

VISOR HERBICIDE IN THE REAL WORLD; THE TREE NUT CROP EUP PROGRAM IN CALIFORNIA

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Introduction

Field research in California since 1994 has shown that Visor 2E (thiazopyr) provides excellent preemergence control of many weed species as well as showing outstanding crop safety in trees and vines. These trials were established as replicated small plot experiments designed to understand the activity of Visor 2E based on rate, moisture requirements, soil type, weed spectrum, residual activity, and crop tolerance. These small plot trials were conducted under very controlled conditions to insure accuracy and reduce as many variables as possible. The early trials were small for another important reason; there was no crop tolerance established by the EPA, and all harvested crops treated with Visor 2E had to be destroyed.

The Federal Environmental Protection Agency approved a temporary tolerance for Visor 2E in tree nut crops and issued an Experimental Use Permit on July 25, 1996. This 2-year EUP allows Rohm and Haas Company to conduct grower-applied Visor 2E trials in almonds, pecans, pistachios and walnuts totaling 100 acres/year for each of these crops in California.

Between November 15, 1996 and February 26, 1997, 24 Visor 2E EUP trials were established in California. These trials were conducted in almonds (7), pecans (2), pistachios (7), and walnuts (8) and were spread throughout the nut crop growing regions of California. In these trials, 4 Visor 2E rates were evaluated; 0.375, 0.5, 0.75 and 1.0 LB ai/Acre. Comparisons were made with the grower's standard preemergence herbicides which included Surflan AS (oryzalin) at 3.0-4.0 LB ai/A (28% of the trials), Princep Caliber 90 (simazine) at 1.0-2.25 LB ai/A (20%), Solicam DF (norflurazon) at 2.0-4.0 LB ai/A (16%), Prowl 3.3EC (pendimethalin) in nonbearing nut crops at 2.5-3.3 LB ai/A (16%), Karmex DF (diuron) at 3.2 LB ai/A (12%), and Devrinol 50DF (napropamide) at 4.0 LB ai/A (8%). Since no single preemergence herbicide generally controls all weeds in an orchard, all grower programs in these 24 EUP trials included tankmixing Goal 2XL (oxyfluorfen) at 0.75-1.5 LB ai/A. Therefore the same rate of Goal 2XL was tankmixed with Visor 2E and the respective grower standard at each of the trial locations. If weeds were present at application, Roundup (glyphosate) at 1.0 LB ai/A or Gramoxone Extra (paraquat) at 0.625 LB ai/A was also used.

Most of these trials were established prior to the winter rains which totaled 6-13". This resulted in excellent incorporation of the herbicides at most locations. The trials were equally split between light and heavy soils providing Visor 2E good representation in the various soils from sandy loam to clay.

The grower's application equipment varied as much as their individual herbicide programs. Spray volumes were from 20GPA to 75GPA. Prior to the establishment of each trial, the sprayers were calibrated, assuring the greatest accuracy possible with all herbicide applications.

The growers did allow small untreated areas within the trial sites, usually 2 rows by 10 trees. This generally gave a good representation of the weed spectrum and made meaningful evaluations possible. Forty-two weed species were evaluated in these EUP trials. Table 1 shows the weeds that were found within the trials and their frequency of occurrence.

Table 1. Weed Species Evaluated In The 1997 Visor 2E EUP Trials.

Broadleaf Weeds (30):

