Influence of Application Rate and Timing of Diclosulam on Weed Control in Peanut (*Arachis hypogaea* L.)

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ABSTRACT

Field studies were conducted from 1996 to1998 in Georgia to determine peanut (*Arachis hypogaea* L.) and weed response to ethalfluralin (0.8 kg ai/ha) plus diclosulam applied preplant incorporated (PPI) at 9, 18, 26, 35 and 52 g ai/ha. Other treatments included ethalfluralin PPI followed by paraquat plus bentazon (140 and 280 g ai/ha, respectively) early postemergence (EPOST) applied alone or following ethalfluralin plus diclosulam (18 and 26 g ai/ha) PPI, ethalfluralin PPI followed by imazapic (71 g ai/ha) postemergence (POST), and ethalfluralin PPI. Ethalfluralin was applied PPI in all herbicide programs. Diclosulam controlled Florida beggarweed [*Desmodium tortuosum* (Sweet) D.C.], sicklepod [*Senna obtusifolia* (L.) Irwin and Barneby], and yellow nutsedge (*Cyperus esculentus* L.) inconsistently, and POST application of paraquat plus bentazon was needed for acceptable control. However, diclosulam controlled common ragweed (*Ambrosia artemisiifolia* L.), tropic croton (*Croton glandulosus* Muell-Arg.), wild poinsettia (*Euphorbia heterophylla* L.), and prickly sida (*Sida spinosa* L.) without the need for POST herbicides. Higher yields were recorded with diclosulam PPI followed by a sequential application of paraquat plus bentazon than herbicide programs not containing diclosulam or diclosulam alone. Diclosulam PPI followed by sequential applications of paraquat plus bentazon provided greater control of sicklepod and prickly sida that resulted in greater yields. Yields from dicosulam PPI followed by paraquat plus bentazon EPOST were equivalent to yields with paraquat plus bentazon EPOST followed by imazapic POST or imazapic EPOST.

Key Words: *Ambrosia artemisiifolia*, *Croton glandulosus*, *Cyperus esculentus*, DE-564, *Desmodium tortuosum*, *Euphorbia heterophylla*, *Senna obtusifolia*, *Sida spinosa*.

Development of new herbicides is necessary because of herbicide registration cancellations and changes in weed spectrum and pressure. Although weed populations vary across the U.S. peanut production regions, many of the same herbicides are used. In the southeastern states of Alabama, Georgia, and Florida, sicklepod, yellow and purple nutsedge (*Cyperus rotundus* L.), and Florida beggarweed, are some of the most troublesome weeds (Dowler, 1998). Without controlling these and other weeds, peanut yield can be reduced considerably (Royal *et al.*, 1989; Bridges *et al.*, 1992; Wilcut *et al.*, 1995b).

The residual herbicides alachlor [2-chloro-*N*-(2,6-diethylphenyl)-*N*-(methoxymethyl) acetamide] (Johnson *et al.*, 1993), imazethapyr {2-[4,5-dihydro-4-methyl-methyl-4-(1-methylethyl)-5-oxo-1*H*-emidazol-2-yl]-5-ethyl-3pyridinecarboxylic acid} (Wilcut *et al.*, 1994, 1995b; Grey *et al.*,1995; Richburg *et al.*, 1995b,c; Grichar and Nester, 1997), imazapic {(±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid} (Richburg *et al.*, 1995a,c; Wilcut *et al.*, 1995b; Grichar and Nester, 1997; Webster *et al.*, 1997), metolachlor [2-chloro-*N*-(2-ethyl-6-methylphenyl)-*N*-(2-methoxy-1-methylethyl)acetiamide] (Richburg *et al.*, 1995b; Grichar *et al.*, 1996), ethalfluralin [*N*-ethyl-*N*-(2-methyl-2-propenly)-2,6-dintro-4-(trifluoromethyl)benzenamine] and pendimethalin [*N*-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine] (Johnson and Mullinix, 1999) often are applied to control or suppress grass and broadleaf weeds and nutsedges. Peanut development and maturity require a relatively long growing season (140-160 d) (Wilcut *et al.*, 1995b), and residual activity of herbicides applied at planting may not control weeds throughout the entire season. Paraquat [1,1'-dimethyl-4,4'-bipyridinium dichloride] plus bentazon [3-(1-methylethyl)-(1*H*)-2,1,3-benzothiadiazin-4(3*H*)-one 2,2-dioxide] applied in combination POST are used to control many broadleaf weeds. However, lack of residual activity, narrow window of application, and antagonism of this combination for sicklepod and Florida beggarweed control often limit long-term effectiveness. Additional herbicides or tillage may be needed in addition to these herbicides (Wehtje *et al.*, 1992; Grey *et al.*, 1995; Wilcut *et al.*, 1995b). Residual herbicides that provide season-long, broad-spectrum control of broadleaf weeds and nutsedge would benefit producers.

