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Preemergent Control of Common Vetch (*Vicia sativa* L.) and Black Medic (*Medicago lupulina* L.)[1]

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Abstract

Preemergence applied herbicides, Barricade 65 WDG (prodiamine), Derby 5G (metolachlor + simazine), Pendulum 60 WDG (pendimethalin), Snapshot DF (isoxaben + oryzalin), and Snapshot TG (isoxaben + trifluralin) were evaluated for control of common vetch (*Vicia sativa* L.) and black medic (*Medicago lupulina* L.) in 2.5 liter (0.7 gal) containerized soilless medium. Herbicides were applied at label rates in November 1993 (experiment 1) and 1994 (experiment 2). Common vetch was controlled up to 16 weeks after treatment (WAT) by both Snapshot formulations. Pendulum and Barricade, or Derby provided excellent and good control of vetch for 8 WAT (experiment 1), respectively, but only 4 WAT in experiment 2. Both Snapshot formulations resulted in excellent control of black medic for the entirety of both experiments. Pendulum provided excellent control up to 12 WAT (experiment 2) and good control up to 16 WAT (experiment 1). Further studies should evaluate the turfgrass/landscape herbicide Gallery (isoxaben), the common active ingredient in both Snapshot formulations.

Index words: herbicide, landscape bed, weed control.

Herbicides used in study: Barricade (prodiamine), [N^3,N^3-di-*n*-propyl-2,4-dinitro-6-(trifluoromethyl)-*m*-phenylenediamine]; Derby (metolachlor + simazine), 2-chloro-*N*-(2-ethyl-6-methyl-phenyl)-*N*-(2-methoxy-1-methylethyl)acetamide + 6-chloro-*N*,*N*'-diethyl-1,3,5-triazine-2,4-diamine; Pendulum (pendimethalin), *N*-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine; Snapshot DF (isoxaben + oryzalin), *N*-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl]-2,6-dimethoxybenzamide and isomer + 4-(dipropylamino)-3,5-dinitrobenzenesulfonamide; Snapshot TG (trifluralin + isoxaben), 2,6-dinitro-*N*,*N*-dipropyl-4-(trifluoromethyl)benzenamine + *N*-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl]-2,6-dimethoxybenzamide and isomer.

Significance to the Nursery Industry

Excellent preemergent control of common vetch and black medic was obtained for 12 or 16 weeks after application with either Snapshot DF at 4.5 kg ai/ha (4 lb ai/A) (no longer sold but was available at the time of this study) or Snapshot TG at 5.6 kg ai/ha (5 lb ai/A). Although neither product is registered for use on turfgrass, an alternative means of obtaining preemergent control of both species in turfgrass and landscape beds would be to tank mix Gallery (isoxaben) at 1.1 kg ai/ha (1.0 lb ai/A) with Surflan (oryzalin) at 3.4 kg ai/ha (3 lb ai/A). These herbicides are the two active ingredients in Snapshot DF, and both can be applied to turf or landscape beds. Good to excellent preemergent control of black medic could be expected for 12 or 16 weeks after application of Pendulum at 4.5 kg ai/ha (4 lb ai/A). Preemergent control of common vetch obtained with Barricade (equivalent product for use on nursery-grown ornamentals is called Factor), Derby (no longer manufactured but the two components, metolachlor and simazine, are available) or Pendulum was limited to 4 or 8 weeks.

Introduction

Vicia sativa L. (common vetch) and *Medicago lupulina* L. (black medic) are legumes that have naturalized in North America (2), and are found throughout the United States (3). These species are utilized as forage and cover crops but can also become weedy. Both species are cool season annuals that become well established in dormant turf especially during late fall through spring in the South. They produce viable seed, increasing the distribution of the species in subsequent years to include adjacent landscape beds. Vetch can also vegetatively spread to landscape beds by using landscape plants as support.

