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# Evaluation of Preemergence Herbicides on Berseem, Rose, and Subterranean Clovers

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## Summary

Two rates of Surflan, Sonalan, Furloe, and Pursuit were applied the day after planting to Bigbee berseem, Kondinin rose, and Clare subterranean clovers. Only Furloe caused a significant decrease in clover seedling weight 48 days after planting. Fifty-four days after treatment (DAT) all herbicides caused significant clover injury except Sonalan and Pursuit on berseem clover. At 98 DAT, there was injury to all clover species by Furloe and to subterranean and rose clovers by Pursuit. Pursuit at 0.04 lbs a.i./A produced an increase in berseem clover forage production. Significant increases in subterranean clover production resulted from 0.75 lbs a.i./A of Surflan, and 0.04 and 0.08 lbs a.i./A of Pursuit.

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**KEYWORDS:** Weed control/pastures.

## Introduction

Use of herbicides for pure clover stands free of grasses and weeds is desirable for research studies and seed production. Weeds reduce clover forage and seed production as well as contaminate harvested clover seed. Data on tolerance of annual clovers to cleared preemergence herbicides are limited. Some information does exist for arrowleaf (Smith and Powell 1979), and subterranean (Evers 1981) clovers. Bigbee berseem and rose clover are two new species for Texas which are well adapted to specific soil types in the state (Evers and Dorsett 1986; Smith et al. 1987). There is no information available on the tolerance of these two clovers to available herbicides. Studies were initiated at the Yoakum Research Station in 1986 to address this need (Grichar et al. 1987). Four herbicides applied the day after planting were evaluated for phytotoxicity to berseem, rose, and subterranean clovers.

## Procedure

The herbicide study was conducted on a Strabor loamy sand with a pH of 6.8 which was fertilized with 70 lbs of phosphorus per acre on September 16, 1987. Bigbee berseem, Kondinin rose, and Clare subterranean clovers were seeded at 12 lbs/A on November 19, 1987 on a prepared seedbed with a John Deere grain drill equipped with a Tye seedbox for small seed. Soil moisture at planting was excellent with 1.1 inches of rain recorded on November 16 while 0.43 inches fell between November 25 and 28.

Two rates of Surflan (oryzalin), Sonalan (ethalfluralin), Furloe (chlorpropham), and Pursuit (imazethapyr) were applied preemergence the day after planting. A compressed air, bicycle sprayer equipped with three SS11002 nozzles spaced 20 inches apart was used to apply the chemicals. The sprayer delivered 20 gallons of water per acre at 27 psi of pressure. The experimental design was a randomized complete block with three replications for each clover. A visual rating of clover injury and weed control was made 54 and 98 days after treatment (DAT). Henbit (*Lamium amplexicaule* L.) and cut-leaf evening primrose (*Oenothera laciniata* Hill.) were the weed species present on the test site. Volunteer burclover (*Medicago polymorphy* L.) was also present.

Forty-eight days after planting, 10 clover seedlings were removed at random from each plot to determine any phytotoxic effects to seedling weight. Soil was removed from the clover roots by washing in water. The seedlings were then dried for 48 hours at 149°F and weighed. Plots were harvested with a flail mower on March 24 and April 29, 1988. Before each harvest, two 1-ft square quadrants were clipped from each plot and hand separated to determine percent clover in the harvested forage.

## Results and Discussion

Furloe was the only preemergence herbicide which reduced seedling weight of rose and subterranean clovers 48 days after planting (Table 1). Except for Sonalan at 1 lb/A on rose clover, none of the herbicide treatments caused a significant increase in seedling weight over the control.

Visual injury ratings of Furloe on Bigbee berseem clover was 72 to 82 percent 54 DAT and 47 to 60 percent 98 DAT (Table 2). The high rate of Surflan at 54 DAT was the only other treatment that caused significant clover injury. All treatments resulted in excellent broadleaf weed control. The low rate of Pursuit was the only treatment which produced a significant berseem clover forage yield increase (Table 3). None of the herbicide treatments reduced forage production.