Diclosulam {*N*-(2,6-dichlorophenyl)-5-ethoxy-7-fluoro[1,2,4]triazolo-[1,5-c]pyrimidine-2-sulfonamide} controls broadleaf weeds and nutsedge weed species in soybean [*Glycine max*, (L.) Merr.] (Kleschick *et al.*, 1992; Barnes *et al.*, 1998; Brewer *et al.*, 1998; Smith *et al.*, 1998; Reddy, 2000) and peanut (Prostko *et al.*, 1997, 1999; Bailey *et al.*, 1998, 1999; Grichar *et al.*, 1998), and has potential forestry uses (Muir and Glover, 1998). Diclosulam can be applied preemergence (PRE) but will not be effective until rainfall or irrigation has moved it into the soil where weed germination occurs (Anon., 2000). Therefore, preplant incorporation (PPI) applications offer less risk and more consistent weed control. Research is needed to further define appropriate use patterns for diclosulam in peanut. Thus, the objectives of this research were to evaluate weed efficacy of

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weed management programs including diclosulam applied PPI and in comparison to herbicide programs that are considered commercial standards.

Materials and Methods

Experiments were conducted in Georgia at the Bledsoe Research Farm near Williamson, at the Attapulgus Research Farm in Attapulgus, at the Coastal Plain Exp. Sta. near Tifton, and at the Southwest Georgia Branch Exp. Sta. located near Plains. The experiment was conducted twice in 1998 at Plains and will thus be designated Plains A 1998 and Plains B 1998. The field characteristics, soil series, soil organic matter, soil pH, peanut cultivar, planting and emergence date, rainfall, irrigation, and harvest date are presented in Table 1.

Ethalfluralin (0.8 kg/ha) was incorporated to a depth of 5 to 7 cm over the entire test area. Peanut was planted 4 to 5 cm deep and spaced 5 to 6 cm apart. Individual plots consisted of two 91-cm wide by 7.6-m long rows. Irrigation was applied as needed in all studies (Table 1).

Herbicide systems evaluated were diclosulam PPI at 9, 18, 26, 35, or 52 g/ha or diclosulam PPI (18 or 26 g ai/ha) followed by an early post-emergence (EPOST) application of paraquat plus bentazon at 140 plus 280 g ai/ha, respectively. Standard treatments included imazapic at 71 g ai/ha EPOST, paraquat plus bentazon at 140 plus 280 g ai/ha EPOST, and paraquat plus bentazon at 140 plus 280 g ai/ha, EPOST fb imazapic at 71 g ai/ha POST. An ethalfluralin alone treatment also was included. EPOST and POST herbicides were applied with a nonionic surfactant at 0.25% v/v at 2 and 5 wk after peanut emergence, respectively. Herbicides were applied with a CO_2-pressurized backpack sprayer calibrated to deliver 187 L/ha at 210 kPa.

Broadleaf weed stage ranged from cotyledon to four leaves, yellow nutsedge was in the spike to three-leaf stage, and peanut had approximately three to five true leaves at the EPOST application timing. POST treatments were applied to broadleaf weeds ranging in size from cotyledon to seven leaves. Yellow nutsedge was three to six-leaf and peanut had approximately five to seven true leaves at the POST timing.

Visual estimates of percentage weed control were recorded 2 wk after the final EPOST and/or POST applications and again in the late season 2 wk prior to harvest on a scale of 0 (no control) to 100 % (complete control) relative to the ethalfluralin alone control. Visual estimates of percentage peanut foliar injury were recorded 1 wk after the EPOST and/or POST treatments and again 2 wk prior to harvest using the scale previously described. Peanut was harvested in September or October depending upon pod maturity using conventional harvesting equipment.

The experimental design was a randomized complete block with four replications. Data were subjected to analysis of variance and tested for year-by-treatment interactions. Treatments means were separated by Fisher's Protected LSD Test at P = 0.05. All percentage weed control ratings were from midseason except for Florida beggarweed, which were from the late season ratings. Significant year-by-treatment interactions were noted for percentage weed control, peanut injury, and pod yield. Therefore, data are presented for individual experiments.

