

Evaluation of Herbicides for Khakiweed Control

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Abstract

Speedzone at 4.0 pt/A provided rapid control of khakiweed and gave 82% control at 17 days after treatment in one of three experiments. Spotlight at 1.0 pt/A alone was only effective at about 50%. BAS-514 and BAS-790 were not effective against khakiweed when applied alone. In a second experiment, sequential applications of Speedzone and Spotlight plus Turflon Ester provided exceptional control of greater than 95%. Initial applications of the POST applications that were combined with Gallery offered control of new emerging seedlings of khakiweed. Monument combined with Gallery gave decreased khakiweed control compared to Monument applied alone. An antagonistic effect could be occurring with the tank-mix combination of the two herbicides. Carfentrazone containing products, QuickSilver at 2 oz/A alone was not effective on khakiweed compared to the package mix product Speedzone. For the ALS-inhibiting herbicides, flazasulfuron and Certainty were the least effective while penoxsulam and Image were comparable to Monument in providing about 50% control.

Introduction

Khakiweed also known as mat chaff-flower (*Alternanthera caracasana*, formerly *A. pungens*) is a prolific perennial weed in turfgrass. A single herbicide has not been found to effectively control it. Postemergence (POST) herbicides typically offer good knockdown of visible and exposed foliage, however, the thick-matted prostrate weed commonly recovers from foliage not contacted by herbicides or new seedlings emerge. Previous work in 2004 showed that fluroxypyr (Spotlight*) combined with carfentrazone combination products (e.g. Speedzone*, Powerzone*) or triclopyr (Turflon Ester*) provided good control of khakiweed. New products are being developed for use in turf and efficacy against khakiweed have not yet been determined for BAS-514 and BAS-790 (BASF Corporation), flazasulfuron (ISK Biosciences Corporation), penoxsulam (DowAgroSciences), sulfosulfuron (Certainty*), and imazaquin (Image*). Tank-mix combinations of POST herbicides with preemergence (PREE) herbicides and multiple POST herbicide applications have potential to offer season-long control of khakiweed. Isoxaben (Gallery*) was combined with POST herbicides because combinations with dinitroaniline herbicides could potentially result in injury on winter overseeded turfgrasses. A series of field experiments were conducted to evaluate efficacy of several new herbicides and combinations of POST and PREE herbicides for khakiweed control in turfgrass.

Materials and Methods

Three small plot field experiments were conducted to evaluate the efficacy of several herbicides for khakiweed control in less maintained common bermudagrass turf on golf courses. At the Ken MacDonald Golf Course in Tempe, AZ, a single timing of application of herbicide treatments was made on khakiweed severely infesting a rough area in turf. Individual treatment plots measured 5 ft by 4 ft and were replicated three times in a randomized complete block design. Sprays were applied on 15 June 2007 using a backpack CO₂ sprayer equipped with a hand-held boom with three flat-fan 8003 nozzles spaced 20 inches apart. The herbicides were applied in 96 gpa water and

included methylated seed oil adjuvant at 1.5 pt/A pressurized to 30 psi. Two experiments were conducted at the Mesa Country Club in Mesa, AZ also in a rough area with common bermudagrass infested with khakiweed. In the Mesa experiment 1, the plots measured 5 ft by 10 ft and treatments were replicated four times in a randomized complete block design. The first application date was 02 August 2007 where POST and PREE herbicides were tank-mixed at application time. The weather conditions on 02 August were temperature at 92°F, scattered high clouds and very humid. POST herbicides only were re-applied on 30 August when the air temperature was 90°F, clear sky, high humidity, and no wind. The same backpack sprayer that was used in Tempe was also used for the Mesa experiment 1 and it delivered 40 gpa water with the same adjuvant added. On 30 August, the Mesa experiment 2 was initiated on plots measuring 5 ft by 7 ft replicated three times in a randomized complete design. The same backpack sprayer was used again to deliver 40 gpa water with a non-ionic surfactant, Latron CS-7 added to all treatments at 0.25% v/v. Khakiweed control was evaluated at intervals following all applications of herbicides.

Results and Discussion

Tempe experiment. Speedzone at 4 pt/A alone or in combination with BAS-514 gave 72% control of khakiweed at 10 days after treatment (DAT) (Table 2). At 17 DAT, the two treatments again provided identical 82% control. Spotlight alone at 1 pt/A or in combination with BAS-514 gave 57% control at 10 DAT. At 17 DAT, Spotlight plus BAS-514 gave 77% control compared to less than 45% control for either herbicide applied alone. BAS-790 exhibited a rate response for the two rates applied but did not offer any khakiweed control. Casual observations at 45 DAT showed that khakiweed control was diminished for all treatments.

Speedzone at 4.0 pt/A provided rapid control of khakiweed at 10 DAT but the greatest degree of control of only 82% was less than a commercially acceptable level. Spotlight alone was not effective but when combined with BAS-514, it performed similar to Speedzone. BAS-514 and BAS-790 were not effective against khakiweed when applied alone.

Mesa experiment 1. Acceptable control of khakiweed at 85% was observed for Speedzone at 4 pt/A plus Gallery at 14 DAT-1 (Table 3). Spotlight at 1 pt/A combined with Turflon Ester at 0.75 pt/A or BAS-790 plus Gallery gave 75% and 82% control, respectively, slightly less than acceptable. The POST treatments were combined with Gallery at 1 lb/A as a PREE treatment at the time of the first application to provide control of continuously emerging seedlings throughout the summer. A second application of only the POST herbicides demonstrated that Speedzone and Spotlight plus Turflon Ester provided exceptional control of greater than 95% at 8 DAT-2. Spotlight plus BAS-790 also gave near acceptable control. Monument plus Gallery did not give effective control of khakiweed after either application and at the end of the season. At 36 DAT-2, Speedzone plus Gallery and Spotlight with Turflon Ester plus Gallery gave the most effective khakiweed control at better than 90% control.

