

Recent Developments in Alfalfa Weed Control

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There have not been any earth shattering revolutionary changes in alfalfa weed control over the past few years. Many of the standard herbicides programs used ten or more years ago are still used today. By in large these programs continue to be effective. There have, however, been some recent developments in the area of unique weed problems and situations—both successes and failures. This paper will briefly outline current weed control practices in alfalfa and then focus on some recent developments.

Standard Alfalfa Weed Control Programs

Seedling Alfalfa

While preemergence herbicides are available for use in alfalfa, most growers opt for postemergence control programs. This approach offers the flexibility of evaluating the weed population prior to treatment in order to select the most appropriate herbicide or combination of herbicides. The most commonly used herbicides on seedling alfalfa in California include imazethapyr (Pursuit), bromoxynil (Buctril), and 2,4-DB. Depending on the weed spectrum encountered and environmental conditions at the time of application, these herbicides are used alone or in combinations. Selective grass herbicides, sethoxydim (Poast) and clethodim (Prism), are used when grassy weeds or volunteer cereals are present. Overall, acceptable control of most weed species is achieved with these programs. The keys to successful results are selecting the proper herbicide for the weeds encountered and treating at the appropriate growth stage. More weed control failures in seedling alfalfa are probably related to treating too late than any other factor.

Established Alfalfa

Standard weed management practices in established alfalfa typically involve the use of a soil active herbicide [i.e., hexazinone (Velpar), diuron (Karmex), or in the case of far northern California metribuzin(Sencor)] applied alone or in combinations. Sometimes the contact herbicide paraquat (Gramoxone) is used alone (especially in the last year of an alfalfa stand) or is tank mixed with soil residual herbicide to broaden the weed spectrum controlled and to improve control of emerged weeds. These programs have proven effective and adequately control most winter annual weeds that infest the first cutting of alfalfa. Summer annual grasses are typically controlled with a preemergence application of trifluralin (Treflan) or with post emergence applications of selective grass herbicides (Poast or Prism).

Recent Developments

Weed Control in Seedling Alfalfa

There has been ongoing research with two relatively new herbicides that are useful in seedling alfalfa. Prism (clethodim) was the most recently registered herbicide for use in seedling alfalfa. It was registered earlier in some other crops so many growers and pest control advisors are already familiar with this herbicide. Its activity is very similar to that of Poast. Its strength is that it controls annual bluegrass, downy brome, and foxtail barley, weeds that are usually not adequately controlled with Poast. Research in San Joaquin County showed better than 90% control of annual bluegrass when Prism was applied alone or tank mixed with Buctril. Control of annual bluegrass declined to 86% when Prism was combined with Pursuit (Table 1). Prism is a useful tool for selective grass control, especially when the field contains the winter annual grasses mentioned above.

Raptor (imazamox) is a new herbicide related to Pursuit. It shows significant promise for weed control in seedling and possibly established alfalfa. It is not yet registered. Its activity is similar to Pursuit with three exceptions. It has the same effect at approximately half the rate of Pursuit, it has shorter soil residual, and in general it controls a broader spectrum of weeds. The primary advantage is that it controls both grass and broadleaf weeds. This is a major advantage, as the common currently registered postemergence herbicides control grassy weeds or broadleaf weeds but not both. Therefore, costly tank mixes are often required for complete weed control in seedling alfalfa. Tables 1 and 2 show the effectiveness of Raptor on annual bluegrass and volunteer cereals. Raptor has also been found to be more effective than Pursuit for the control of fiddleneck, but is less effective for the control of red maids. However, like Pursuit, it usually does not adequately control prickly lettuce, sowthistle, common groundsel, and lambsquarters and will likely have to be tank mixed with other herbicides for complete control if these weeds are present.