Results and Discussion

Peanut injury recorded 1 wk after the POST treatment was 13% or less and did not differ among treatments at Attapulgus, Plains A and B 1998, or Tifton in 1997 and 1998 (data not presented). Peanut injury from diclosulam PPI applied was 9% or less in other environments (Table 2). Peanut injury from diclosulam PPI was transient and not observed later in the season. Minor and transient peanut injury with diclosulam PPI and PRE has been previously reported (Wilcut, 1997; Bailey *et al.*, 1998, 1999; Prostko *et al.*, 1998). In other research, excellent tolerance was reported for runner, spanish, and virginia-type peanut throughout the peanut belt (Braxton *et al.*, 1997).

Peanut injury increased when diclosulam at 18 and 26 g ai/ha was followed by paraquat plus bentazon EPOST compared with diclosulam alone at these same rates (Table 2). However, this injury was attributable to paraquat plus bentazon (Wilcut *et al.*, 1995b). Imazapic applied EPOST or POST following paraquat plus bentazon EPOST was the most injurious herbicide treatment. The level of injury noted for these herbicides does not cause yield loss (Richburg *et al.*, 1995a,c; Webster *et al.*, 1997)

Florida beggarweed control varied across environ-

Table 1. Summary of field characteristics for the sites used to determine the influence of application rate and timing of diclosulam in peanut from 1996 through 1998 in Georgia.

	Williamson (Cecil sandy clay loam)	Attapulgus (Dothan loamy sand)		Tifton (Tifton loamy sand)			Plains (Faceville sandy loam)	
Parameter	1996	1997	1998	1996	1997	1998	A 1998	B 1998
Soil organic matter (%)	1.6	0.5	0.5	0.8	0.5	0.5	1.4	1.5
Soil pH	6.1	6.0	6.1	6.0	6.0	6.1	6.0	6.5
Peanut cultivar	Florunner	Ga. Runner	Ga. Green	Ga. Runner	Ga. Runner	Ga. Green	Ga. Green	Ga. Green
Planting date	21 May	5 May	30 April	15 May	5 May	27 April	14 May	28 May
Emergence date	30 May	14 May	5 May	21 May	12 May	8 May	22 May	5 June
Rainfall[a] (mm)	454	753	754	448	461	531	681	681
Irrigation (mm)	215	102	348	114	177	163	245	229
Harvest date	21 Oct.	8 Oct.	6 Oct.	22 Oct.	16 Oct.	25 Sep.	7 Oct.	[illegible]

[a]Accumulative from 15 April through 30 September.

Table 2. Peanut injury from herbicides applied PPI, EPOST, and POST at Williamson in 1996 and at Attapulgus and Tifton in 1997.

Herbicide	Herbicide rate	Appl. timing[a]	Injury Williamson 1996	Attapulgus 1997	Tifton 1997
	g/ha		%		
Diclosulam	9	PPI	0	3	4
Diclosulam	18	PPI	1	0	1
Diclosulam	26	PPI	0	0	9
Diclosulam	35	PPI	0	0	5
Diclosulam	52	PPI	4	3	0
Diclosulam fb paraquat + bentazon	18 140 280	PPI EPOST EPOST	20	3	6
Diclosulam fb paraquat + bentazon	26 140 280	PPI EPOST EPOST	21	6	10
Paraquat + bentazon	140 280	EPOST EPOST	18	3	6
Imazipic	71	EPOST	21	3	2
Paraquat + bentazon fb imazipic	140 280 71	EPOST EPOST POST	19	14	18
Check			0	0	0
LSD (0.05)			5	5	4

[a]Abbreviations: PPI, preplant incorporated; fb, followed by; EPOST, early postemergence 2 wk after emergence; POST, postemergence 5 wk after emergence.

ments and application methods (Table 3). Diclosulam at 9 to 52 g ai/ha applied PPI controlled Florida beggarweed 54 to 95% in 1996 and 1997 at Attapulgus and Tifton and in 1997 at Plains. Control, however, was more consistent in 1998 (79 to 99%) for all locations. In 1998 at Attapulgus, Plains A and B, and Tifton, control was greater than 90% when diclosulam was applied at rates exceeding 18 g ai/ha PPI and control was significantly greater than imazapic EPOST for Plains A and B. Previous research has reported 90% or greater control of Florida beggarweed in peanut with diclosulam at rates of 26 to 35 g ai/ha PPI (Braxton *et al.*, 1997; Wilcut, 1997).