Mesa experiment 2. At 8 DAT, Speedzone at 4 pt/A exhibited the most effective khakiweed control of 75% among all treatments (Table 4). Quicksilver at 2 oz/A alone offered only 30% control of khakiweed. The ALS-inhibiting herbicide treatments caused minimally observable control ranging from 0 to 13%. Monument alone gave 10% control that was perceptibly better than Monument combined with Gallery at 3%. At 36 DAT, Speedzone control of khakiweed improved to an acceptable level of 85%. Quicksilver did not provide control of khakiweed. Monument alone gave 42% control while the combination with Gallery caused only slight injury to the khakiweed. Flazasulfuron and Certainty were the least effective while penoxsulam and Image were comparable to Monument in providing about 50% control.

Carfentrazone, the active ingredient of QuickSilver, required the addition of 2,4-D, mecoprop, and dicamba as Speedzone, a package mix of the four herbicides, to give effective khakiweed control. Carfentrazone alone was not effective on khakiweed.

Monument combined with Gallery gave decreased khakiweed control compared to Monument applied alone. An antagonistic effect could be occurring with the tank-mix combination of the two herbicides. The tank-mix application of the two herbicides also gave minimal khakiweed control in the Mesa experiment 1.

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Reference

Umeda, K. and G. Towers. 2004 Turfgrass, Landscape and Urban IPM Research Summary. D. Kopec, editor. The University of Arizona College of Agriculture and Life Sciences. Index at: <http://cals.arizona.edu/pubs/crops/az1359/>

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Table 1. Product and pre-mix active ingredients

<u>Product and Rate</u>	<u>Formulated A.I.</u>	<u>Rate A.I./A</u>
Spotlight 1.0 pt/A	1.5 lb ae/gal fluroxpyr	0.23 lb
Speedzone 4.0 pt/A	0.05 lb/gal carfentrazone 1.53 lb ae/gal 2,4-D 0.48 lb ae/gal mecoprop 0.14 lb ae/gal dicamba	0.025 lb 0.765 lb 0.24 lb 0.07 lb
Turflon Ester 0.75 pt/A	4.0 lb ae/gal triclopyr	0.375 lb
Gallery 1.0 lb/A	75% dry flowable isoxaben	0.75 lb
QuickSilver 2.0 oz/A	1.9 lb a.i./gal carfentrazone	0.03 lb
Monument 0.55 oz/A	75% wettable granule trifloxysulfuron	0.026 lb
Certainty 2.0 oz/A	75% water dispersible granule sulfosulfuron	0.094 lb
Image 11.4 oz/A	70% dispersible granule imazaquin	0.5 lb

Table 2. Khakiweed control with one application of herbicides at Ken MacDonald Golf Course, Tempe, AZ

<u>Treatment</u>	<u>Rate</u>	<u>Khakiweed control (%)</u>	
		10 DAT	17 DAT
Untreated check		0	0
BAS-514	0.75 lb a.i./A	13	17
BAS-514 + Speedzone	0.75 lb a.i./A + 4.0 pt/A	72	82
BAS-514 + Spotlight	0.75 lb a.i./A + 1.0 pt/A	57	77
Speedzone	4.0 pt/A	72	82
Spotlight	1.0 pt/A	57	45
BAS-790	3.1 pt/A	18	17
BAS-790	4.7 pt/A	25	32
LSD (p=0.05)		11.1	17.4

Treatments applied 15 June 2007

Table 3. Multiple postemergence herbicide applications plus preemergence herbicide for khakiweed control at Mesa Country Club, Mesa, AZ (Mesa experiment 1)

<u>Treatment</u>	<u>Rate</u>	<u>Khakiweed control (%)</u>		
		14 DAT-1	8 DAT-2	36 DAT-2
Untreated check		0	0	0
Spotlight + Turflon + Gallery	1.0 pt/A + 0.75 pt/A + 1.0 lb/A	75	95	94
Speedzone + Gallery	4.0 pt/A + 1.0 lb/A	85	96	90
Monument + Gallery	0.026 lb a.i./A + 1.0 lb/A	21	56	38
Spotlight + BAS-790 + Gallery	1.0 pt/A + 4.7 pt/A + 1.0 lb/A	82	84	73
LSD (p=0.05)		7.1	15.2	19.7

Treatments applied 02 August 2007

Sequential POST applications without Gallery applied 30 August

Table 4. Comparison of postemergence herbicides for khakiweed control at Mesa Country Club, Mesa, AZ (Mesa experiment 2)

<u>Treatment</u>	<u>Rate</u>	<u>Khakiweed control (%)</u>	
		8 DAT	36 DAT
Untreated check		0	0
Flazasulfuron	0.047 lb a.i./A	13	0
Penoxsulam	0.06 lb a.i./A	3	50
Monument	0.026 lb a.i./A	10	42
Monument + Gallery	0.026 lb a.i./A + 1.0 lb/A	3	17
Quicksilver	2.0 oz/A	30	8
Speedzone	4.0 pt/A	75	85
Certainty	0.094 lb a.i./A	0	33
Image	0.5 lb a.i./A	3	58
LSD (p=0.05)		9.0	30.2

Treatments applied 30 August 2007