cooler temperatures in plots with cover crops compared to bare plots. Rainfall from time of desiccation to planting was sufficient so there was generally no difference in soil moisture between cover cropped and tilled bare plots (data not shown). However, plots with hairy vetch cover crop at the time of sweet corn planting at Kibler had more soil moisture (12%) than other cover crops and no-cover

[5]John Deere 7100, Deere & Co., P.O. Box 663. Moline, IL 61266-0663.
[6]SAS Institute, Inc. Box 8000, Cary, North Carolina 27511-800.

Table 1. Emergence and height increase of sweet corn as affected by cover crops[a].

		Sweet corn height increase			
		Fayetteville		Kibler	
Cover crop	Stand count	1992[b]	1993[c]	1992[c]	1993[b]
	% of no cover	cm			
No cover	—	135	124	82	125
Hairy vetch	0	111	139	82	140
Rye + hairy vetch	63	88	130	64	131
Rye	43	83	125	57	135
Wheat	46	102	129	59	132
$LSD_{(0.05)}$	31	25	NS	10	NS

[a]Average of years and weed control treatments.

[b]Height increase between 4 and 9 wk after planting.

[c]Height increase between 3 and 6 wk after planting.

crop plots (7 to 8%). This was possibly due to the desiccated vetch foliage covering the soil surface as compared to the standing stubble of rye, wheat, and rye plus vetch. Studies on field corn indicated that the potential of a cover crop to inhibit germination, emergence, and early growth is affected by the allelopathic potential of the cover crop and cover crop management. Mowed hairy vetch and rye reduced stand of field corn more than when these cover crops were desiccated (11). Freshly mowed residues take longer to decompose and have greater surface area and, thus, can physically impede seedling emergence more than desiccated residues. Although aqueous extracts of hairy vetch inhibited germination and seedling growth of field corn in the greenhouse (25), this may not hold true under field conditions.

Effect on weed population. Untreated plots in 1992 at Fayetteville had a weed distribution of 30% yellow nutsedge, 38% large crabgrass, 15% goosegrass, and 8% redroot pigweed. Untreated plots at Kibler had 59% goosegrass and 41% Palmer amaranth. Goosegrass distribution in Fayetteville was erratic, so only data from Kibler are presented. Cover crop by herbicide, cover crop by year, and year by herbicide interaction effects on the density of redroot pigweed were significant. Without herbicides, population of redroot pigweed was less with residue than without residue (Figure 1). Also, without herbicide, redroot pigweed density was reduced more in rye, wheat, and rye plus hairy vetch than in hairy vetch alone. In another study, rye mulch reduced emergence of redroot pigweed, common lambsquarters, common purslane (*Portulaca oleracea* L.), and large crabgrass early in the growing season when rye mulch was still standing (17). The potential of rye to inhibit emergence and growth of weeds had been confirmed (1, 20). Weed suppression by hairy vetch was primarily through inhibition of weed emergence (9). This occurred because weed suppression by vetch was strongly and inversely dependent on light transmittance to the soil (22). Therefore, weed emergence is inhibited when weed seeds are fully covered by vetch debris, totally blocking out light penetration to the soil surface. Because desiccated hairy vetch residue decomposed faster than desiccated grass cover crops, weed suppression by vetch was short-lived. Weeds that escaped grew well during the rest of the season probably due to added nitrogen from the decomposing vetch residue. This was reflected in the weed control ratings in hairy vetch treatments later in the season.

Rye, wheat, and rye plus vetch residues controlled redroot pigweed emergence without herbicides 3 WAP[4] (Figure 1). Half rates of atrazine and metolachlor reduced number of redroot pigweed 97% in plots without cover crop and 42% in plots with hairy vetch residue. This was probably because at the time of herbicide application, vetch foliage that covered the soil surface intercepted some of the herbicides and perhaps vetch by itself could not inhibit redroot pigweed emergence as much as rye or wheat.