Florida beggarweed control by paraquat plus bentazon varied from 49 to 99% (Table 3). This variation is attributed to the lack of any soil residual activity for either herbicide in this combination (Wilcut *et al.*, 1995b). Florida beggarweed control with diclosulam PPI at 18 or 26 g ai/ha followed by paraquat plus bentazon EPOST was similar to control by paraquat plus bentazon EPOST followed by imazapic POST at Williamson and Tifton in 1996, Attapulgus and Tifton in 1997, and 1998 at Attapulgus, Plains A and B, and Tifton in 1998 (Table 3).

As reported previously, yellow nutsedge control varies with diclosulam rate and method of application (Braxton, 1997; Grichar *et al.*, 1997; Wilcut, 1997; Bailey *et al.*, 1998; Prostko *et al.*, 1998, 1999). Wilcut *et al.* (1999) also determined that soil application of diclosulam resulted in reduced shoot dry weights of yellow and purple nutsedge. In 1997 and 1998 at Attapulgus and Tifton, increasing the rate of diclosulam applied PPI

Table 3. Florida beggarweed and yellow nutsedge control as influenced by herbicides applied PPI, EPOST, and POST.

Herbicide	Herbicide rate	Appl. timing[a]	Florida beggarweed Williamson 1996	Attapulgus 1997	Attapulgus 1998	Tifton 1996	Tifton 1997	Tifton 1998	Plains A 1998	Plains B 1998	Yellow nutsedge Attapulgus 1997	Attapulgus 1998	Tifton 1997	Tifton 1998
	g/ha		%								%			
Diclosulam	9	PPI	66	71	97	75	88	86	-	79	78	46	68	53
Diclosulam	18	PPI	81	63	95	75	90	93	98	95	79	53	84	66
Diclosulam	26	PPI	91	54	93	75	88	94	98	95	90	61	86	71
Diclosulam	35	PPI	95	81	90	83	94	93	-	96	92	56	86	68
Diclosulam	52	PPI	95	84	97	72	91	95	99	95	94	75	90	75
Diclosulam fb paraquat + bentazon	18 140 280	PPI EPOST EPOST	94	74	87	85	95	88	97	96	84	65	80	79
Diclosulam fb paraquat + bentazon	26 140 280	PPI EPOST EPOST	94	89	90	87	97	92	97	95	90	80	91	78
Paraquat + bentazon	140 280	EPOST EPOST	94	71	85	80	85	49	99	95	60	64	68	60
Imazipic	71	EPOST	73	65	94	87	95	85	54	70	94	89	91	84
Paraquat + bentazon fb Imazipic	140 280 71	EPOST EPOST POST	94	97	94	87	95	73	-	93	94	89	86	88
Check			0	0	0	0	0	0	0	0	0	0	0	0
LSD (0.05)			15	21	8	NS	14	21	3	17	19	22	4	15

[a]Abbreviations: PPI, preplant incorporated; fb, followed by; EPOST, early postemergence 2 wk after emergence; POST postemergence 5 wk after emergence.

increased yellow nutsedge control (Table 3). Control of yellow nutsedge was at least 79% in 1997 with diclosulam PPI at rates greater than 18 g ai/ha, but control was less in 1998 at both locations.

Yellow nutsedge control with imazapic EPOST or POST following paraquat plus bentazon EPOST was at least 84% regardless of year or location (Table 3). Diclosulam at 26 g ai/ha applied PPI followed by paraquat plus bentazon EPOST was required to control yellow nutsedge as well as control by imazapic. Paraquat plus bentazon EPOST controlled yellow nutsedge no more than 68%.

Sicklepod control by diclosulam PPI was inconsistent and ranged from 0 to 92% at Tifton in 1996 and 1998, Attapulgus in 1997 and 1998, and Plains A and B (Table 4). Paraquat plus bentazon EPOST following diclosulam increased sicklepod control compared with diclosulam PPI and was equivalent to imazapic EPOST or paraquat plus bentazon EPOST followed by imazapic POST at Tifton in 1996 and 1998, Attapulgus in 1997, and Plains A and B. Previous research demonstrated that diclosulam did not control sicklepod (Wilcut, 1997) or provided variable control (Braxton *et al.*, 1997). Diclosulam controlled sicklepod no more than 65% in soybean (Smith *et al.*, 1998), and a sequential program of soil-applied and POST herbicides were needed (Arnold *et al.*, 1998).

Diclosulam applied PPI controlled prickly sida at least 90% regardless of rate, and this level of control was equal to or greater than control by paraquat plus bentazon EPOST, imazapic EPOST, or paraquat plus bentazon EPOST fb imazapic POST at Williamson (1996) and Plains (1998) (Table 4). Bailey *et al.* (1999) noted variable control of prickly sida with diclosulam PRE and inconsistent control was attributed to differences in rainfall.

