

Annual Grass Control in Established Mohave Valley Alfalfa Using Thiazopyr (Visor), Trifluralin (Treflan) and Norflurazon (Zorial)

Tim C. Knowles¹, William B. McCloskey², and Vic Wakimoto³

¹Assistant Agent, La Paz County Cooperative Extension, University of Arizona, Parker, AZ;

²Associate Specialist, Department of Plant Sciences, University of Arizona, Tucson, AZ; and

³Alfalfa Grower, Mohave Valley, AZ

Abstract

Annual grasses such as wild barley and Mexican sprangletop are of economic concern to alfalfa growers in western Arizona. Thus, granular formulations of thiazopyr (Visor 2.5G), trifluralin (Treflan TR-10), and norflurazon (Zorial 5G) herbicides were evaluated for annual grass control in an established alfalfa field in Mohave County when applied after the first hay cutting in early spring and prior to irrigation. Visor 2.5G was applied in spring 1998 and 1999 at application rates of 0.25, 0.38, and 0.5 lb a.i./acre. Treflan TR-10 was applied at 2.0 lb a.i./acre in early spring or in both early spring and late summer. Visor 2EC was applied at 0.5 lb a.i./acre in spring 1998 but was replaced with Zorial 5G at 2.0 lbs a.i./acre in spring 1999. In 1998, good wild barley control (81%) resulted from a spring application of Visor 2.5G at 0.50 lb a.i./acre. The Visor 2EC formulation at 0.5 lb a.i./acre provided poor weed control (40%) due to the retention of herbicide on the alfalfa foliage and lack of incorporation into the soil by irrigation. In 1999, fair wild barley control (73 to 79%) resulted from spring applications of Visor 2.5G at 0.50 lb a.i./acre and Zorial 5G at 2.0 lb a.i./acre. During summer 1998, good Mexican sprangletop control (83-93%) resulted from Visor 2.5G applied at 0.38 and 0.50 lb a.i./acre and Treflan TR-10 applied in both spring and summer at 2.0 lb a.i./acre. No alfalfa phytotoxicity was observed at the rates applied in this study.

Introduction

Grass weeds are a major concern to alfalfa hay growers throughout Arizona with Mexican sprangletop (*Leptochloa uninervia*) and wild barley (*Hordeum leporinum*) being major problems in many Mohave Valley alfalfa fields. Grass weeds can become a serious problem in weak alfalfa stands, especially during the summer alfalfa slump (i.e., heat induced growth reduction). Late summer grass weed control may be a questionable practice for horse hay growers, since it reduces hay tonnage during the summer slump. However, grass weeds can reduce alfalfa hay quality to off-grade and substantially reduce the price received for dairy hay.

Thiazopyr (Visor) is a preemergence herbicide for control of annual grasses and certain small seeded broadleaf weeds with selectivity in many crops, including alfalfa, cotton, tree crops, and grape vines. Visor is a cell division inhibitor with a mode of action similar to dinitroaniline herbicides such as trifluralin (e.g., Treflan). Favorable weed control and crop safety have been obtained in established alfalfa with both the 2EC and 2.5G formulations of Visor applied in spring at 0.25 to 1.0 lb a.i./acre. Dodder (*Cuscuta* spp.) control has been especially good. The Visor granule formulation (2.5G) performs more consistently at lower use rates (0.25-0.50 lb a.i./acre) than the 2EC formulation for season long control of summer grass weeds including sandbur (*Cenchrus* spp.), junglerice (*Echinochloa colonum*), and sprangletop.

Trifluralin (Treflan TR-10) is a granular preemergence herbicide for control of grasses and some broadleaf weeds in many crops including established alfalfa. Trifluralin, like all dinitroaniline herbicides, inhibits root growth of susceptible plants by disrupting cell division in the active meristematic region near the root tip. Favorable season long control of barnyardgrass, junglerice, sandbur, and sprangletop has been obtained in established alfalfa with TR-10 applied in early spring (February) at 2 lb a.i./acre. A second 2 lb a.i./acre TR-10 application should follow 60 days later (or after a cutting and before irrigation) for effective dodder control and improved late season grass control (e.g., sprangletop). In fields where nutsedge species are a problem, Zorial can be used in addition to Treflan TR-10. Norflurazon (Zorial 5G and Zorial 80DF) is a pre-emergence herbicide that controls many annual broadleaf and grass weeds in addition to nutsedge species.