In 1993, percentage of yellow nutsedge in the total weed population, pooled over herbicide treatments increased 30 to 60% in all cover crops except wheat (Table 2). Yellow nutsedge shoot density was originally highest in hairy vetch, regardless of weed control treatment. Increase in yellow nutsedge was lowest in wheat (9%) and highest in rye (61%), and yellow nutsedge comprised 75% of the total weeds in rye by 1993. Over time, full rates of atrazine plus metolachlor reduced yellow nutsedge population better (68%) than half rates (44%) with reference to unweeded plots. Cover crops did not reduce yellow nutsedge density.

The effect of atrazine and metolachlor on weed density was more pronounced than the effect of cover crops. Pooled over cover crops and years, half rates of atrazine and metolachlor reduced Palmer amaranth and goosegrass densities 89 and 92%, respectively; full rates reduced densities 100% (Table 3). Although plots with cover crops tended to have lower densities of Palmer amaranth and goosegrass compared to no-cover crop plots, differences between treatments were not significant. How-

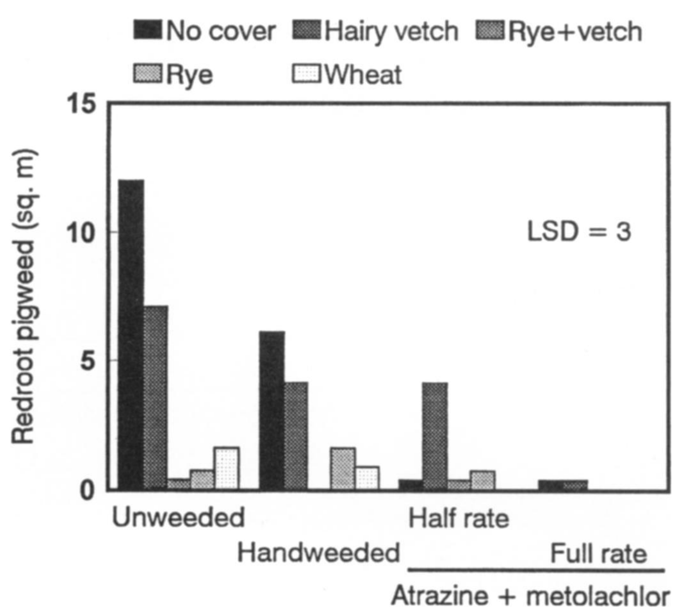

Figure 1. Effect of cover crop and weed control treatment on redroot pigweed density at Fayetteville, 5 wk after desiccation, pooled over years.

Table 2. Effect of cover crop and weed control treatments on population of yellow nutsedge 5 wk after cover crop desiccation.

Factor	Yellow nutsedge 1992	Yellow nutsedge 1993
	% of total weed density	
Cover crop[a]:		
No cover	8	41
Hairy vetch	31	61
Rye + hairy vetch	10	50
Rye	14	75
Wheat	22	31
$LSD_{(0.05)}$	16	
Weed control treatment[b]:		
Unweeded	18	77
Handweeded	23	61
Atrazine + metolachlor, PRE (1.1 + 1.1 kg ai ha^{-1})	17	43
Atrazine + metolachlor, PRE (2.2 + 2.2 kg ai ha^{-1})	10	25
$LSD_{(0.05)}$	21	

[a]Average of weed control treatments.

[b]Average of cover crops.

ever, total weed counts indicated significantly fewer weeds with rye plus vetch, rye, and wheat than with no cover crop.

Weed control ratings. The cover crop by herbicide interaction was significant for control of redroot pigweed, large crabgrass, and yellow nutsedge 8 wk after cover crop desiccation (Figure 2). Although hairy vetch reduced densities of some weed species 5 wk after desiccation, it provided negligible weed control 8 wk after desiccation. Without herbicides, rye plus hairy vetch, rye,

Table 3. Effect of cover crop and weed control treatment on density of Palmer amaranth and goosegrass at Kibler.