Variable control of tropic croton was observed with PPI application of diclosulam at all rates in 1998 at Attapulgus and Tifton (Table 5). Control was at least 65% at both locations, and increasing the diclosulam rate improved control at Tifton but not at Attapulgus. Diclosulam PPI followed by paraquat plus bentazon EPOST improved tropic croton control at Attapulgus but not at Tifton.

Wild poinsettia control was at least 84% when diclosulam was applied PPI at Plains A and B 1998 (Table 5). Following diclosulam applied PPI with paraquat plus bentazon EPOST, imazapic POST alone, or paraquat plus bentazon EPOST followed by imazapic POST controlled this weed similarly.

Common ragweed control at Attapulgus in 1997 and 1998 exceeded 97% when diclosulam was applied regardless of EPOST or POST treatment (Table 5). Control of common ragweed with diclosulam PPI was comparable to paraquat plus bentazon EPOST during both years. Imazapic EPOST control of common ragweed varied from 68% (1997) and 95% (1998). Variable control of common ragweed has been previously noted in peanut with imazethapyr (York *et al.*, 1995) and imazapic

Table 4. Sicklepod and prickly sida control as influenced by herbicides applied PPI, EPOST, and POST.

Herbicide	Herbicide rate	Appl. timing[a]	Sicklepod: Tifton 1996	Sicklepod: Tifton 1998	Sicklepod: Attapulgus 1997	Sicklepod: Attapulgus 1998	Sicklepod: Plains A 1998	Sicklepod: Plains B 1998	Prickly sida: Williamson 1996	Prickly sida: Plains A 1998
	g/ha		%						%	
Diclosulam	9	PPI	0	44	55	75	-	10	90	-
Diclosulam	18	PPI	43	59	92	56	31	64	95	98
Diclosulam	26	PPI	30	55	40	74	56	64	95	98
Diclosulam	35	PPI	43	73	48	73	-	69	95	-
Diclosulam	52	PPI	30	64	74	80	92	79	95	99
Diclosulam fb	18	PPI	90	70	97	63	93	90	95	97
paraquat +	140	EPOST								
bentazon	280	EPOST								
Diclosulam fb	26	PPI	88	71	96	76	92	90	95	97
paraquat +	140	EPOST								
bentazon	280	EPOST								
Paraquat +	140	EPOST	83	71	73	54	96	90	71	99
bentazon	280	EPOST								
Imazipic	71	EPOST	93	79	98	91	76	85	86	93
Paraquat +	140	EPOST	95	85	98	94	-	98	75	-
bentazon fb	280	EPOST								
imazipic	71	POST								
Check			0	0	0	0	0	0	0	0
LSD (0.05)			23	25	43	16	27	18	8	3

[a]Abbreviations: PPI, preplant incorporated; fb, followed by; EPOST, early postemergence 2 wk after emergence; POST, postemergence 5 wk after emergence.

Table 5. Tropic croton, wild poinsettia, and common ragweed control as influenced by herbicides applied PPI, EPOST, and POST.

			Tropic croton		Wild poinsettia		Common ragweed	
	Herbicide	Appl.	Attapulgus	Tifton	Plains		Attapulgus	
Herbicide	rate	timing[a]	1998	1998	A 1998	B 1998	1997	1998
	g/ha		----------% ----------		---------- % ----------		-------- % --------	
Diclosulam	9	PPI	71	65	-	87	99	98
Diclosulam	18	PPI	69	93	98	84	98	98
Diclosulam	26	PPI	78	95	98	95	98	98
Diclosulam	35	PPI	71	95	-	90	99	98
Diclosulam	52	PPI	68	95	99	95	98	98
Diclosulam fb	18	PPI	90	-	97	91	97	98
paraquat +	140	EPOST						
bentazon	280	EPOST						
Diclosulam fb	26	PPI	91	95	97	93	99	98
paraquat +	140	EPOST						
bentazon	280	EPOST						
Paraquat +	140	EPOST	79	-	82	61	88	95
bentazon	280	EPOST						
Imazipic	71	EPOST	88	90	70	96	68	95
Paraquat +	140	EPOST	95	95	-	98	97	98
bentazon fb	280	EPOST						
imazipic	71	POST						
Check			0	0	0	0	0	0
LSD (0.05)			19	7	13	13	16	3

[a]Abbreviations: PPI, preplant incorporated; fb, followed by; EPOST, early postemergence 2 wk after emergence; POST, postemergence 5 wk after emergence.