Unfortunately, little attention has been focused on controlling these two common weeds of southern landscapes. Prodiamine will provide preemergent control of common vetch in cut foliage field nurseries (8). However, there is no preemergent herbicide labeled to control common vetch in turfgrass and landscape beds. Snapshot DF (60% oryzalin and 20% isoxaben) and Snapshot TG (2% trifluralin and 0.5% isoxaben) are labeled for control of black medic at the highest recommended rate (5, 6). However, neither of these herbicides is registered for use in turfgrasses and the DF formulation has been discontinued. Isoxaben (Gallery 75DF), a component of both Snapshot products, has activity on black medic, and can be used in turfgrass and landscape beds (4). Image 1.5LC (ammonium salt of imazaquin), a turfgrass/landscape preemergent herbicide, has activity on black medic but was not labeled for landscape beds when this study was initiated (1).

The purpose of this study was to compare preemergent turfgrass/landscape herbicides with the two Snapshot formulations for control of common vetch and black medic. Gallery was not evaluated since it is a component of both Snapshot formulations. Two turfgrass/landscape herbicides, Barricade 65 WDG (prodiamine) and Pendulum 60 WDG (pendimethalin), were evaluated because common vetch and black medic infest landscape beds by seed blown in from plants infesting adjacent turf. Derby 5G (4% metolachlor

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Table 1. Effect of preemergent herbicides on number, percent coverage of substrate, and total dry weight of common vetch *(Vicia sativa L.)* or black medic *(Medicago lupulina L.)* seeded to containerized substrate on November 17, 1993, at the North Florida Research and Education Center in Monticello, FL.[z]

		Common vetch							Black medic						
		4 WAT		8 WAT		16 WAT			4 WAT		8 WAT		16 WAT		
Treatment/ formulation	Rate kg ai/ha	Percent coverage[y]	No. of weeds	Percent coverage	No. of weeds	Percent coverage	No. of weeds	Total dry wt. (g)	Percent coverage	No. of weeds	Percent coverage	No. of weeds	Percent coverage	No. of weeds	Total dry wt. (g)
Nontreated control	—	4.5a[x]	8.1a	38.8a	12.8a	85.6a	11.4a	7.57a	4.0a	12.8a	14.4a	15.9b	97.5a	14.8a	8.53a
Barricade 65WG	1.7	1.4b	7.1a	6.3bc	13.1a	12.0c	9.5ab	0.61c	2.5b	14.9a	4.0b	17.9ab	33.8c	16.5a	1.01c
Derby 5G	4.5	1.0bc	3.8b	8.3b	12.4a	68.1b	10.9ab	3.58b	1.0c	6.6b	2.0c	9.5c	65.6b	9.5b	2.42b
Pendulum 60WDG	4.5	1.5b	7.6a	4.6c	13.4a	13.4c	9.0b	0.34c	3.5ab	15.1a	1.0c	18.6a	6.8d	9.6b	0.13c
Snapshot DF	4.5	0.8c	0.8c	1.5d	8.5b	1.0d	3.9c	0.02c	1.0c	3.6c	1.0c	3.8d	1.0d	3.3c	0.01c
Snapshot TG	5.6	0.6c	0.8c	1.0d	4.3c	1.9d	1.9c	0.02c	1.0c	3.9c	1.0c	4.0d	2.9d	3.1c	0.05c

[z]Containers were overseeded with 15 common vetch or 25 black medic seeds per container 0 days after herbicide application. Treatments were replicated eight times.

[y]Statistical analysis performed after arcsine transformation; retransformed means are presented.

[x]Means within columns followed by the same letter are not significantly different by Waller-Duncan (*k*-ratio = 100).

Table 2. Effect of preemergent herbicides on number, percent coverage of substrate, and total dry weight of common vetch *(Vicia sativa L.)* or black medic *(Medicago lupulina L.)* seeded to containerized substrate on November 16, 1994, at the North Florida Research and Education Center in Monticello, FL.[z]