Factor	Weed density: Palmer amaranth	Goose-grass	Total[a]
	number m^{-2}		
Cover crop[b]:			
No cover	52	66	125
Hairy vetch	23	48	80
Rye + hairy vetch	13	8	26
Rye	14	40	58
Wheat	12	17	34
$LSD_{(0.05)}$	NS	NS	88
Weed control[c]:			
Unweeded	61	77	149
Handweeded	23	60	94
Half rate[d]	7	6	15
Full rate[e]	0	0	0
$LSD_{(0.05)}$	27	49	70

[a]Includes minor species: southwestern cupgrass (*Eriochloa gracilis* (Fourn.) A. S. Hitchc.), large crabgrass, and eclipta (*Eclipta prostrata* L.).

[b]Average of weed control treatments and years.

[c]Average of cover crops and years.

[d]Atrazine plus metolachlor, PRE, 1.1 + 1.1 kg ha^{-1}.

[e]Atrazine plus metolachlor, PRE, 2.2 + 2.2 kg ha^{-1}.

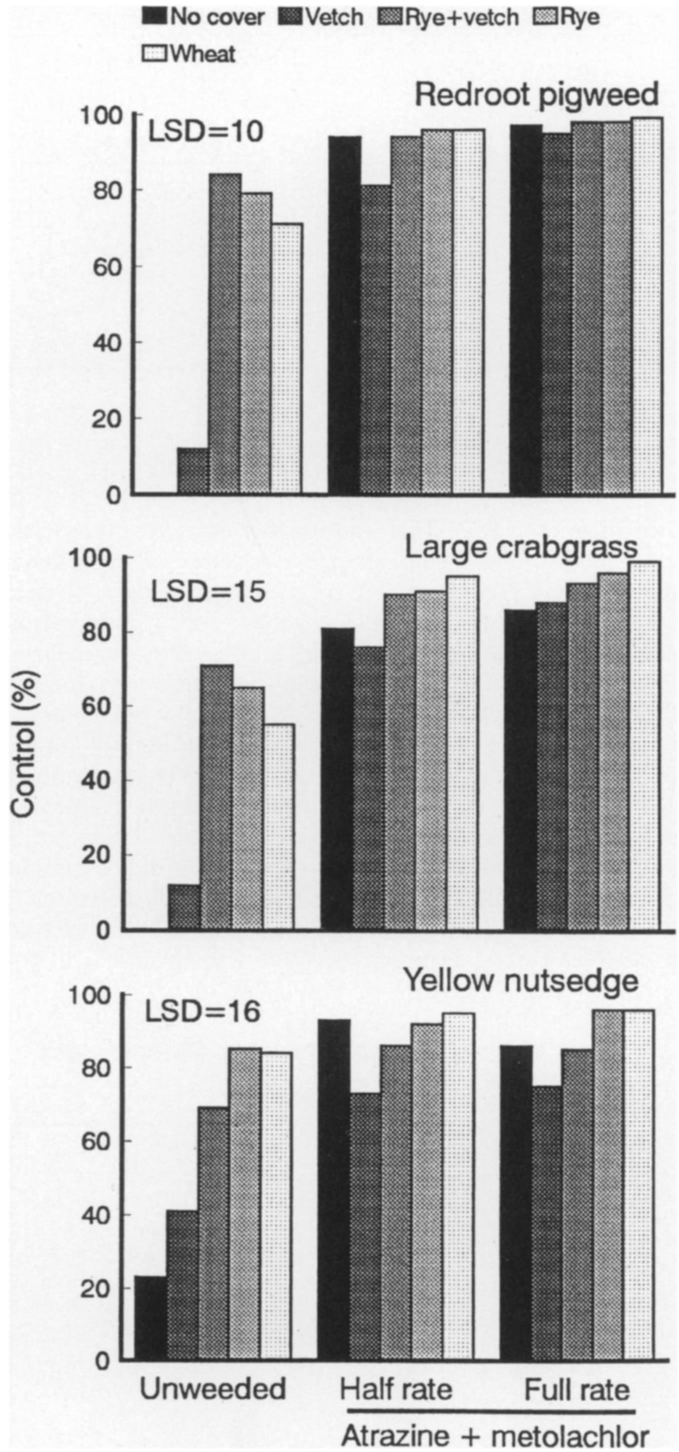

Figure 2. Control of redroot pigweed, large crabgrass, and yellow nutsedge from cover crop and atrazine plus metolachlor 8 wk after desiccation, pooled over years, Fayetteville.