(Wilcut *et al.*, 1995a; Gooden and Stabler, 1996). York *et al.* (1995), in experiments across 2 yr and locations, reported 56 to 93% early season control but this declined to 4 to 47% by harvest for imazethapyr applied at peanut cracking or POST, respectively. In contrast, paraquat plus bentazon EPOST effectively controlled common ragweed at least 88%. Gooden and Stable (1996) noted inferior control of common ragweed with imazapic POST compared to EPOST application, and Wilcut *et al.* (1995a) reported 70% control with imazapic EPOST.

Higher yields were recorded with diclosulam PPI followed by a sequential application of paraquat plus bentazon at Williamson and Tifton in 1996, Attapulgus and Tifton in 1997, and Plains B in 1998 than herbicide programs not containing diclosulam or diclosulam alone (Table 6). Diclosulam PPI followed by sequential applications of paraquat plus bentazon provided greater control of sicklepod and prickly sida that resulted in greater yields at these locations. Yields from dicosulam PPI followed by paraquat plus bentazon EPOST were equivalent to yields with paraquat plus bentazon EPOST followed by imazapic POST or imazapic EPOST in these experiments. For Attapulgus and Tifton in 1998, peanut yield following application of imazapic or paraquat plus bentazon EPOST followed by imazapic POST were higher yielding than any diclosulam PPI treatment.

Diclosulam PPI at the recommended rate of 26 g ai/ha consistently controlled prickly sida, wild poinsettia, and common ragweed in these experiments. Control of prickly sida and common ragweed with diclosulam (PPI or PRE) has been previously reported in peanut (Braxton *et al.*, 1997; Sheppard *et al.*, 1997; Wilcut, 1997; Bailey *et al.*, 1998, 1999) and soybean (Gander *et al.*, 1997; Richburg *et al.*, 1997; Arnold *et al.*, 1998; Barnes *et al.*, 1998). Although diclosulam PPI suppressed Florida beggarweed, sicklepod, and yellow nutsedge, additional herbicides applied EPOST were needed for acceptable control. Imazapic can be used to effectively control many weed species but label restrictions for cotton (18 mo) limits use. Diclosulam has a reported laboratory half-life of 33 to 65 d, soil degradation is microbial (Sheppard *et al.*, 1997) with a cotton rotational restriction of 10 mo (Dow, 2000). Therefore, diclosulam can be utilized for weed control in peanut without the cotton rotational restriction the following year.

Literature Cited

Anon. 2000. Dow AgroSciences LLC. Strongarm (product label). Indianapolis, IN.

Arnold, J.C., D.R. Shaw, and A.C. Bennett. 1998. New herbicides for stale seedbed soybean systems. Proc. South. Weed Sci. Soc. 51:2 (abstr.).

Bailey, W.A., J.W. Wilcut, D.L. Jordan, S.D. Askew, J.D. Hinton, and V.B. Langston. 1998. Evaluation of Strongram (DE 564, diclosulam) for weed control in southeastern peanuts. Proc. South. Weed Sci.

Table 6. Peanut yield as influenced by herbicides applied PPI, EPOST, and POST.

Herbicide	Herbicide rate	Appl. timing[a]	Yield Williamson 1996	Attapulgus 1997	Attapulgus 1998	Tifton 1996	Tifton 1997	Tifton 1998	Plains B 1998
	g/ha		kg ai/ha						
Diclosulam	9	PPI	5060	1560	1680	2100	4120	2970	2300
Diclosulam	18	PPI	4920	1360	1320	2100	4080	2810	2610
Diclosulam	26	PPI	5190	910	1340	2060	4090	3280	2740
Diclosulam	35	PPI	5210	1640	1430	2520	3570	3860	2600
Diclosulam	52	PPI	5280	640	1650	2560	4490	2770	2910
Diclosulam fb	18	PPI	5500	1810	2080	3700	4520	3560	4300
paraquat +	140	EPOST							
bentazon	280	EPOST							
Diclosulam fb	26	PPI	4650	2010	1720	4410	5030	3740	2830
paraquat +	140	EPOST							
bentazon	280	EPOST							
Paraquat +	140	EPOST	4150	1550	1420	3350	4480	3290	3680
bentazon	280	EPOST							
Imazipic	71	EPOST	4650	920	2450	3770	4450	3960	3970
Paraquat +	140	EPOST	3900	1420	2790	3230	4610	4160	3920
bentazon fb	280	EPOST							
imazipic	71	POST							
Check			1700	800	860	2290	3630	2200	2060
LSD (0.05)			1000	420	410	1280	820	710	740

[a]Abbreviations: PPI, preplant incorporated; fb, followed by; EPOST, early postemergence 2 wk after emergence: POST, postemergence 5 wk after emergence.

