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Peanut Tolerance to Aim and ET

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SUMMARY

Field experiments were conducted in 2004 and 2005 to gain experience with Aim and ET applied postemergence in peanut at different application timings. Visual injury ranged from 47 to 62% following Aim treatments and 35 to 40% following ET treatments applied early-postemergence (EP) at AG-CARES in 2004. Injury decreased over time but was still apparent at harvest (2 to 7%). Visual injury following late-postemergence (LP) treatments did not exceed 5%. Yield loss was observed following Aim (2 oz) and ET (1.5 and 2 oz) applied EP and ET (2 oz) applied LP. At WPGRF in 2004, visual injury was observed following Aim and ET applied 30 days after planting (DAP). This injury ranged from 22 to 47% following Aim treatments and 33 to 48% following ET treatments 14 days after treatment (DAT). All injury decreased over time, but was still apparent at harvest (2 to 3%). Visual injury from applications made at 120 DAP did not exceed 7%. Peanut yield was not reduced following any herbicide treatment at this location. At Rochestor in 2004, Aim and ET (2 oz) applied EP injured peanut 23 to 25%, but injury decreased to less than 5% at the end of the season. Aim and ET applied LP caused up to 20% injury 19 DAT. Peanut yield loss was observed following Aim at 2 oz EP. At Yoakum in 2004, visual injury was observed following Aim and ET applied EP regardless of rate. ET at 2 oz produced the lowest yield. At a second location South Texas, Aim and ET applied 35 DAP caused more injury (14 to 20%) than applications made at 97 DAP (4 to 8%). No differences in yield were noted between herbicide treatments at this location. At AG-CARES in 2005, injury ranged from 17 to 30% following Aim treatments and 27 to 38% following ET treatments 14 days after EP applications. All peanut injury decreased over time, but was still visible at harvest (2 to 6%). Visual injury following Aim and ET applied LP ranged from 9 to 13% and 12 to 16%, respectively. Peanut yield and grade were not affected by herbicide or application timing. At Lockett in 2005, peanut injury did not exceed 7% regardless of herbicide, rate, or time of application. Peanut yield and grade were not different from the untreated control. At Lamesa in 2005, ivyleaf morningglory was controlled at least 88% by Aim (1.0, 1.5, and 2.0 oz) and ET (1.5 and 2.0 oz) when applications were made at-crack (AC). In general, control decreased when applications were delayed, especially at 56 days after crack (DAC). Peanut injury was less than 5% and 14% in 2004 and 2005, respectively, when applications were made AC. Injury increased to as much as 60% when applications were delayed to 28 DAC. Peanut yield decreased as weed control decreased. At Yoakum in 2005, at-crack applications of Aim controlled Palmer amaranth and horse purslane 100%, but control of southern crabgrass was ineffective (10 to 22%). ET was less effective at controlling Palmer amaranth (92 to 98%) and smellmelon (93 to 96%) two days after treatment. Herbicide treatments made at 28 DAC were not as effective as the control following the AC treatments. Aim controlled Palmer amaranth 47 to 63% and southern crabgrass 0 to 20%, while ET controlled these same weeds 26 to 45% and 0 to 27%, respectively. Regardless of herbicide and rate, applications made 56 DAC were ineffective at controlling Palmer amaranth (0 to 63%) and southern crabgrass (0%).

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INTRODUCTION

In 2004, Spartan 4F (sulfentrazone) was labeled for use in the southeast (Alabama, Georgia, North Carolina, South Carolina, Virginia, and Mississippi) after several years of testing. Research from South and West Texas indicated that this herbicide injured peanut 50 to 80% (Grichar et al. 2006). FMC received a federal label for this product, but the label excludes states like Texas where significant injury has been observed. Aim (carfentrazone-ethyl) may be applied to the row middles of emerged peanut. Both sulfentrazone and carfentrazone belong in the PPO family of herbicides. Until 2004, little university data (Georgia and South Texas) had been collected on the use of Aim postemergence-topical in peanut. ET (pyraflufen-ethyl), which is manufactured by Nichino America, Inc., is another PPO inhibitor that is being tested for selectivity in peanut. Field experiments were conducted in 2004 and 2005 to gain experience with Aim and ET applied postemergence in peanut at different application timings.