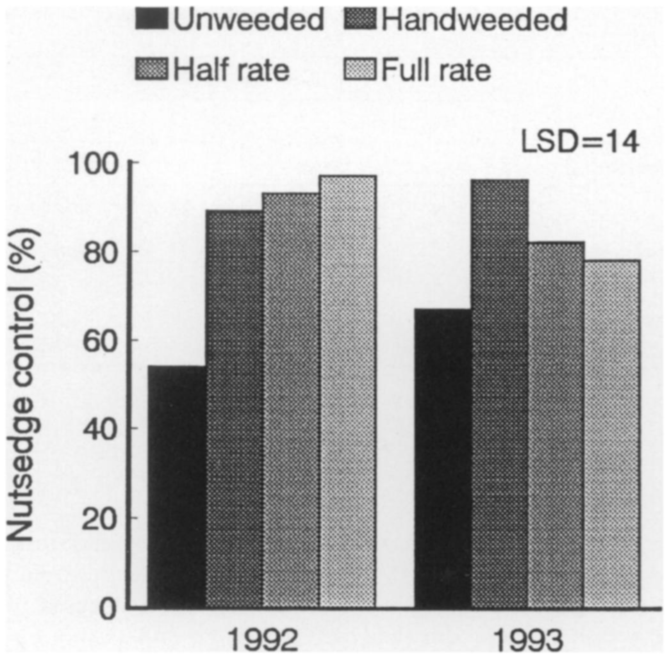

Figure 3. Effect of weed control treatment and year on yellow nutsedge control, 8 wk after cover crop desiccation, pooled over cover crops, Fayetteville.

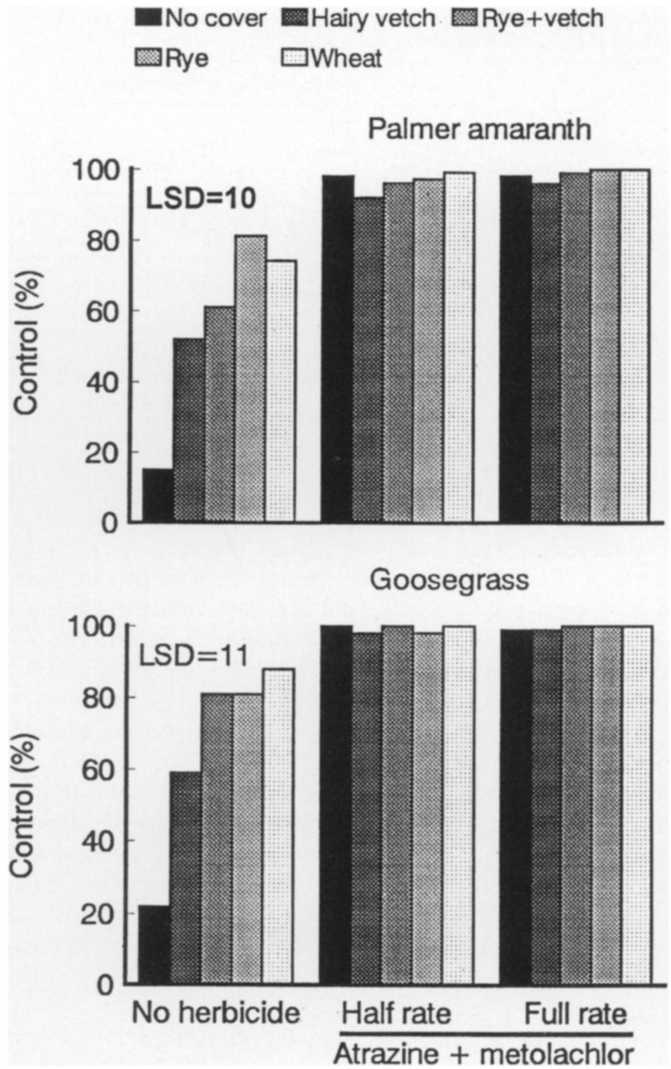

Figure 4. Effect of cover crops and rates of atrazine plus metolachlor on control of Palmer amaranth and goosegrass, pooled over years, Kibler.