Soc. 51:59 (abstr.).

Bailey, W.A., J.W. Wilcut, D.L. Jordan, S.D. Askew, J.D. Hinton, and V.B. Langston. 1999. Weed management in peanut (*Arachis hypogaea*) with diclosulam. Weed Technol. 13:450-456.

Barnes, J.W., L.R. Oliver, and J.L. Barrentine. 1998. Potential of diclosulm (Strongarm) for weed control in soybeans. Proc. South. Weed Sci. Soc. 51:61-62.

Brewer, K.D., W.J. Grichar, D.C. Sestak, and B.A. Besler. 1998. Soybean (*Gylcine max*) variety response to diclosulam. Proc. South. Weed Sci. Soc. 51:274 (abstr.).

Braxton, L.B., J.L. Barrentine, T.C. Geselius, D.L. Grant, V.B Langston, S.P. Nolting, K.D. Redding, J.S. Richburg III, and B.R. Sheppard. 1997. Efficacy and crop tolerance of diclosulam soil-applied in peanuts. Proc. South. Weed Sci. Soc. 50:162 (abstr.).

Bridges, D.C., B.J. Brecke, and J.C. Barbour. 1992. Wild poinsettia (*Euphorbia heterophylla*) interference with peanut (*Arachis hypogaea*). Weed Sci. 40:37-42.

Dowler, C.C. 1998. Weed survey—Southern states. 1998. Proc. South. Weed Sci. Soc. 51:304 (abstr.).

Gander, J.R., L.R. Oliver, and D.M. Wallace. 1997. Soybean weed control programs with diclosulam. Proc. South. Weed Sci. Soc. 50:22-23.

Gooden, D.T., and G.F. Stabler. 1996. Management of common ragweed and tropic croton in peanuts with Cadre combinations. Proc. South. Weed Sci. Soc. 49:12-13.

Grey, T.L., G.R. Wehtje, R.H. Walker, and K.P. Paudel. 1995. Comparison of imazethapyr and paraquat-based weed control systems in peanut (*Arachis hypogaea*). Weed Technol. 9:813-818.

Grichar, W.J., A.E. Colburn, and P.A. Baumann. 1996. Yellow nutsedge (*Cyperus esculentus*) control in peanut (*Arachis hypogaea*) as influenced by method of metolachlor application. Weed Technol. 10:278-281.

Grichar, W.J., and P.R. Nester. 1997. Nutsedge (*Cyperus* spp.) control in peanut (*Arachis hypogaea*) with AC 263,222 and imazethapyr. Weed Technol. 11:714-719.

Grichar, W.J,. and D.C. Sestak. 1997. Diclosulam for weed control in south Texas peanuts. Proc. South. Weed Sci. Soc. 50:6 (abstr.).

Grichar, W.J., D.C. Sestak, K.D. Brewer, R.L. Lemon, P.A. Dotray, and T.A. Hoelewyn. 1998. Nutsedge control in Texas peanut with diclosulam. Proc. South. Weed Sci. Soc. 51:58-59.

Johnson, W.C. III, J.R. Chamberlin, T.B. Brenneman, J.W. Todd, B.G. Mullinix, Jr., and J. Cardina. 1993. Effects of paraquat and alachlor on peanut (*Arachis hypogaea*) growth, maturity, and yield. Weed Technol. 7:855-859.

Johnson, W.C., III, and B.G. Mullinix, Jr. 1999. Peanut seedling response to dinitroanilin herbicides applied preplant incorporated and preemergence. Peanut Sci. 26:28-32.

Kleschick, W.A., C.M. Carson, M.J. Costales, J.J. Doney, B.C. Gerwick, J.B. Holtwick, R.W. Meikle, W.T. Monte, J.C. Little, and N.R. Pearson. 1992. 1,2,4,-Triazolo(1,5-a)pyrimidine-2-sulfonanilide herbicides: influence of alkoxy heterocyclic subsitution on *in vitro* and *in vivo* biological activity and soil decompostions. ACS Symposium Series. 504:17-25.

Muir, R.L., Jr., and G.R. Glover. 1998. Screening of diclosulam and azafenidin for herbaceous weed control in loblolly pine. Proc. South. Weed Sci. Soc. 51:151-152.