The objective of the field experiment reported here was to examine the effectiveness of thiazopyr for winter (e.g., wild barley) and summer grass (e.g., sprangletop) weed control in established alfalfa. Visor is not currently labeled for use in alfalfa and soil persistence and plant back restrictions are still being established.

Materials and Methods

A field experiment was conducted during 1998 and 1999 in Mohave Valley (located in western Mohave County) to determine the effect of thiazopyr herbicide formulations on Mexican sprangletop in two year old 'CUF 101' alfalfa. In 1998, the herbicide treatments included three rates of Visor 2.5G (0.25, 0.38, and 0.50 lb a.i./acre) applied in a single early spring application on January 20. Two herbicide treatments examined the efficacy of Treflan TR-10 (trifluralin granules) applied in a single 2.0 lb a.i./acre application (January 20) or applied as two sequential 2.0 lb a.i./acre applications (i.e., a split 4.0 lb a.i./acre-year application) on January 20 and August 20. The granular herbicide treatments were applied using a Valmar granule applicator (model 1255 PT) following cutting and hay removal and were incorporated by flood irrigation usually within 1 to 4 days of application. The first herbicide incorporating irrigation in this experiment was on January 24, 1998. There was an addition treatment of Visor 2EC applied at 0.5 lb a.i./acre in 21 gal of water/acre using TeeJet XR8005VS nozzles and a CO₂ pressurized backpack sprayer on January 20, 1998. Alfalfa regrowth after cutting resulted in 4 to 6 inch tall alfalfa shoots at the time of the herbicide applications with only about 50% bare ground. These herbicide treatments were reapplied on March 24, 1999, with one change. In 1999, the Visor 2EC treatment was replaced with Zorial 5G (norflurazon) at 2.0 lb a.i./acre. The second half of the Treflan TR-10 split application treatment was reapplied on July 9, 1999. The seven treatments included an untreated check and were replicated four times in a randomized complete block design. Individual plots were 20 ft wide by 75 feet long.

The first spring weed ratings in 1998 were made on May 12 which was 112 days after the first treatment (DAT). Wild barley or common foxtail (*Hordeum leporinum*) was the primary weed species present at the first rating. Mexican sprangletop (*Leptochloa univaria*) control was rated on June 23 (154 DAT), August 19 (211 DAT), September 9 (232 DAT), and September 24, 1998 (247 DAT). In 1999, plots were rated again for wild barley control on April 28 (36 DAT) and on June 3, 1999 (72 DAT). Data were statistically analyzed using ANOVA and the least significant difference Duncan's Multiple Range Test at the 0.05 probability level when appropriate.

Results and Discussion

Wild barley (common foxtail) control was visually estimated in the spring of 1998 and 1999. Wild barley ground cover

was approximately 75-100% in the untreated plots by May 12, 1998. In 1999, wild barley began to emerge prior to the March 24th herbicide applications but the preemergence herbicides still suppressed the weed infestation. By June 3, 1999, wild barley ground cover was approximately 50-100% in the untreated plots. In general, the highest rate of Visor (0.5 lbs a.i./acre) provided the best wild barley control, 81% and 79%, in 1998 and 1999, respectively (Table 1). As the rate of Visor declined from 0.5 lb to 0.38 and 0.25 lb a.i./ acre, weed control declined to unacceptable levels (Tables 1 and 2). Compared to the granule formulation of Visor at 0.5 lb a.i./acre, the EC formulation at 0.5 lb a.i./acre provided poor weed control (40% vs. 81%) (Table 1). The poor performance of the Visor 2EC formulation was probably due to the retention of herbicide on alfalfa foliage since the shoots were 4 to 6 inches tall and covered about 50% of the ground surface. This reduced the amount of herbicide reaching the soil surface where it could be incorporated into the soil by irrigation. Treflan TR-10 applied at 2 lb a.i./acre in January 1998 and March 1999 provided poor weed control compared to the higher rates of Visor (Tables 1 and 2). A second Treflan TR-10 application in the summer of 1998 and 1999 did not improve wild barley weed control since wild barley had already emerged and completed its life-cycle prior to the second application of Treflan. Due to the poor performance of the Visor 2EC formulation, this treatment was changed to norflurazon granules (Zorial 5G) at a rate of 2 lb a.i./acre in 1999. At the June 3, 1999 evaluation, the Zorial treatment suppressed wild barley almost as well as the 0.5 lb. a.i./acre Visor treatment (73 % vs. 79%) (Table 2).