MATERIALS AND METHODS

Field studies were conducted in 2004 and 2005 in West Texas (at AG-CARES near Lamesa and Western Peanut Growers Research Farm (WPGRF) near Denver City), in South Texas (Yoakum), and in the Rolling Plains (Rochestor and Lockett). In peanut tolerance studies, Aim at 0.024 and 0.032 lb ai/A and ET at 0.00234 and 0.00313 lb ai/A (1.5 and 2.0 ounces of product per acre) were applied early-postemergence (EP, 30 to 50 days after planting (DAP)) and late-postemergence (LP, approximately 90 to 120 DAP). Peanut injury was evaluated after each application and yield and grade determined at the end of the growing season. In order to ensure that plant injury and yield/quality loss was the result of a herbicide treatment, plots were maintained weed-free. Additional studies were conducted in West and South Texas to determine peanut response and weed control following Aim and ET applications made at-crack (AC), 28 days after ground crack (28 DAC), and 56 DAC. Weed control was evaluated on various weed species and peanut injury was evaluated throughout the growing season.

2005 RESULTS AND DISCUSSION

West Texas. At AG-CARES in 2005, injury ranged from 17 to 30% following Aim treatments and 27 to 38% following ET treatments 14 days after EP applications (Table 1). All peanut injury decreased over time, but was still visible at harvest (2 to 6%). Visual injury following Aim and ET applied LP ranged from 9 to 13% and 12 to 16%, respectively. Peanut yield and grade was not affected by herbicide or application timing (Table 1). At Lockett in 2005, peanut injury did not exceed 7% regardless of herbicide, rate, or time of application (Table 2). Peanut yield and grade were not different from the untreated control. Ivyleaf morningglory was controlled at least 88% by Aim (1.0, 1.5, and 2.0 oz) and ET (1.5 and 2.0 oz) when applications were made AC (Table 4). In general, control decreased when applications were delayed, especially at 56 DAC. Peanut injury was less than 14% when applications were made AC (Table 3). Injury increased to as much as 60% when applications were delayed to 28 DAC. Peanut yield decreased as weed control decreased (Table 5). Tall waterhemp was controlled 83 to 93%,

98 to 100%, and 82 to 94% following Aim and ET applied AC, 28 DAC, and 56 DAC, respectively. Poor control of broadleaf signalgrass (up to 13%) was observed regardless of herbicide, rate, and application timing.

South Texas. At 2 days after the at-crack (AC) treatment, peanut was injured 23 to 40% and 12 to 25% following Aim and ET, respectively (Table 6). Aim at 2.0 oz/A injured peanut 40%, which was similar to the injury caused by Gramoxone Max plus Basagran. Two weeks after the AC applications, no treatment caused over 4% peanut injury. AC applications of Aim effectively controlled Palmer amaranth (99 to 100%), smellmelon (98 to 100%), and horse purslane (100%) 2 days after treatment (DAT). Two weeks after the AC applications, Aim controlled Palmer amaranth and horse purslane 100%, but control of southern crabgrass was ineffective (10 to 22%). ET was less effective at controlling Palmer amaranth (92 to 98%), smellmelon (93 to 96%), southern crabgrass (27 to 67%) and horse purslane (89 to 98%) at 2 DAT. Control of Palmer amaranth (100%) and horse purslane (100%) by ET was similar to Aim, but ET was less effective than Aim at controlling southern crabgrass (0 to 10%) at 2 weeks after treatment (WAT). In general, Aim was more similar to Gramoxone Max plus Basagran compared to ET.

At four to five weeks after the AC treatments were applied, Aim controlled Palmer amaranth and smellmelon 100%, but poor control of southern crabgrass was observed (5 to 10%). At this same observation period, ET controlled Palmer amaranth 98 to 100%, smellmelon 88 to 93%, and southern crabgrass 0 to 7%. Herbicide treatments made at 28 DAC were not as effective as the control following the AC treatments. Aim controlled Palmer amaranth 47 to 63% and southern crabgrass 0 to 20%, while ET controlled these same weeds 26 to 45% and 0 to 27%, respectively. Regardless of herbicide and rate, applications made 56 DAC were ineffective at controlling Palmer amaranth (0 to 63%) and southern crabgrass (0%). Control of smellmelon following Aim (67 to 99%) and ET (97 to 100%) applied 28 DAC was as effective as applications made AC.

