Field Bindweed Management for Processing Tomatoes

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Field studies were conducted at UC Davis and West Side Research and Education Center (WSREC) near Five Points in Fresno County to evaluate the potential of registered herbicides to control field bindweed (*Convolvulsus arvensis*) in processing tomatoes under furrow and drip irrigation[1]. Field bindweed is a significant and growing problem for tomato growers in many areas of California. The large root system typical of field bindweed makes control very difficult, and the rapid adoption of drip irrigation in processing tomatoes, and the resulting minimal tillage practices required for this irrigation system, seems to have exasperated the problem.

At each location, a split-plot, randomized block design with 4 replications was used, with main plots as pre-plant and pre-emergent applications of Prowl H_2O (pendimethalin), Treflan (trifluralin), Zeus (sulfentrazone), Matrix (rimsulfuron), and untreated. Split plot treatments were post emergence applications of Matrix or Shark (carfentrazone). Adjacent to this trial, other herbicide treatment combinations were tested with a randomized block design, and included sequential POST applications of Matrix or Shark, Matrix + Sandea (halosulfuron), Treflan applied two times, a Treflan + Dual (metalochlor) combination that is commonly used in tomatoes, and untreated controls. The trials included a hand-weeded check plot. Total number of unique treatment combinations = (5 x 3) + 6 = 21. Tomatoes were transplanted using standard equipment and plant spacing, and were managed using standard production practices. The UC Davis site was furrow irrigated; WSREC employed drip irrigation. Weed control was evaluated 2 and 4 weeks after herbicide application, and at harvest. A listing of these treatments is shown in Table 1 and Figure 2.

At both locations, the herbicide combinations suppressed field bindweed growth, but none of the herbicides provided complete control. Main and split plot treatment affects for the WSREC location are shown in Figure 1, and show weed and crop phytotoxicity ratings based on a 0 – 10 scale, where 10 indicates all weeds/crop phytotoxicity. Thus, high ratings indicate high weed pressure. Best control of field bindweed was observed with pre-plant incorporated (PPI) Treflan at 2 pints/A. This treatment had significantly lower field bindweed on the May 30 and June 14 evaluation dates, but this effect was marginal on Aug 9. At that time, the untreated plots had a bindweed score of 7.3 compared to 4.3 for the Treflan treated area. Thus, the best PPI treatment provided only about 50% control of the bindweed by the end of the season. Results were similar with furrow irrigation at the UC Davis location.

Application of Matrix or Shark as a post treatment provided significant suppression of bindweed as compared to the untreated plots on all evaluation dates. Matrix performed better than Shark, but again by the end of the season average control was marginal – only about 50%. Best

[1] Both field sites funded by a grant from the California Tomato Research Institute.

overall bindweed control occurred with the Treflan PPI + Matrix POST or Treflan PPI + Shark POST treatment (Figure 1). All of the PPI treatments significantly reduced other broadleaf weeds (mainly puncture vine, pigweed, lambsquarters, purslane, and nightshades) as compared to the untreated control at all evaluation dates, though pigweed control at UC Davis was marginal in the Prowl treatments. Unlike with bindweed, the addition of post emergence herbicides did not improve control of other broadleaf weeds.

The main effect of the additional herbicide treatments are shown in Table 1. The application of Treflan both as a pre-plant and at layby gave best overall bindweed and other broadleaf control of all the treatment combinations tested in this trial. End of the season bindweed rating was 3.8, compared to the untreated at 7.3.

Crop injury was noted only at WSREC in the PPI Prowl, Treflan, and Zeus treatments and in any treatment where Shark was applied. Visible crop injury was gone by the end of the season, however, some areas where Shark and Treflan were applied resulted in the complete loss of plants because of overspray (Shark) or shallow transplant depth (Treflan).

Overall, the Treflan treatment has remained near the top among treatments for the past three years at studies conducted with furrow irrigation at UC Davis; these results were very similar when tested at WSREC under drip irrigation in 2012. Postemergence applications of Shark or Matrix also reduced field bindweed levels, but bindweed in the crop row could not be treated with the shielded application used with Shark. The combination of a preemergence herbicide and either Matrix or Shark applied postemergence, or applying Treflan both pre and at layby, were the best treatments for field bindweed in these trials. Future work will continue to examine treatment and timing combinations that optimize field bindweed management in processing tomatoes.

Table 1. Field bindweed, other weeds, and crop phytotoxicity ratings* as affected by additional herbicide treatments in processing tomatoes (harvest ratings not shown). WSREC, 2012.

				May 30			crop	June 14			crop
	Herbicide Treatment and Use Rate:	Incorporation	Application date	Bindweed	BL (1)	Grass (2)	phyto	Bindweed	BL	Grass	phyto
1	Matrix (2 oz) post and again at 20 days	water	May 11 & 30	5.0	2.0	0.0	0.0	4.8	0.5	0.0	0.3
2	Shark (2 fl oz) post + 20 days	none	May 11 & 30	5.0	4.8	0.0	2.0	4.3	2.8	0.5	0.8
3	Matrix (2 oz) + Sandea (1 oz/A), post	water	May 11 & 30	4.5	0.0	0.0	0.0	4.5	0.5	0.0	0.0
4	Treflan (1 lb) pre + Treflan (1 lb) at layby	mechanical	Apr 24 & May 30	3.8	0.5	0.0	0.3	2.3	0.0	0.0	0.8
5	Treflan (1 lb) + Dual Magnum (1.5 pints/A) PPI	mechanical	24-Apr	4.3	0.3	0.0	0.8	7.8	0.5	0.0	1.8
6	Untreated, hand weeded control**	---	---	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
			Average	4.5	1.5	0.0	0.6	4.7	0.9	0.1	0.7
			LSD 0.05	**ns**	**1.25**	**---**	**1.28**	**2.2**	**1.5**	**---**	**ns**
			CV, %	24.6	54.1	---	139	29.7	117	---	135

* Ratings are based on a 0 - 10 scale, where 0 = no weeds/phyto and 10 = complete weed cover/crop death.