		# Of Trials			# Of Trials
Annual Sowthistle	(<i>Sonchus oleraceus</i>)	9	Pineappleweed	(<i>Matricaria matricarioides</i>)	3
Black Mustard	(<i>Brassica nigra</i>)	2	Prickly Lettuce	(<i>Lacuca serriola</i>)	3
Brassbuttons	(<i>Cotula australis</i>)	1	Prostrate Knotweed	(<i>Polygonum aviculare</i>)	2
California Burclover	(<i>Medicago polymorpha</i>)	2	Prostrate Pigweed	(<i>Amaranthus blitoides</i>)	1
Chickweed	(<i>Stellaria media</i>)	6	Puncturevine	(<i>Tribulus terrestris</i>)	1
Common Groundsel	(<i>Senecio vulgaris</i>)	3	Redroot Pigweed	(<i>Amaranthus retroflexus</i>)	2
Common Purselane	(<i>Portulaca oeracea</i>)	5	Russian Thistle	(<i>Salsola kali</i>)	1
Fiddleneck	(<i>Amsinckia intermedia</i>)	2	Scented Mayweed	(<i>Matricaria chamomilla</i>)	1
Flaxleaf Fleabane	(<i>Conyza bonariensis</i>)	6	Shepherdspurse	(<i>Capsella bursa-pastoris</i>)	6
Green Amaranth	(<i>Amaranthus hybridus</i>)	1	Smooth Cat's Ear	(<i>Hypochoeris glabra</i>)	1
Lambsquarters	(<i>Chenopodium album</i>)	2	Spiny Sowthistle	(<i>Sonchus asper</i>)	2
Little Mallow	(<i>Malva parviflora</i>)	4	Spotted Spurge	(<i>Euphorbia maculata</i>)	10
London Rocket	(<i>Sisymbrium irio</i>)	2	Strawberry Clover	(<i>Trifolium fragiferum</i>)	1
Marestail	(<i>Conyza canadensis</i>)	9	Tumbling Pigweed	(<i>Amaranthus albus</i>)	1
Pannicled Willowherb	(<i>Epilobium paniculatum</i>)	3	Whitestem Filaree	(<i>Erodium moschatum</i>)	2

Grasses (10):

		# Of Trials			# Of Trials
Annual Bluegrass	(<i>Poa annua</i>)	4	Johnsongrass	(<i>Sorghum halepense</i>)	1
Barnyardgrass	(<i>Echinochloa crus-galli</i>)	5	Junglerice Grass	(<i>Echinochloa colonum</i>)	3
Bearded Sprangletop	(<i>Leptochloa fascicularis</i>)	1	Large Crabgrass	(<i>Digitaria sanguinalis</i>)	3
Diffuse Lovegrass	(<i>Eragrostis diffusa</i>)	1	Orchardgrass	(<i>Dactylis glomerata</i>)	1
Foxtail Barley	(<i>Hordeum jubatum</i>)	4	Southwest Cupgrass	(<i>Eriochloa gracilis</i>)	2

Sedges (2):

		# Of Trials			# Of Trials
Purple Nutsedge	(<i>Cyperus halepense</i>)	3	Yellow Nutsedge	(<i>Cyperus esculentus</i>)	11

Results And Discussion

Visor 2E provided excellent residual weed control with all rates and was still 75-90% effective 8-9 months after application. Table 2 shows the overall weed control with Visor 2E compared to the grower standard herbicides. Generally, there was a rate response with Visor 2E; however, even the 0.375 LB ai/A rate demonstrated more effective control than the average activity of the commercial standard herbicides.

Table 2. Overall Preemergence Weed Control Activity Of Visor 2E Compared To The Commercial Standards In Nutcrops.

Treatment*	LB ai/ Acre	% Preemergence Weed Control			
		2-3 Months	4-5 Months	6-7 Months	8-9 Months
Visor 2E	0.375	96	87	78	81
Visor 2E	0.5	87	91	78	75
Visor 2E	0.75	96	95	88	90
Visor 2E	1.0	91	96	93	87
Commercial Standard**		88	79	69	62

*Goal 2XL at 0.75-1.5LB ai/Acre added to all treatments including commercial standards.

**Depending on trial location, commercial standard was Surflan, Prowl, Solicam, Princep, Karmex, or Devrinol.

To better understand the activity of Visor 2E, comparisons were made based on the strengths of the grower's preferred choice for their herbicide program. For example, Surflan AS (all nutcrops) and Prowl 3.3E (currently only labeled for nonbearing nutcrops) are usually selected for their good residual activity on annual grasses and many broadleaf weeds (excluding marestail and flaxleaf fleabane). The results in Table 3 show that Visor 2E was as effective as Surflan AS in providing excellent grass control up to 8-9 months after application. For broadleaf weed control, Visor 2E was considerably more effective than Surflan AS at both 4-5 months and 8-9 months.

Table 3. The Preemergence Activity Of Visor 2E Compared To Surflan For The Control Of Annual Grasses And Broadleaf Weeds.

Treatment*	LB ai/ Acre	% Preemergence Weed Control			
		Grasses		Broadleaves**	
		4-5 Months	8-9 Months	4-5 Months	8-9 Months
Visor 2E	0.375	----	---	89	75
Visor 2E	0.5	100	85	94	81
Visor 2E	0.75	100	88	97	81
Visor 2E	1.0	100	85	97	80
Surflan AS	3.0-4.0	100	84	82	63

*Goal 2XL at 0.75-1.5LB ai/Acre added to all 5 treatments.