Table 1. Peanut injury and yield as affected by AIM and ET applied early- (EP) and late-postemergence (LP) at AG-CARES in 2005.

Treatment	Timing	Rate (lb ai/A)	Rate (oz/A)	Peanut Injury (%)					Yield (lb/A)	Grade (%)
				Jun 29	Jul 15	Aug 10	Sep 6	Sep 20		
Non-treated	—	---	---	0	0	0	0	0	4255	69
AIM + COC	EP	0.024 + 1%	1.5	17	20	7	6	4	4780	70
AIM + COC	EP	0.032 + 1%	2.0	30	31	12	7	5	4736	70
ET + COC	EP	0.00234 + 0.5%	1.5	27	31	10	6	2	4119	69
ET + COC	EP	0.00313 + 0.5%	2.0	38	38	13	10	6	4434	68
Gramoxone Max + Basagran + NIS	EP	0.1875 + 0.25 + 0.25%	8 + 8	10	23	6	5	0	4660	70
AIM + COC	LP	0.024 + 1%	1.5	--	--	--	9	0	4599	69
AIM + COC	LP	0.032 + 1%	2.0	--	--	--	13	3	3999	68
ET + COC	LP	0.00234 + 0.5%	1.5	--	--	--	12	0	4344	69
ET + COC	LP	0.00313 + 0.5%	2.0	--	--	--	16	5	4104	69
2,4-DB + COC	LP	0.40 + 1%	25.6	--	--	--	7	0	3864	68
CV									11	2
LSD (0.10)				4	2	2	2	2	NS	NS

Table 2. Peanut injury and yield as affected by AIM and ET applied early- (POST 1) and late-postemergence (POST 2) at Lockett in 2005.

Treatment	Timing	Rate (oz/A)	Peanut Injury (%)					Yield (lb/A)	Grade (%)
			Jul 8	Jul 25	Aug 8	Sep 12	Sep 22		
AIM + Agridex	POST 1	1.5 + 1 %	3	2	2	2	0	6895	77
AIM + Agridex	POST 2	1.5 + 1 %	0	0	0	0	8	5952	76
AIM + Agridex	POST 1	2 + 1 %	7	3	0	0	0	5986	77
AIM + Agridex	POST 2	2 + 1 %	0	0	0	0	12	5996	76
ET + Agridex	POST 1	1.5 + 0.5 %	5	0	2	2	0	5366*	77
ET + Agridex	POST 2	1.5 + 0.5 %	0	0	0	0	7	5591	75
ET + Agridex	POST 1	2 + 0.5 %	3	2	2	2	2	6487	75
ET + Agridex	POST 2	2 + 0.5 %	0	0	0	0	2	5548	75
Gramoxone + Basagran + Induce	POST 1	8 + 8 + 0.25%	0	0	0	0	0	6422	75
2, 4-DB + Agridex	POST 2	1.6 pt/A + 1%	0	0	0	0	0	6083	75
Untreated	---	---	0	0	0	0	0	5490	76
CV								19	2
LSD (0.10)			3	NS	NS	NS	6	NS	NS

*yield is less than the non-treated control based on $p \leq 0.10$.

Table 3. Peanut injury, as affected by AIM and ET applied at-crack, mid-postemergence, and late-postemergence.