As temperatures increased during the spring and summer months, Mexican sprangletop replaced wild barley as the dominant weed species at the study site. Visor 2.5G applied at the 0.38 and 0.5 lb a.i./acre rate provided good Mexican sprangletop control (89 to 93%) in 1998 (Table 1). As the rate of Visor declined from 0.5 lb to 0.38 and 0.25 pounds a.i./acre, sprangletop control declined (Table 1). A single 2 lb a.i./acre Treflan TR-10 application did not provide as good Mexican sprangletop control as Treflan TR-10 applied at 2.0 lb a.i./acre in both the spring and summer of 1998 (48% vs. 71% on September 9th and 83% vs. 64% on September 24th) (Table 1). Two applications of the Treflan TR-10 provided Mexican sprangletop control comparable to Visor 2.5G applied at 0.38 lb a.i./acre (Table 1). Mexican sprangletop evaluations will be made in the summer and fall of 1999. It was noted that the 1998 winter was mild enough in Mohave Valley at this location to allow some sprangletop plants to overwinter and resume growth from established crowns in the spring of 1999. The spring 1999 preemergence herbicide applications did not control these established Mexican sprangletop plants.

A single winter or early spring application of Visor at 0.5 lb a.i./acre provided superior wild barley and Mexican sprangletop compared to lower rates of Visor and to Treflan TR-10 suggesting that this herbicide is a good choice for all around winter and summer annual grass control. Two applications of TreflanTR-10 provided good Mexican sprangletop control in 1998 but the necessity of making two applications a year for annual grass control in alfalfa may make Treflan a less desirable option than Visor depending on the relative price of the two herbicides. Treflan TR-10 also did not provide quite as good control of wild barley as did Visor. In situations where nutsedge species are present, the use of Zorial can provide suppression of winter annual grasses as well as purple and yellow nutsedge. When registered, Visor will provide growers with another valuable tool for weed control alfalfa.

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Table 1. Wild barley and Mexican sprangletop control in established Mohave Valley alfalfa in 1998 after Visor 2.5G, Visor 2EC, and Treflan TR-10 applications. Initial herbicide applications were made on January 20, 1998 and the second half of the split 4.0 lb a.i./acre Treflan TR-10 treatment was applied on August 20, 1998.

Herbicide	Rate (lb a.i./A)	Wild Barley Control		Mexican Sprangletop Control		
		5-12-98 (%)	7-23-98 (%)	8-19-98 (%)	9- 9-98 (%)	9-24-98 (%)
None	-----	0 d	0 d	0 e	0 e	0 f
Visor 2.5G	0.25	35 c	13 c	39 d	48 d	70 de
Visor 2.5G	0.38	55 b	20 b	53 ab	73 ab	89 ab
Visor 2.5G	0.5	81 a	30 a	60 a	83 a	93 a
Visor 2EC	2	40 bc	19 b	43 cd	64 bc	76 cd
Treflan TR-10	2	50 bc	20 b	50 bc	48 d	64 e
Treflan TR-10	2.0 + 2.0	54 b	20 b	45 bcd	71 ab	83 bc

Values are percent control compared to untreated plots. Means within columns followed by the same letter are not significantly different at the 0.05 level of probability according to Duncan's Multiple Range Test.

Table 2. Wild barley and Mexican sprangletop control in established Mohave Valley alfalfa in 1999 after applications of Visor 2.5G, Zorial 5G, and Treflan TR-10. The first 1999 herbicide applications were made on March 24, 1999 and the second half of the split 4.0 lb a.i./acre Treflan TR-10 treatment was applied on July 9, 1999.

Herbicide	Rate (lb a.i./acre)	Wild Barley Control	
		4-28-99 (%)	6-3-99 (%)
None	-----	0 c	0 e
Visor 2.5G	0.25	60 a	59 d
Visor 2.5G	0.38	55 a	68 bc
Visor 2.5G	0.50	65 a	79 a
Zorial 5G	2.0	60 a	73 ab
Treflan TR-10	2.0	20 b	58 d
Treflan TR-10	2.0 + 2.0	65 a	64 cd

Values are percent control compared to untreated plots. Means within columns followed by the same letter are not significantly different at the 0.05 level of probability according to Duncan's Multiple Range Test.