and wheat controlled 70 to 85% of redroot pigweed and yellow nutsedge. Although cover crop residues generally did not reduce shoot density of yellow nutsedge, shoot growth was visually diminished by rye, wheat, and rye plus vetch residues. Rye plus vetch and rye alone controlled 65 to 70% of large crabgrass, but there was only 55% control by wheat. With half rates of atrazine and metolachlor, good to excellent control of these weeds was obtained with no cover and all cover crop treatments except hairy vetch. Control of yellow nutsedge in hairy vetch was marginal even with full herbicide rates. The capacity of atrazine and metolachlor to control yellow nutsedge diminished in 1993 (Figure 3) as nutsedge density increased. Cover crop by herbicide treatment interaction was observed on the control of Palmer amaranth and goosegrass in Kibler. Without herbicides, rye plus hairy vetch, rye alone, and wheat provided good control of goosegrass 6 wk after planting (Figure 4). Suppression of Palmer amaranth during the growing season was poor when hairy vetch was present, alone, or in combination with rye and when herbicides were not used. This may be due to minimum phytotoxicity of hairy vetch to Palmer amaranth or to residual N from vetch. Excellent control (>90%) of goosegrass and Palmer amaranth was obtained at half rates of metolachlor and atrazine regardless of cover crop treatment.

Effect on sweet corn height. Height gained by sweet corn over time was affected by presence of cover crops (Table 1). In 1992, increase in sweet corn height 4 to 9 wk after planting was less in rye plus hairy vetch, rye alone, and wheat in both locations than plots with hairy vetch alone. Absence of a detrimental effect by vetch might have been due to added N from vetch residue and the nonphytotoxicity of vetch to sweet corn under field conditions. Teasdale (22) reported that hairy vetch residue did not affect establishment of field corn in the greenhouse under full sunlight. Cover crop effects on sweet corn height were not observed in 1993. This was because the experiment was replanted in both locations in 1993 4 to 5 wk after cover crop desiccation, when temperature was warmer, and by this time, it appeared that phytotoxicity of rye and wheat may have dissipated.

Sweet corn yield. Cover crop by herbicide interaction was significant on the number of sweet corn ears and weight of ears in 1992. Fewer ears were harvested from plots with rye, wheat, and rye plus hairy vetch residues, despite some weed suppression in these covers compared to weedy checks in no cover-crop or hairy vetch plots (Table 4). The difference in total number of ears between no cover crop and rye, wheat, and rye plus hairy vetch

Table 4. Effect of cover crop and weed control treatment on number of sweet corn ears, average of Fayetteville and Kibler, 1992.

Cover crop	Sweet corn ears with weed control treatment			
	Unweeded	Hand-weeded	Half rate[a]	Full rate[b]
	$\times$ 1000 ha^{-1}			
No cover	30	54	57	43
Hairy vetch	30	49	48	50
Rye + hairy vetch	21	33	28	31
Rye	14	27	25	32
Wheat	16	35	37	35
$LSD_{0.05}$	To compare any cover crop or weed control treatment = 10			

[a]Atrazine plus metolachlor, PRE, 1.1 + 1.1 kg ha^{-1}.
[b]Atrazine plus metolachlor, PRE, 2.2 + 2.2 kg ha^{-1}.

Table 5. Sweet corn yield as affected by cover crops and weed control treatments, 1993[a].