		Common vetch							Black medic						
		4 WAT		8 WAT		16 WAT			4 WAT		8 WAT		16 WAT		
Treatment/ formulation	Rate kg ai/ha	Percent coverage[y]	No. of weeds	Percent coverage	No. of weeds	Percent coverage	No. of weeds	Total dry wt. (g)	Percent coverage	No. of weeds	Percent coverage	No. of weeds	Percent coverage	No. of weeds	Total dry wt. (g)
Nontreated control	—	16.0a[x]	6.6a	74.0a	16.8a	97.0a	18.9a	6.36a	10.0a	14.4b	53.0a	15.5b	99.0a	9.4a	5.00a
Barricade 65WG	1.7	6.0b	15.8ab	17.0c	17.6a	19.0c	19.1a	0.21c	5.0b	16.5a	11.0b	19.3a	14.0b	20.1a	0.25b
Derby 5G	4.5	5.1b	10.4c	36.0b	14.5b	72.0b	16.1b	2.23b	1.3d	3.5d	4.3c	5.4d	13.6b	6.2c	0.21b
Pendulum 60WDG	4.5	4.6b	14.8b	11.0d	16.8a	13.0c	15.0b	0.17c	3.0c	11.4c	3.0c	13.0c	3.0c	13.4b	0.01b
Snapshot DF	4.5	0.6c	0.9d	2.6e	7.6c	2.6d	6.8c	0.01c	0.5e	0.8e	0.6d	1.2e	0.7d	1.5d	0.01b
Snapshot TG	5.6	0.2c	0.2d	1.4e	4.7d	1.4d	4.5d	0.01c	0.3e	0.5e	1.0d	1.8e	0.8d	2.0d	0.01b

[z]Containers were overseeded with 20 common vetch or 30 black medic seeds per container 0 days after herbicide application. Treatments were replicated ten times.

[y]Statistical analysis performed after arcsine transformation; retransformed means are presented.

[x]Means within columns followed by the same letter are not significantly different by Waller-Duncan (*k*-ratio = 100).

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and 1% simazine), which was registered as a preemergent landscape ornamental herbicide at the time of this experiment but is no longer available, was included in this study since there was an indication that triazines have activity against black medic (7). Moreover, the two components are individually registered for some turfgrasses.

Materials and Methods

Experiment 1, 1993–94. Common vetch and black medic seeds were collected in early May 1993 from sites at the North Florida Research and Education Center (NFREC) in Monticello, FL. Seeds were stored in plastic bags at room temperature.

A soilless substrate composed of pine bark:Canadian sphagnum peat:sand (3:1:1 by vol) amended with 6.1 kg/m^3 (10.3 lb/yd^3) dolomite, 1.6 kg/m^3 (2.7 lb/yd^3) triple superphosphate, 0.9 kg/m^3 (1.5 lb/yd^3) Micromax (The Scotts Co., Marysville, OH), and 6.1 kg/m^3 (10.3 lb/yd^3) 18N–2.6P–9.9K (Osmocote 18–6–12; 8–9 month formulation at 21C (70F), The Scotts Co.) was prepared and added to 2.5 liter (2.7 qt) containers on November 15, 1993. The initial pH of the substrate was 4.3. These containers received daily irrigation of 1.3 cm (0.5 in) until November 17.

On November 17, preemergent herbicide treatments (Table 1) were applied to the moist, weed-free substrate. Barricade 65WG (prodiamine), Pendulum 60WDG (pendimethalin), and Snapshot 80DF (isoxaben plus oryzalin) were applied as over-the-top broadcast sprays using a compressed-air backpack sprayer that delivered 374 liters/ha (40 GPA) at 173 kPa (25 psi). Individual aliquots of Derby 5G (metolachlor plus simazine) and Snapshot 2.5TG (isoxaben plus trifluralin) granules were hand-applied to the substrate surface. Non-treated containers were used as controls. Containers were overhead irrigated with 1.3 cm (0.5 in) water, immediately after application. Seeds (common vetch—15; black medic—25) were then dispersed over the surface of the substrate. There were eight single pot replications per treatment arranged in a randomized complete block design by weed species. The experiment was conducted under full sun on black polyethylene beds. Overhead irrigation of 1.3 cm (0.5 in) was applied daily until January 19, 1994, then once every other day until January 30, then every third day until February 7, then every other day until March 9. Total rainfall during the experimental period was 54.2 cm (21.3 in).

Weed counts and visual estimation of percent coverage of the substrate in each container were recorded 4, 8, and 16 weeks after treatment (WAT). Weeds were harvested 16 WAT, dried in an oven at 70C (158F), and weighed.

Experiment 2, 1994–95. Common vetch and black medic seeds were collected in mid-April and early May 1994, respectively, from sites at the NFREC-Monticello. Seeds were stored in plastic bags at room temperature.

