Weed Control in Specialty Crops

Cultivation and herbicide treatments for weed management in grain sorghum. Regehr, David L., J. Anita Dille, and Dallas E. Peterson. An experiment was conducted near Manhattan, KS, on a Reading silt loam soil with 2.5% organic matter and a pH of 5.8 to evaluate alternative weed management programs and to validate treatments suggested by 'WeedSoft.' The experiment was a randomized complete block design with three replications. 'Pioneer 8505' sorghum was planted 1.5 inch deep on May 30, 2002, at 53,000 seed/A, in a tilled seedbed with less than 5% plant residue cover. The dominant weed was Palmer amaranth, plus there were low densities of large crabgrass and velvetleaf. Herbicide treatments were applied with a tractor-mounted boom to 10 ft by 25 ft plots. Rainfall was 0.24 inch on June 4, apparently enough to stimulate amaranth and crabgrass germination and to at least partially activate preemergence herbicides. Thereafter, precipitation totaled 0.6 inch until July 27. Weeds were not stressed at the early postemerge treatments, but were becoming quite water stressed by the postemerge treatments. A Buffalo cultivator (Fleischer Manuf., Columbus, NE) was used for between-row cultivation on June 17.

Date	May 31	Jun 11	Jun 20
Treatment	PRE	EPOST	POST
Sprayer			
gpa	15	15	15
psi	40	40	20
nozzle	AI11002	AI11002	TT11003
Temperature (C)			
air	34	26	28
soil (4 inch)	27	26	27
Soil moisture	good	fair	dry
Wind (mph)	5	2	6
Cloud cover (%)	25	95	65
Relative humidity (%)	26	75	60
Sorghum			
leaf no.	--	4	6
height (inch)	--	4	12
Large crabgrass			
stage	--	--	4-lf to tiller
height (inch)	--	--	1-3
infestation	--	--	0.1/ft^2
Palmer amaranth			
leaf no.	--	2-6	Many
height (inch)	--	1-2	6-12
infestation	--	3/ft^2	3/ft^2
Velvetleaf			
leaf no.	--	2-4	4-8
height (inch)	--	2	2-6
infestation	--	0.2/ft^2	0.2/ft^2

Crop injury was minor across all treatments. Large crabgrass was present in low numbers, and was not very competitive in the presence of either grain sorghum or other weeds. There was a flush of Palmer amaranth brought on by the rain shower on June 4. Amaranth control was excellent where preemergence treatments included s-metolachlor with atrazine, and good where just atrazine was applied preemergence. However, these preemerge treatments did not control velvetleaf. Early postemerge atrazine was by far the most effective and economical treatment in this experiment, giving excellent control of all emerged Palmer amaranth and velvetleaf. Throughout the very low rainfall conditions of June and July, there was no new grass or broadleaf weed germination, so the early postemerge atrazine treatments stayed almost weed-free. In contrast, all postemerge herbicide treatments failed to adequately control Palmer amaranth. By June 20, most Palmer amaranth was too tall and too stressed to be controlled with herbicides. The low sorghum yields in the postemerge herbicide treatments reflect how dominant the Palmer amaranth was in a growing season when rainfall was very low. Between-row cultivation typically gives 70 to 80% weed control, due to the surface area tilled and to weed suppression within crop rows. In this experiment, controlling Palmer amaranth between the sorghum rows with cultivation alone merely 'released' the amaranth growing in the sorghum rows, resulting in taller and more robust amaranth in the cultivation treatment than in the untreated plots. In contrast, cultivation following preemergence atrazine was an excellent treatment, as it was largely free of Palmer amaranth, and the cultivation controlled velvetleaf that escaped the preemergence atrazine. (Dept. of Agronomy, Kansas State University, Manhattan)

Table. Cultivation and herbicide treatments for weed management in grain sorghum (Regehr, Dille, and Peterson).

Treatment[a]	Rate	Time[b]	Crop	Large crabgrass		Palmer amaranth		Velvetleaf		Yield	Cost
			injury	Jul-16	Aug-27	Jul-16	Aug-27	Jul-16	Aug-27		
	(lb/A)		(%)	----------(% control)----------						(bu/A)	($/A)
Weed-free check: S-metolachlor&atrazine / CGA152005+atrazine+COC+UAN+ handweeding	1.26&1.63 / 0.027 + 0.5	PRE / POST	1	99	99	98	99	98	99	92	33
Untreated check	–	–	5	85	85	0	0	0	0	10	0
Atrazine	1.5	PRE	3	92	92	83	70	35	25	55	4
Atrazine / Cultivation	1.5	PRE / POST	2	99	98	93	96	93	87	84	10
S-metolachlor&atrazine	1.26&1.63	PRE	3	99	96	95	93	55	35	77	22
Cultivation	–	POST	5	99	99	53	32	95	65	26	6
Bromoxynil&atrazine + dicamba	0.25 & 0.5 + 0.13	POST	9	83	92	57	47	90	90	28	12
Atrazine + COC + UAN	1.5	POST	8	87	93	57	28	72	70	27	5
Dicamba&atrazine + NIS + UAN	0.28&0.53	POST	11	82	94	65	53	93	88	32	8
CGA152005 + atrazine + COC + UAN	0.027 + 0.5	POST	5	82	95	67	25	93	80	25	11
Atrazine + COC	1.5	EPOST	3	94	98	98	96	96	85	95	5
Atrazine + COC / Cultivation	1.5	EPOST /POST	2	99	98	97	96	98	97	92	11
LSD (5%)			4	6	7	12	8	18	11	12	--

[a]COC = Crop Oil Plus from Agriliance, at 1% v/v; NIS = Penetrate II non-ionic surfactant from Precision Labs, at 0.25% v/v; UAN = 28% nitrogen liquid fertilizer at 2.5% v/v.

[B]PRE = preemergence on May 31; EPOST = early postemergence on June 11; POST cultivation on June 17 and POST herbicide application on June 20.