Weed control treatment	Sweet corn yield			
	Fayetteville		Kibler	
	Ear no.	Ear wt	Ear no.	Ear wt
	$\times$ 1000 ha^{-1}	mt ha^{-1}	$\times$ 1000 ha^{-1}	mt ha^{-1}
Weedy check	37	7	10	1
Handweeded	48	8	22	2
Half rate[b]	46	8	23	2
Full rate[c]	51	8	21	2
$LSD_{(0.05)}$	10	NS	NS	NS

[a]Average of cover crops.
[b]Atrazine plus metolachlor, PRE, 1.1 + 1.1 kg ha^{-1}.
[c]Atrazine plus metolachlor, PRE, 2.2 + 2.2 kg ha^{-1}.

was magnified when weed interference was removed by handweeding. Yield reductions with rye and wheat may be attributed to allelopathy; however, we did not have direct evidence of allelopathy by cover crops in these studies. Use of atrazine plus metolachlor increased the number of ears harvested compared to the weedy check regardless of herbicide rate and cover crop.

Corn treated with half rates of atrazine plus metolachlor yielded as well as corn treated with full rates (Figure 5). Removal of weed competition by handweeding or with herbicides increased weight of harvested ears in plots with hairy vetch or no cover crop, but yields in rye plus vetch, rye alone, and wheat were low (Figure 5). Reduced sweet corn stand and plant height (indicating less growth) contributed to yield loss. Sweet corn yield at Lane, Oklahoma, also was found to be less in rye cover

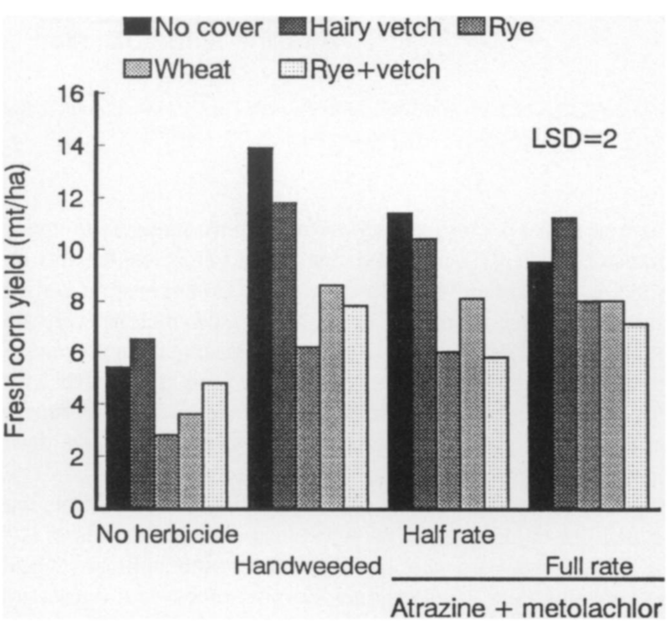

Figure 5. Sweet corn yield as affected by cover crop and weed control treatment, average of Fayetteville and Kibler, 1992.

crop compared to hairy vetch and no cover crop with nitrogen levels of 45 to 179 kg ha^{-1} (21). Additional nitrogen from hairy vetch in the rye plus hairy vetch mixture did not compensate for reduction in sweet corn yield by the rye cover crop (19).

In 1993, cover crops did not affect sweet corn yield at either location (data not shown). Lack of cover crop effect on sweet corn emergence, height, and yield in 1993 was possibly due to the dissipation of allelochemicals and warmer temperatures by the time the crop was replanted 4 to 5 wk after desiccation. Our observations were consistent with the findings of Yenish et al. (26) that allelochemicals (DIBOA, DIBOA-glucoside, and BOA) in clipped rye have a half life of 10 to 12 d under field conditions. Handweeding and half and full rates of atrazine plus metolachlor produced more ears than the weedy check, averaged across cover crops in Fayetteville (Table 5). Blackbirds decimated sweet corn ears at Kibler in 1993, reducing weight of ears to approximately 1 t ha^{-1} in all treatments. Harvested ears were 80 to 90% damaged and were not marketable.

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