**Broadleaf weeds do not include marestail or flaxleaf fleabane.

Visor 2E provided even greater differences in activity when compared to Prowl 3.3E, as shown in Table 4. The evaluations after 8-9 months show that the residual activity of Prowl 3.3E was considerably less than the activity of Visor 2E, especially on the grasses where Visor 2E was 61-93% effective, compared to only 38% control with Prowl 3.3E. Even the Prowl 3.3E activity on broadleaf weeds (64%) was much less than the 88-94% control with Visor 2E.

Table 4. The Preemergence Activity Of Visor 2E Compared To Prowl For The Control Of Annual Grasses And Broadleaf Weeds.

Treatment*	LB ai/ Acre	% Preemergence Weed Control			
		Grasses		Broadleaves**	
		4-5 Months	8-9 Months	4-5 Months	8-9 Months
Visor 2E	0.375	83	61	80	88
Visor 2E	0.5	93	85	89	90
Visor 2E	0.75	93	91	92	91
Visor 2E	1.0	96	93	94	94
Prowl 3.3E	2.5-3.3	83	38	72	64

*Goal 2XL at 0.75-1.5LB ai/Acre added to all 5 treatments.

**Broadleaf weeds do not include marestail or flaxleaf fleabane.

For control of nutsedge, marestail, and flaxleaf fleabane, Solicam DF is the only preemergence herbicide that offers fairly good suppression of those weeds. However, Solicam DF is often not used due to grower concerns over crop injury. Table 5 shows the results when Visor 2E was compared to Solicam DF in controlling nutsedge and the marestail/flaxleaf fleabane complex. For nutsedge control, Visor 2E at rates of at least 0.75 LB ai/Acre was slightly more

effective than Solicam DF. After 4-5 months, Visor 2E was providing 90-99% marestalk/flaxleaf fleabane control compared to only 80% control with Solicam DF.

Table 5. The Preemergence Activity Of Visor 2E Compared To Solicam For The Control Of Nutsedge And Marestalk/Flaxleaf Fleabane.

Treatment*	LB ai/ Acre	% Preemergence Weed Control		
		Nutsedge		Marestalk/FLF
		4-5 Months	8-9 Months	4-5 Months
Visor 2E	0.375	80	70	95
Visor 2E	0.5	53	70	98
Visor 2E	0.75	78	90	90
Visor 2E	1.0	80	85	99
Solicam DF	2.0-4.0	63	73	80

*Goal 2XL at 0.75-1.5LB ai/Acre added to all 5 treatments.

Summary And Conclusions

Although the overall activity of Visor 2E showed excellent broadspectrum preemergence weed control compared to the current standard herbicides in nutcrops, there were some areas of potential "weaknesses" with the Visor 2E + Goal 2XL tankmixes that were evident in the 1997 EUP program. For optimum nutsedge control, the rate of Visor 2E should be greater than 0.5 LB ai/A. The spotted spurge control with Visor 2E, although not specifically mentioned in this paper, dropped off after 6-9 months when rates were equal or less than 0.5 LB ai/A. Finally, also not specifically mentioned, the annual sowthistle control dropped off after 8-9 months. This was probably related to the Goal 2XL rate in the Visor 2E + Goal 2XL tankmix where growers decided on a rate that did not give sufficient long-term residual sowthistle control (0.75-1.0 LB ai/A instead of 1.5-2.0 LB ai/A).

The highlight of the 1997 research was undoubtedly the excellent residual activity of Visor 2E compared to the commercial standards. Table 6 shows that the longer the time between application and evaluation, Visor 2E increases the difference in activity compared to current preemergence herbicides.

Table 6. Residual Weed Control Activity Of Visor 2E Compared To The Grower's Commercial Standards.

Residual Time	Visor 2E Less Active	Equal Activity	Visor 2E More Active
2-3 Months	10%	69%	21%
4-5 Months	15%	37%	48%
6-7 Months	25%	15%	60%
8-9 Months	8%	13%	79%

The 1997-98 field trials for the second year of the Visor 2E EUP program in nutcrops will be even more ambitious than the work conducted during this past year in anticipation of a registration in the near future.