1) BL = broadleaf weeds other than field bindweed. Main species included puncture vine, pigweed, lambsquarters, purslane, and nightshades.

2) Grass = grassy weeds, dominated by Jungle Rice and Barnyard Grass.

** Hand weeded plots used for comparison and not included in the statistical analysis.

LSD 0.05 = Least significant difference at the 95% confidence level. Means within a column separated by less than this amount are not significantly different.

ns, --- Not significant, or insufficient data for statistical analysis.

CV = coeffecient of variation.

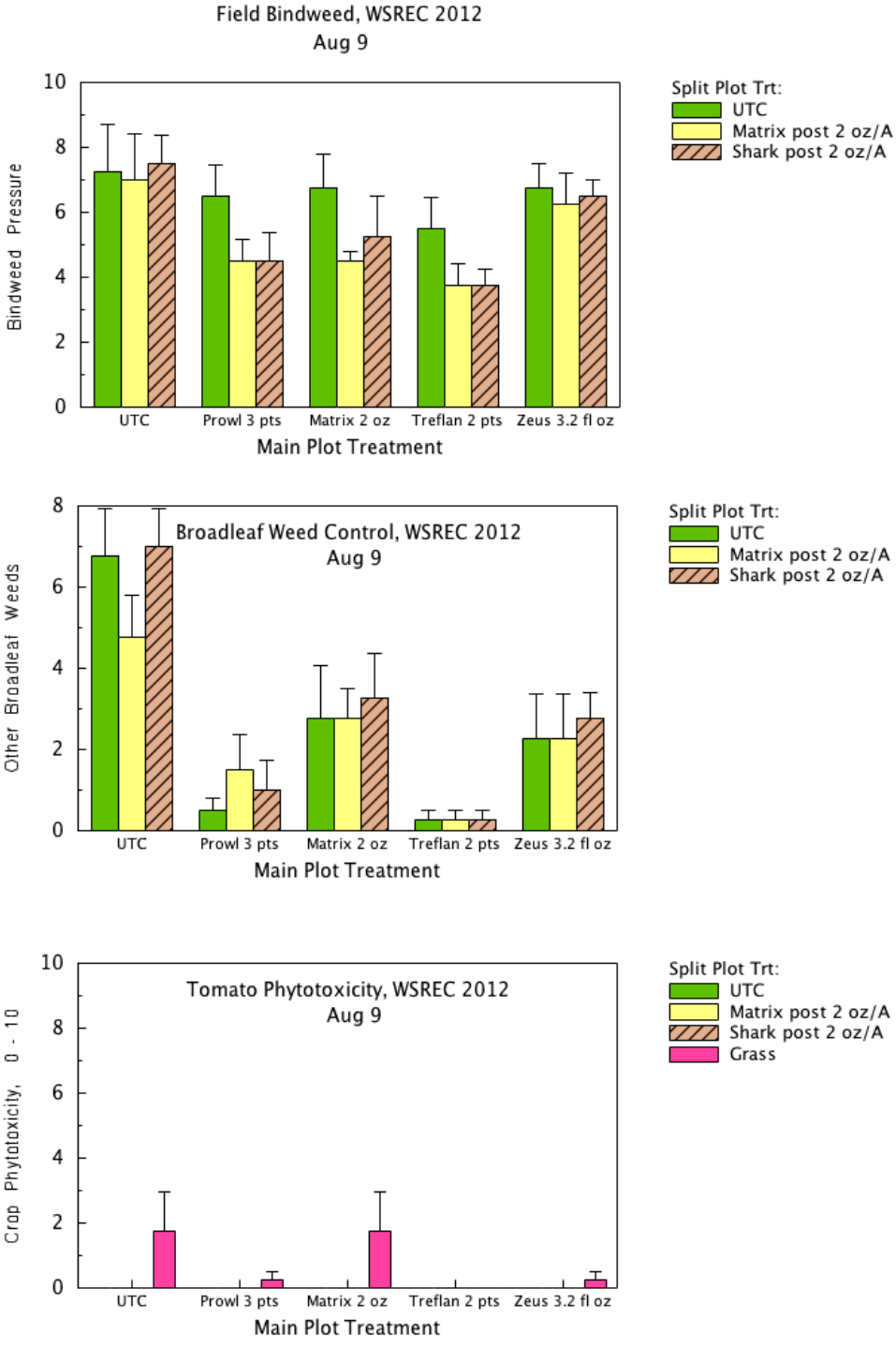

Figure 1. Field bindweed, other broadleaf weeds, and crop phytotoxicity ratings for all treatment combinations at WSREC on August 9, 2012.