Treatment	Timing	Rate (lb ai/A)	Rate (oz/A)	Peanut Injury (%)						
				Jun 9	Jun 21	Jul 5	Jul 19	Aug 2	Aug 16	Sep 13
Non-treated	---	---	---	0	0	0	0	0	0	0
AIM + COC	AC	0.008 + 1%	0.5	4	0	3	3	7	0	0
AIM + COC	AC	0.016 + 1%	1.0	7	8	9	5	8	0	3
AIM + COC	AC	0.024 + 1%	1.5	13	20	12	6	5	7	8
AIM + COC	AC	0.032 + 1%	2.0	14	25	10	9	8	10	12
ET + COC	AC	0.00078 + 0.5%	0.5	2	0	2	7	8	0	0
ET + COC	AC	0.00156 + 0.5%	1.0	9	8	6	6	8	0	0
ET + COC	AC	0.00234 + 0.5%	1.5	10	7	5	6	8	0	3
ET + COC	AC	0.00313 + 0.5%	2.0	12	10	6	9	8	2	12
Gramoxone Max + Basagran + NIS	AC	0.25 + 0.25 + 0.25%	10.6 + 8	6	3	4	7	7	7	5
AIM + COC	28 DAC	0.008 + 1%	0.5	0	0	10	12	8	23	18
AIM + COC	28 DAC	0.016 + 1%	1.0	0	0	14	18	10	32	25
AIM + COC	28 DAC	0.024 + 1%	1.5	0	0	27	27	15	33	27
AIM + COC	28 DAC	0.032 + 1%	2.0	0	0	32	32	15	13	17
ET + COC	28 DAC	0.00078 + 0.5%	0.5	0	0	10	15	17	27	27
ET + COC	28 DAC	0.00156 + 0.5%	1.0	0	0	23	22	13	33	32
ET + COC	28 DAC	0.00234 + 0.5%	1.5	0	0	24	25	17	33	33
ET + COC	28 DAC	0.00313 + 0.5%	2.0	0	0	38	37	15	27	27
Gramoxone Max + Basagran + NIS	28 DAC	0.25 + 0.25 + 0.25%	10.6 + 8	0	0	25	25	12	27	27
AIM + COC	56 DAC	0.008 + 1%	0.5	0	0	0	0	13	45	43
AIM + COC	56 DAC	0.016 + 1%	1.0	0	0	0	0	12	47	47
AIM + COC	56 DAC	0.024 + 1%	1.5	0	0	0	0	13	40	42
AIM + COC	56 DAC	0.032 + 1%	2.0	0	0	0	0	7	33	38
ET + COC	56 DAC	0.00078 + 0.5%	0.5	0	0	0	0	8	47	37
ET + COC	56 DAC	0.00156 + 0.5%	1.0	0	0	0	0	13	40	40
ET + COC	56 DAC	0.00234 + 0.5%	1.5	0	0	0	0	12	40	40
ET + COC	56 DAC	0.00313 + 0.5%	2.0	0	0	0	0	15	40	42
2,4-DB + COC	56 DAC	0.40 + 1%	25.6	0	0	0	0	5	43	33
LSD (0.10)				2	2	5	3	NS	6	8

Table 4. Weed control, as affected by AIM and ET applied at-crack, mid-postemergence, and late-postemergence.

Treatment	Timing	Rate (lb ai/A)	Rate (oz/A)	Ivyleaf Morningglory Control (%)						
				Jun 9	Jun 21	Jul 5	Jul 19	Aug 2	Aug 16	Sep 13
Non-treated	---	---	---	0	0	0	0	0	0	0
AIM + COC	AC	0.008 + 1%	0.5	79	75	96	97	96	85	88
AIM + COC	AC	0.016 + 1%	1.0	88	78	96	98	93	87	90
AIM + COC	AC	0.024 + 1%	1.5	88	83	92	96	84	80	78
AIM + COC	AC	0.032 + 1%	2.0	90	84	96	97	92	78	78
ET + COC	AC	0.00078 + 0.5%	0.5	70	65	93	95	93	82	82
ET + COC	AC	0.00156 + 0.5%	1.0	87	75	98	98	93	83	88
ET + COC	AC	0.00234 + 0.5%	1.5	90	90	98	98	95	91	91
ET + COC	AC	0.00313 + 0.5%	2.0	88	85	95	98	92	85	88
Gramoxone Max + Basagran + NIS	AC	0.25 + 0.25 + 0.25%	10.6+ 8	78	78	96	98	95	91	88
AIM + COC	28 DAC	0.008 + 1%	0.5	0	0	77	78	73	73	77
AIM + COC	28 DAC	0.016 + 1%	1.0	0	0	77	57	72	78	79
AIM + COC	28 DAC	0.024 + 1%	1.5	0	0	81	58	73	82	84
AIM + COC	28 DAC	0.032 + 1%	2.0	0	0	88	71	83	90	88
ET + COC	28 DAC	0.00078 + 0.5%	0.5	0	0	52	42	45	73	81
ET + COC	28 DAC	0.00156 + 0.5%	1.0	0	0	68	32	63	78	83
ET + COC	28 DAC	0.00234 + 0.5%	1.5	0	0	63	32	62	80	85
ET + COC	28 DAC	0.00313 + 0.5%	2.0	0	0	82	60	82	88	90
Gramoxone Max + Basagran + NIS	28 DAC	0.25 + 0.25 + 0.25%	10.6 + 8	0	0	78	66	75	70	73
AIM + COC	56 DAC	0.008 + 1%	0.5	0	0	0	18	30	32	42
AIM + COC	56 DAC	0.016 + 1%	1.0	0	0	0	0	13	32	35
AIM + COC	56 DAC	0.024 + 1%	1.5	0	0	0	0	37	53	53
AIM + COC	56 DAC	0.032 + 1%	2.0	0	0	0	0	35	60	60
ET + COC	56 DAC	0.00078 + 0.5%	0.5	0	0	0	0	50	22	35
ET + COC	56 DAC	0.00156 + 0.5%	1.0	0	0	0	0	54	40	50
ET + COC	56 DAC	0.00234 + 0.5%	1.5	0	0	0	0	43	40	43
ET + COC	56 DAC	0.00313 + 0.5%	2.0	0	0	0	0	23	65	60
2,4-DB + COC	56 DAC	0.40 + 1%	25.6	0	0	0	0	57	96	95
LSD (0.10)				3	4	10	19	28	10	15