Clare subterranean clover injury was significant for all treatments except the low rate of Sonalan at the 54 DAT rating (Table 4). At the 98 DAT rating, Surflan at 0.75-lb and Sonalan at 0.5-lb and 1.0-lb rates were not significantly different from the untreated check. The two rates of Pursuit and the 0.75-lb rate of Surflan caused significant increase in subterranean clover production for the season (Table 5).

All treatments caused injury to Kondinin rose clover at 54 DAT (Table 6). By 98 DAT only Furloe and the high rate of Pursuit caused significant injury. None of the herbicide treatments resulted in significant yield increases or decreases from the control (Table 7).

Furloe caused the greatest injury to clover when it was applied the day after planting. The results are in agreement with the label restrictions which state Furloe should be applied to established forage legume stands (legume seedlings with a minimum of six true leaves). Surflan, Sonalan, and Pursuit are not cleared for use on clovers. All four herbicides control both grassy and broadleaf weeds so their potential use is limited to pure stands of forage legumes.

**TABLE 1. EFFECT OF FOUR PREEMERGENCE HERBICIDES ON BERSEEM, ROSE, AND SUBTERRANEAN SEEDLING WEIGHT 48 DAYS AFTER PLANTING**

Treatment	Rate	Clover		
		Berseem	Rose	Subterranean
		grams of dry weight per 10 seedlings		
	lbs a.i./A			
Check	--	1.00 a <sup>1</sup>	0.90 bc	2.17 a
Surflan AS	0.75	0.79 ab	1.20 b	2.20 a
Surflan AS	1.50	0.87 a	0.89 bc	2.17 a
Sonalan 50 DWG	0.50	1.03 a	1.05 bc	2.23 a
Sonalan 50 DWG	1.00	0.83 a	2.30 a	2.27 a
Furloe 4EC	2.00	0.50 c	0.57 c	1.23 b
Furloe 4EC	4.00	0.57 bc	0.47 c	1.33 b
Pursuit 2AS	0.04	0.87 a	0.80 bc	2.23 a
Pursuit 2AS	0.08	0.80 ab	0.70 bc	1.93 ab

<sup>1</sup>Means within a column followed by the same letter are not significantly different at the 0.05 level of significance (Duncan's Multiple Range Test).

**TABLE 2. INJURY RATING ON BIGBEE BERSEEM CLOVER AND BROADLEAF WEEDS**

Treatment	Rate lbs a.i./A	% Injury or control			
		54 DAT		98 DAT	
		Clover	Weed <sup>1</sup>	Clover	Weed
Check	--	0 b <sup>2</sup>	0 b	0 b	0 c
Surflan AS	0.75	35 ab	62 a	5 b	90 ab
Surflan AS	1.50	63 a	72 a	10 b	90 ab
Sonalan 50 DWG	0.50	0 b	68 a	3 b	73 b
Sonalan 50 DWG	1.00	12 b	85 a	8 b	78 ab
Furloe 4EC	2.00	82 a	100 a	47 a	97 a
Furloe 4EC	4.00	72 a	100 a	60 a	98 a
Pursuit 2AS	0.04	15 b	100 a	7 b	100 a
Pursuit 2AS	0.08	35 ab	98 a	13 b	100 a

<sup>1</sup>Mixed stand of henbit (*Lamium amplexicaule* L.) and cutleaf evening primrose (*Oenothera laciniata* Hill.).

<sup>2</sup>Means within a column followed by the same letter are not significantly different at the 0.05 level of significant (Duncan's Multiple Range Test).