Soilless substrate, containers, treatments, and herbicide application methods were the same as in experiment 1. Treatments (Table 2) were applied on November 16 to the moist, weed-free substrate. Seeds (common vetch—20 or black medic—30) were dispersed on the substrate of each container. Ten containers per treatment were arranged in a randomized complete block design by weed species on the above described container bed. Daily overhead irrigation of 0.5 cm (0.2 in) was applied from November 17 to February 7, 1995. Total rainfall was 21.5 cm (8.5 in) during the experimental period.

Weed counts, percent coverages (visual), and dry weights per container were recorded 4, 8, and 12 wk after application as described above.

Data analyses. In performing the analyses, the arcsine transformation was applied to the percent coverage data. Means were separated by the Waller-Duncan procedure of SAS (9) using a K-ratio of 100. Retransformed means are reported. Acceptable preemergent control was defined as 70% reduction in weed counts, with a substrate coverage of ≤10% (excellent control); or percent coverage >10% but ≤20% (good control). However, due to the differences among herbicides in their mode of action, preemergent control was deemed excellent or good regardless of weed count, if percent coverage of the substrate was ≤5%, or >5% but ≤10%, respectively.

Results and Discussion

Experiment 1. Both Snapshot DF and TG provided excellent control of both weeds for 16 WAT (Table 1). Control of both weeds for 8 weeks was excellent using Pendulum, although statistically less than that provided by either Snapshot formulation (Table 1). Barricade and Derby provided 8 weeks of good control of common vetch and excellent control of black medic. Sixteen weeks of acceptable control of common vetch was not achieved with Barricade, Derby, or Pendulum, but all three reduced weed pressure as determined by dry weight. Additionally, both Barricade and Pendulum reduced percent coverage (>80%) and dry weight (>90%) of common vetch. Good control of black medic (<7% substrate coverage) for 16 WAT was obtained with Pendulum. Barricade and Derby did not effectively reduce number and percent coverage of black medic 16 WAT. However, Barricade and Derby reduced black medic dry weight by 88 and 72%, respectively.

Experiment 2. Overseeding rate of common vetch and black medic was increased 20% compared to experiment 1 but weed pressure was increased about two- to three-fold as evidenced by the increases in percent coverage 4 and 8 WAT (Table 2). Excellent control of both weeds was only obtained with both Snapshot formulations. Pendulum and Barricade substantially reduced coverage (>80%) and dry weight (>95%) of common vetch 12 WAT even though control was deemed unacceptable. Pendulum was the only turfgrass/landscape herbicide that provided excellent long-term control of black medic—percent coverage and dry weight were reduced by 97% and 99%, respectively, compared to the control 12 WAT. Preemergent control of black medic 12 WAT by Derby was deemed unacceptable, although compared to the control, Derby reduced weed number by 68% and weed dry weight by 96%.

Common vetch was controlled acceptably by all herbicide treatments evaluated at 8 WAT in experiment 1, but not in experiment 2, perhaps the result of increased weed pressure. The two Snapshot formulations were highly effective in controlling common vetch for up to 16 WAT. Pendulum provided excellent control for 8 weeks and 4 weeks in experiment 1 and 2, respectively by substantially reducing percent coverage. Derby and Barricade only provided 8 and 4 weeks of good control in experiment 1 and 2, respectively.

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As with common vetch, both Snapshot formulations provided nearly complete control of black medic. Pendulum provided good control of black medic up to 16 WAT (experiment 1) and excellent control for 12 WAT (experiment 2). Derby resulted in excellent control of black medic for 8 weeks in both experiments, Barricade likewise but only in experiment 1.

The amount of rainfall plus irrigation in experiment 1 was 165 cm (65 in) and 63 cm (24.8 in) in experiment 2. These amounts were a 4-fold and 2-fold increase over the average amount of rainfall for north Florida during the experimental periods, respectively. The amount of irrigation normally applied to a landscape during the months of November to February or March would be minimal. Therefore, the control of common vetch and black medic observed should be applicable even during cool seasons which experience heavy rainfall, or when a landscape is over-irrigated.

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