Weed Control in Established Alfalfa

The most recent addition to herbicides used in established alfalfa is Zorial. It has been used for years in orchards as Solicam. It is typically applied as a winter dormant application. Zorial has little activity on emerged weeds and therefore must be tank mixed with a herbicide with postemergence activity such as Gramoxone if weeds have emerged at the time of application. For winter weed control, Zorial offers little advantage over other soil active herbicides registered in alfalfa. The possible advantage for Zorial is the potential for residual control of summer weeds, primarily green and yellow foxtail and nutsedge. It would be very advantageous for alfalfa growers if season-long weed control could be achieved in a single herbicide application. Research has shown that Zorial does control yellow and green foxtail but not to the same degree and not as late into the season as does Treflan TR-10. Zorial also suppresses yellow nutsedge but the level of suppression diminishes as the season progresses (Table 3). Zorial is not likely to cause a major shift in alfalfa weed control programs but it may be useful where residual control of moderate to low summer weed populations is desired.

Postemergence Dodder Control

Dodder is a parasitic weed that infests alfalfa hay and seed fields. Dodder weakens the alfalfa plant; reducing yield and even causing stand loss. It is also more succulent than alfalfa and thus increases the length of time needed to sufficiently cure alfalfa. Dodder is especially troublesome in seed fields, as dodder seed closely resembles alfalfa seed. The presence of dodder seed in alfalfa seed is reason for rejection from certification.

Preemergence applications of trifluralin granules have gone a long way toward controlling this weed. However, oftentimes a dodder problem is not recognized until too late for a preemergence treatment. Also, even with a trifluralin application at the proper time there are enough dodder escapes that they must be controlled to prevent further seed production. Since the loss of dinoseb in the 1980's there have been no effective herbicides for the control of attached dodder. Several trials have been conducted since that time to find a suitable replacement for the control of attached dodder but none was found.

Recent research in San Joaquin County has demonstrated that Pursuit can effectively control dodder without perceptible injury to alfalfa. Pursuit did not completely eliminate dodder but the 0.094 pound active ingredient per acre rate suppressed dodder by approximately 90% thirty days after treatment and 80% fifty days after treatment (Table 4). More importantly, the Pursuit treatment in the field trials affected dodder growth sufficiently to prevent seed production. The key to long-term dodder management is to eliminate seed production to prevent future infestations. The manufacturers of Pursuit, American Cyanamid, have submitted for a supplemental label to include dodder suppression at the 0.094-pound active ingredient per acre rate.

Flaming for Winter Weed/Weevil Control

An increasing market for organically grown products and some pesticide restrictions (i.e., Bureau of Reclamation lease lands in Tulelake) has brought about an interest in non-chemical weed control practices in alfalfa. The use of flaming for weed control has received some attention in other crops and may have some merit in alfalfa. New more efficient flamers with shields to concentrate the heat may improve the effectiveness of this technique. It may be most cost effective in areas where the alfalfa goes dormant and, therefore, there is less plant biomass to combust. It has been proposed that flaming may have the added benefit of controlling alfalfa weevil. Flaming will destroy weevil eggs that were deposited in alfalfa stems prior to the time the field is flamed. Also, it may make the alfalfa field an inhospitable environment for returning weevil adults to mate and lay eggs. The effectiveness of flaming for weed and weevil control had not previously been evaluated under intermountain conditions.

A field trial demonstrated that flaming is partially effective for weed control (Table 5). However, flaming was not nearly as effective as a standard herbicide treatment. This was especially true for perennial weeds and grasses. Perennial weeds draw on their root reserves and recover from a foliar burn; the growing point for grasses is in the crown area and more protected than that of broadleaf plants. These results suggest that flaming is a viable means of reducing weed pressure, but if complete weed control is required, flaming is not a substitute for herbicides. Similarly, flaming did reduce the number of alfalfa weevil larvae per sweep, about half as larvae as untreated plots (Table 5). These results suggest that flaming may be an adequate control measure under low or moderate weevil populations but not under high pressure.

Table 1. Postemergence Weed Control in Seedling Alfalfa, Canevari, 1999.