Table 5. Peanut yield and grade, as affected by AIM and ET applied at-crack, mid-postemergence, and late-postemergence.

Treatment	Timing	Rate (lb ai/A)	Rate (oz/A)	Yield (lb/A)	Grade (%)
Non-treated	---	---	---	3066	70
AIM + COC	AC	0.008 + 1%	0.5	3634	71
AIM + COC	AC	0.016 + 1%	1.0	3348	73
AIM + COC	AC	0.024 + 1%	1.5	2580*	72
AIM + COC	AC	0.032 + 1%	2.0	2823*	71
ET + COC	AC	0.00078 + 0.5%	0.5	2519*	72
ET + COC	AC	0.00156 + 0.5%	1.0	2386*	72
ET + COC	AC	0.00234 + 0.5%	1.5	3340	73
ET + COC	AC	0.00313 + 0.5%	2.0	2871*	72
Gramoxone Max + Basagran + NIS	AC	0.25 + 0.25 + 0.25%	10.6 + 8	3182	72
AIM + COC	28 DAC	0.008 + 1%	0.5	2938*	70
AIM + COC	28 DAC	0.016 + 1%	1.0	1280*	72
AIM + COC	28 DAC	0.024 + 1%	1.5	2275*	69
AIM + COC	28 DAC	0.032 + 1%	2.0	2194*	71
ET + COC	28 DAC	0.00078 + 0.5%	0.5	2360*	70
ET + COC	28 DAC	0.00156 + 0.5%	1.0	2461*	70
ET + COC	28 DAC	0.00234 + 0.5%	1.5	2259*	70
ET + COC	28 DAC	0.00313 + 0.5%	2.0	2459*	71
Gramoxone Max + Basagran + NIS	28 DAC	0.25 + 0.25 + 0.25%	10.6 + 8	1915*	71
AIM + COC	56 DAC	0.008 + 1%	0.5	1111*	70
AIM + COC	56 DAC	0.016 + 1%	1.0	1533*	69
AIM + COC	56 DAC	0.024 + 1%	1.5	958*	71
AIM + COC	56 DAC	0.032 + 1%	2.0	1559*	69
ET + COC	56 DAC	0.00078 + 0.5%	0.5	1958*	71
ET + COC	56 DAC	0.00156 + 0.5%	1.0	1618*	69
ET + COC	56 DAC	0.00234 + 0.5%	1.5	1433*	70
ET + COC	56 DAC	0.00313 + 0.5%	2.0	1684*	70
2,4-DB + COC	56 DAC	0.40 + 1%	25.6	1852*	70
CV				38	3
$LSD_{(0.10)}$				1175	NS

*yield is less than the non-treated control based on $p \leq 0.10$.

Table 6. Peanut injury and weed control as affected by AIM and ET applied at-crack, mid-postemergence, and late-postemergence[a].