Prostko, E.P., W.J. Grichar, T.A. Baughman, K.B. Brewer, and R.B. Lemon. 1999. Cadre and Strongarm comparisons for nutsedge (*Cyperus* spp.) control in peanuts—1998. Proc. Amer. Peanut Educ. Res. Soc. 31:27 (abstr.).

Prostko, E.P., R.G. Lemon, R.A. Whitney, W.J. Grichar, D.C. Sestak, and J.L. Barrentine. 1998. Weed control in peanuts with diclosulam. Proc. South. Weed Sci. Soc. 51:59 (abstr.).

Reedy, K.N. 2000. Weed control in soybean (*Glycine max*) with cloransulam and diclosulam. Weed Technol. 14:293-297.

Richburg, J.S. III, J.L. Barrentine, L.B. Braxton, T.C. Geselius, D.L. Grant, V.B. Langston, K.D. Redding, B.R. Sheppard, and S.P. Nolting. 1997. Performance of diclosulam on key broadleaf weeds in southern soybeans. Proc. South. Weed Sci. Soc. 50:161 (abstr.).

Richburg, J.S. III, J.W. Wilcut, A.K. Culbreath, and C.K. Kvien. 1995a. Response of eight peanut (*Arachis hypogaea*) cultivars to the herbicide AC 263,222. Peanut Sci. 22:76-80.

Richburg, J.S. III, J.W. Wilcut, and E.F. Eastin. 1995b. Weed management in peanut (*Arachis hypogaea*) with imazethapyr and metolachlor. Weed Technol. 9:807-812.

Richburg, J.S. III, J.W. Wilcut, and G.L. Wiley. 1995c. AC 263,222 and imazethapyr rates and mixtures for weed management in peanut (*Arachis hypogaea*). Weed Technol. 9:801-806.

Royal, S.S., B.J. Brecke, and L.L. Colvin. 1989. Wild poinsettia (*Euphorbia heterophylla*) interference in peanuts (*Arachis hypogaea*). Proc. South. Weed Sci. Soc. 42:26 (abstr.).

Sheppard, B.R., L.B. Braxton, J.L. Barrentine, T.C. Geselius, D.L. Grant, V.B. Langston, K.D. Redding, J.S. Richburg III, and D.B. Roby. 1997. Diclosulam, a new herbicide for broadleaf weed control in soybeans and peanuts. Proc. South. Weed Sci. Soc. 50:161 (abstr.).

Smith, M.C., D.R. Shaw, and S.M. Schraer. 1998. Soybean weed control with Strongram, Firstrate, and Frontrow. Proc. South. Weed Sci. Soc. 51:62-63.

Webster, T.M., J.W. Wilcut, and H.D. Coble. 1997. Influence of AC 263,222 rate and application method on weed management in peanut (*Arachis hypogaea*). Weed Technol. 11:520-526.

Wehtje, G.W., J.W. Wilcut, and J.A. McGuire. 1992. Influence of bentazon on the phytotoxicity of paraquat to peanuts (*Arachis hypogaea*) and associated weeds. Weed Sci. 40:90-95.

Wilcut, J.W. 1997. Evaluation of Strongarm (DE-564) for weed control in southeastern peanuts. Proc. South. Weed Sci. Soc. 50:5 (abstr.).

Wilcut, J.W., J.S. Richburg III, and L.B. Braxton. 1999. Behavior of Strongarm in purple and yellow nutsedge. Proc. Amer. Peanut Educ. Res. Soc. 31:29 (abstr.).

Wilcut, J.W., J.S. Richburg III, E.F. Eastin, G.R. Wiley, F.R. Walls, Jr., and S. Newell. 1994. Imazethapyr and paraquat systems for weed management in peanut (*Arachis hypogaea*). Weed Sci. 42:601-607.

Wilcut, J.W., J.S. Richburg, III, G. Wiley, and S. Newell. 1995a. Paraquat, bentazon, and AC 263,222 systems for Georgia peanut. Proc. South. Weed Sci. Soc. 48:16-17.

Wilcut, J.W., A.C. York, W.J. Grichar, and G.R. Wehtje. 1995b. The biology and management of weeds in peanut (*Arachis hypogaea*), pp. 207-244. *In* H.E. Pattee and H.T. Stalker (eds.) Advances in Peanut Science. Amer. Peanut Res. Educ. Soc., Inc., Stillwater, OK.

York, A.C., J.W. Wilcut, C.W. Swann, D.L. Jordan, and R.R. Walls, Jr. 1995. Efficacy of imazethapyr in peanut (*Arachis hypogaea*) as affected by time of application. Weed Sci. 43:107-116.