Treatment*	Rate lbs ai/A	Shepherd's Purse 4/16	Chick- weed 4/16	Burning Nettle 4/16	Annual Bluegrass 3/17	Common Groundsel 4/16	Red Maids 4/16
Buctril 2E	0.25	72	0	0	3	86	0
Buctril 2E	0.375	81	0	0	3	95	0
Pursuit	0.094	98	83	85	47	17	100
Buctril + Pursuit	0.25 + 0.094	90	90	45	52	73	98
Buctril + Prism	0.25 + 0.1	67	0	0	93	90	0
Prism	0.1	0	0	0	95	0	0
Pursuit + Prism	0.094 + 0.1	95	84	82	86	17	100
Raptor	0.032	99	66	86	92	0	10
Raptor	0.04	97	75	78	96	0	17
Raptor	0.048	97	91	80	98	0	63
Untreated	--	0	0	0	0	0	0

* MSO @ 1 pt/A added to all treatments; UN-32 at 1% V/V added to imazamox treatments only.

Table 2. Postemergence Control of Broadleaf Weeds and Volunteer Cereals in Seedling Alfalfa, Orloff, 1998.

Treatment*	Rate lbs/A	Alfalfa Injury 10/10	Filaree		Shepherd's Purse		Barley		Fiddleneck	
			11/5	5/1	11/5	5/1	11/5	5/1	11/5	5/1
Raptor	.024	5	97	90	100	98	90	98	99	78
Raptor	.032	11	99	100	100	100	98	98	100	90
Raptor	.047	12	99	100	100	100	93	100	100	88
Pursuit	.063	5	91	80	96	88	46	38	92	65
Pursuit + Poast	.063 + .28	2	92	82	96	90	84	92	86	59
2,4 - DB + Poast	.75 + .28	1	66	85	88	98	98	98	51	50
Pursuit + Buctril + Poast	.063 + .5+ .28	14	94	85	96	100	80	88	94	71
2,4 - DB + Buctril + Poast	0.5 + .25 + .28	35	25	15	70	68	98	98	64	50
Pursuit + Prism +	.063 + .1	6	92	80	89	95	92	75	86	70
Check		0	0	0	0	0	0	0	0	0

* Hasten and UN 32 added at 1 pint and 1 quart per acre, respectively. Aero Dyne-Amic at 0.5% added to treatments containing Poast or Prism.

Table 3. Nutsedge and Yellow Foxtail Control in Established Alfalfa, Canevari, 1998.

Treatment*	Rate lbs ai/A	Yellow Nutsedge Control			Yellow Foxtail
		5/4	6/30	7/31	7/1
Zorial 80 WG	2.0	47	33	33	67
Zorial 5 G	2.0	37	37	23	57
Zorial 5 G	1.0 + 1.0	50	40	35	52
Eptam 20 G	3.0 + 3.0	67	55	36	67
Untreated	--	0	0	13	0

*1st treatment: 3/4/98; 2nd treatment (for split applications): 6/22/98

Table 4. Post Attachment Control of Dodder in Alfalfa, Canvari 1999.

Treatment	Rate Lbs ai/A	% Dodder Control		Dodder length (in)	
		7/13	8/05	7/13	8/05
Untreated	--	0	0	18–34	7–14
Pursuit*	.047 + .047	83	92	1.7–4	0.7–1.7
Pursuit*	.063	82	62	1.7–3	5.5–8
Pursuit*	.094	94	79	0.4–1.8	1.7–4.7
Pursuit + Prowl	.094 + 4.0	98	88	0.25–0.5	2.7–5.7
Prowl	4.0	42	48	5.3–18	4.7–9.3
Pursuit + X-77	.094	92	81	0.5–1.5	3.3–5.3
Pursuit + COC	.094	93	81	0.5–1.5	2–3.3
Pursuit + Hasten	.094	93	78	0.5–0.8	3.3–7.3

* Hasten and UN 32 added at 1 quart and 2 quarts per acre, respectively.

Table 5. Comparison of Flaming and Herbicides for Weed and Weevil Control in Established Alfalfa, Orloff, 1998.

Treatment and Rate/A	Shepherd's Purse	Tansy Mustard	Kentucky Bluegrass	Weevil larvae/sweep
Flaming @ 11 gallons	51	59	37	38
Flaming @ 22 gallons	76	75	46	31
Sencor @ 0.5 lbs + Gramoxone @ 0.4 lbs	100	100	100	66
Untreated	7	17	0	68