Treatment	Timing	Rate (lb ai/A)	Rate (oz/A)	Peanut (%) Injury 2 DAT	AMAPA (%) Control 2 DAT	CUMME (%) Control 2 DAT	DIGSP (%) Control 2 DAT	TRTPO (%) Control 2 DAT	Peanut (%) Injury 2 WAT	AMAPA (%) Control 2 WAT	DIGSP (%) Control 2 WAT	TRTPO (%) Control 2 WAT	AMAPA (%) Control 4-5 WAT	CUMME (%) Control 4-5 WAT	DIGSP (%) Control 4-5 WAT
Non-treated	---	---	---	0	0	0	0	0	0	0	0	0	0	0	0
AIM + COC	AC	0.008 + 1%	0.5	23	99	100	33	100	2	100	10	100	100	100	5
AIM + COC	AC	0.016 + 1%	1.0	28	99	98	47	100	2	100	13	100	100	100	7
AIM + COC	AC	0.024 + 1%	1.5	33	100	100	60	100	1	100	22	100	100	100	10
AIM + COC	AC	0.032 + 1%	2.0	40	100	100	78	100	2	100	20	100	100	100	10
ET + COC	AC	0.00078 + 1%	0.5	12	95	93	37	89	1	100	10	100	100	93	3
ET + COC	AC	0.00156 + 1%	1.0	20	93	96	27	98	4	100	5	100	98	88	7
ET + COC	AC	0.00234 + 1%	1.5	28	98	93	65	97	2	100	0	100	100	99	3
ET + COC	AC	0.00313 + 1%	2.0	25	92	95	67	98	2	100	7	100	98	90	0
Gramoxone Max + Basagran + NIS	AC	0.375 + 0.25 + 0.25%	16 + 8	40	100	100	100	100	3	99	99	99	97	100	98
AIM + COC	28 DAC	0.008 + 1%	0.5	---	---	---	---	---	---	---	---	---	52	---	0
AIM + COC	28 DAC	0.016 + 1%	1.0	---	---	---	---	---	---	---	---	---	63	---	13
AIM + COC	28 DAC	0.024 + 1%	1.5	---	---	---	---	---	---	---	---	---	53	---	0
AIM + COC	28 DAC	0.032 + 1%	2.0	---	---	---	---	---	---	---	---	---	47	---	20
ET + COC	28 DAC	0.00078 + 1%	0.5	---	---	---	---	---	---	---	---	---	27	---	0
ET + COC	28 DAC	0.00156 + 1%	1.0	---	---	---	---	---	---	---	---	---	45	---	27
ET + COC	28 DAC	0.00234 + 1%	1.5	---	---	---	---	---	---	---	---	---	52	---	13
ET + COC	28 DAC	0.00313 + 1%	2.0	---	---	---	---	---	---	---	---	---	26	---	3
Gramoxone Max + Basagran + NIS	28 DAC	0.375 + 0.25 + 0.25%	16 + 8	---	---	---	---	---	---	---	---	---	73	---	37
AIM + COC	56 DAC	0.008 + 1%	0.5	---	---	---	---	---	---	---	---	---	0	99	0
AIM + COC	56 DAC	0.016 + 1%	1.0	---	---	---	---	---	---	---	---	---	33	98	0
AIM + COC	56 DAC	0.024 + 1%	1.5	---	---	---	---	---	---	---	---	---	57	87	0
AIM + COC	56 DAC	0.032 + 1%	2.0	---	---	---	---	---	---	---	---	---	63	67	0
ET + COC	56 DAC	0.00078 + 1%	0.5	---	---	---	---	---	---	---	---	---	27	100	0
ET + COC	56 DAC	0.00156 + 1%	1.0	---	---	---	---	---	---	---	---	---	58	100	0
ET + COC	56 DAC	0.00234 + 1%	1.5	---	---	---	---	---	---	---	---	---	40	100	0
ET + COC	56 DAC	0.00313 + 1%	2.0	---	---	---	---	---	---	---	---	---	7	97	0
2,4-DB + COC	56 DAC	0.40 + 1%	25.6	---	---	---	---	---	---	---	---	---	37	43	0
LSD (0.05)				6	5	5	12	4	2	0	10	0			

[a]Abbreviations: AMAPA, *Amaranthus palmeri* (Palmer amaranth); CUMME, *Cucumis melo* (smellmelon); DIGSP, *Digitaria ciliaris* (southern crabgrass); TRTPO, *Trianthema portulacastrum* (horse purslane).