Efficacy of Aim Herbicide in Grain Sorghum in the Texas High Plains

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Summary
Studies were conducted in 1999, 2000, and 2001 to evaluate palmer amaranth control and grain sorghum response to Aim 40DF (carfentrazone-ethyl) herbicide applied as a postemergence treatment. Studies were placed at Milo Center (Deaf Smith County) in 1999 and at the Texas Agricultural Experiment Station at Bushland in 2000 and 2001. Aim applied alone each year provided only marginal control of Palmer amaranth. When tank-mixed with atrazine control improved considerably, except in 2001 when conditions were extremely dry and hot. Aim plus 2,4-D or Clarity provided good control of Palmer amaranth, though control was usually as good with 2,4-D or Clarity alone. Aim plus Peak proved to be a good method of control in two of three years, but in 2001 no advantage was seen over Peak applied alone. Significant leaf burn on the grain sorghum following application was observed in two of three years. Grain sorghum yield was not affected in 2000 or 2001. Overall, these studies indicated that Aim applied alone will not provide sufficient control of Palmer amaranth in grain sorghum.

Objective

Palmer amaranth and other pigweed species rank as the most common and the second most troublesome weed in Texas grain sorghum. Preemergence herbicides provide good control but sometimes allow escapes which must be controlled either with cultivation or a postemergence herbicide. 2,4-D and Clarity are traditionally used to control pigweed species in grain sorghum, though they tend to cause crop injury in the form of stunting or root deformation which leads to reduced water and nutrient uptake and ultimately yield reduction. Aim was first introduced to the market as a corn herbicide, but has recently been labeled for use in grain sorghum.

Materials and Methods

	1999	2000	2001
Study Design	RCBD	RCBD	RCBD
Plot Size	15'x25'	15'x25'	15'x25'
Crop Variety	Pioneer 84G62	Pioneer 8699	Pioneer 8699
Planting Date	May 18	June 12	June 4
Application Date	June 10	July 12	June 29
Crop Size	5 inch	12 inch	12 inch

	1999	2000	2001
Weed Size	8 inch	2 inch	4 inch
Temperature (F)	85	99	100
Humidity (%)	70	30	31
Spray Vol. (GPA)	10	10	10

All applications were made with a tractor mounted CO_2 propelled sprayer. Ratings for crop injury and weed control were taken at various intervals each year. Ratings were based on a scale of 0 to 100 % with 0 = no crop injury or weed control and 100 = complete crop kill or weed control.

Results

See tables 1-3.

Table 1. Control of Palmer amaranth and grain sorghum response in 1999.

Treatment[1]	Product Rate / Acre	% P. amaranth control		% Crop Injury	
		2 WAT	4 WAT	2 WAT	4 WAT
Aim	0.33 oz	56	73	0	0
Aim + atrazine 4SC	0.33 oz + 0.5 qt	74	74	0	0
Aim + Peak	0.33 oz + 0.25 oz	70	79	0	0
Aim + Peak	0.33 oz + 0.5 oz	81	86	0	0
Aim + Clarity	0.33 oz + 4 oz	85	90	0	0
Aim + Clarity + atrazine	0.33 oz + 4 oz + 0.5 qt	91	93	0	0
Aim + 2,4-D amine 4	0.33 oz + 8 oz	84	83	0	0
Clarity	8 oz	83	85	0	0
2,4-D amine 4	16 oz	80	85	0	0

[1] All Aim treatments applied with 0.25 % v/v non-ionic surfactant.

Table 2. Control of Palmer amaranth and grain sorghum response in 2000.

Treatment[1]	Product Rate / Acre	% P. amaranth control		% Crop Injury		Crop Yield
		3 WAT	6 WAT	3 DAT[2]	24 DAT	lbs/ac
Aim	0.33 oz	41	50	26	1	6534
Aim + atrazine 90DF	0.33 oz + 1.1 lbs	90	86	14	0	6603
Aim + Peak	0.33 oz + 0.5 oz	60	66	25	0	6395
Aim + Clarity	0.33 oz + 4 oz	75	79	31	3	6514
Aim + 2,4-D LV6	0.33 oz + 5 oz	80	85	46	14	6316
Clarity	8 oz	78	75	23	8	6851
2,4-D LV6	16 oz	75	79	63	18	5385

1 All Aim treatments applied with 0.25 % v/v non-ionic surfactant.
2 Crop injury ratings encompass both leaf necrosis and stunting.

Table 3. Control of Palmer amaranth and grain sorghum response in 2001.

Treatment[1]	Product Rate / Acre	% P. amaranth control		% Crop Injury		Crop Yield
		2 WAT[2]	4 WAT	3 DAT[3]	14 DAT[4]	lbs/ac
Aim	0.33 oz	47	45	18	0	4799
Aim + atrazine 90DF	0.33 oz + 1.1 lbs	68	73	15	2	7066
Aim + Peak	0.33 oz + 0.5 oz	67	62	17	12	5974
Aim + Clarity	0.33 oz + 6 oz	77	83	20	8	5517
Aim + 2,4-D Amine 4	0.33 oz + 8 oz	70	67	10	5	6305
Peak	0.75 oz	68	63	5	17	5767

[1] All Aim treatments applied with 0.25 % v/v non-ionic surfactant. [2] WAT=weeks after treatment.
[3] 3 DAT rating taken for leaf necrosis. [4] 14 DAT rating taken for crop stunting.

Discussion

In 1999 Aim alone provided marginal control of Palmer amaranth. When tank-mixed with atrazine, Clarity, 2,4-D, or Peak control improved. Clarity and 2,4-D alone provided control comparable to the tank mixes. No crop injury was recorded for any of the treatments in 1999. In 2000 Aim again provided only marginal control when applied alone. Aim plus Peak did not provide the level of control that was observed in 1999. Aim plus atrazine, Clarity, or 2,4-D

provided good control. However, control was just as good with either Clarity or 2,4-D applied alone. High levels of crop injury were observed in 2000. Injury consisted of necrotic spots on the leaves, though lodging was also seen in treatments containing Clarity and 2,4-D. Aim injury did not translate into yield reduction. In 2001, weather conditions were extremely hot and dry at application. Palmer amaranth was hard to control with all treatments in June. Characteristically, Aim alone did not control Palmer amaranth. Unlike the two previous years, the tank mixes did not drastically improve control. By 4 WAT Aim plus Clarity proved to be the best treatment. Crop injury was consistent with the two previous years. Yields were variable, likely due to environmental conditions. Aim plus atrazine yielded the highest probably due to the fact that it had fair to good weed control and did not really stunt the crop as did Aim plus Clarity.

Overall, Aim applied alone provides less than acceptable control of Palmer amaranth. When tank-mixed with other herbicides control is improved, though the tank mix partners usually provide comparable control when applied alone. Aim will cause a significant level of leaf burn immediately after application, but new growth does not appear affected and these data do not indicate a yield reduction. Better alternatives for control of Palmer amaranth would be Peak, Clarity, 2,4-D, and atrazine, preferably in a combination. However, use of Aim in combination with other herbicides should be considered if other broadleaf weeds such as velvetleaf are present.

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