**TABLE 3. EFFECT OF HERBICIDE TREATMENTS ON BIGBEE BERSEEM CLOVER FORAGE YIELDS**

Treatment	Rate lbs a.i./A	Harvest Date		
		March 24	April 27	Total
		pounds of dry weight per acre		
Check	--	558 ab <sup>1</sup>	317 b	875 b
Surflan AS	0.75	605 ab	209 b	814 b
Surflan AS	1.50	758 ab	465 ab	1,223 ab
Sonalan 50 DWG	0.50	764 ab	85 b	849 b
Sonalan 50 DWG	1.00	343 ab	255 b	597 b
Furloe 4EC	2.00	354 ab	218 b	573 b
Furloe 4EC	4.00	256 ab	184 b	441 b
Pursuit 2AS	0.04	915 a	822 a	1,737 a
Pursuit 2AS	0.08	425 ab	408 b	833 b

<sup>1</sup>Means within a column followed by the same letter are not significantly different at the 0.05 level of significance (Duncan's Multiple Range Test).

**TABLE 4. INJURY RATING ON CLARE SUBTERRANEAN CLOVER AND BROADLEAF WEEDS**

Treatment	Rate lbs a.l./A	% Injury or control			
		54 DAT		98 DAT	
		Clover	Weed <sup>1</sup>	Clover	Weed
Check	—	0 f <sup>2</sup>	0 d	0 e	0 c
Surflan AS	0.75	40 cd	88 ab	10 de	92 a
Surflan AS	1.50	63 b	93 a	33 c	95 a
Sonalan 50 DWG	0.50	18 ef	58 c	8 de	72 b
Sonalan 50 DWG	1.00	22 de	77 b	5 de	72 b
Furloe 4EC	2.00	90 a	98 a	50 b	97 a
Furloe 4EC	4.00	96 a	100 a	88 a	100 a
Pursuit 2AS	0.04	42 cd	96 a	15 d	100 a
Pursuit 2AS	0.08	57 bc	96 a	18 d	100 a

<sup>1</sup>Mixed stand of henbit (*Lamium amplexicaule* L.) and cutleaf evening primrose (*Oenothera laciniata* Hill.).

<sup>2</sup>Means within a column followed by the same letter are not significantly different at the 0.05 level of significance (Duncan's Multiple Range Test).

**TABLE 5. EFFECT OF HERBICIDE TREATMENTS ON CLARE SUBTERRANEAN CLOVER FORAGE YIELDS**

Treatment	Rate lbs a.l./A	Harvest Date		
		March 24	April 27	Total
		pounds of dry weight per acre		
Check	—	557 c <sup>1</sup>	256 b	812 b
Surflan AS	0.75	848 bc	1,558 a	2,406 a
Surflan AS	1.50	358 c	351 ab	710 b
Sonalan 50 DWG	0.50	696 bc	207 b	903 b
Sonalan 50 DWG	1.00	1,197 b	928 ab	2,178 ab
Furloe 4EC	2.00	502 c	443 ab	945 b
Furloe 4EC	4.00	529 c	399 ab	928 b
Pursuit 2AS	0.04	2,148 a	1,195 ab	3,343 a
Pursuit 2AS	0.08	2,245 a	1,379 ab	3,624 a

<sup>1</sup>Means within a column followed by the same letter are not significantly different at the 0.05 level of significance (Duncan's Multiple Range Test).

**TABLE 6. INJURY RATING ON KONDININ ROSE CLOVER AND BROADLEAF WEEDS**

Treatment	Rate lbs a.i./A	% Injury or control			
		54 DAT		98 DAT	
		Clover	Weed <sup>1</sup>	Clover	Weed
Check	--	0 c <sup>2</sup>	0 c	0 c	0 d
Surflan AS	0.75	62 b	90 ab	25 bc	73 bc
Surflan AS	1.50	58 b	95 a	12 bc	80 ab
Sonalan 50 DWG	0.50	40 b	82 b	10 bc	73 bc
Sonalan 50 DWG	1.00	50 b	79 b	10 bc	57 c
Furloë 4EC	2.00	90 a	100 a	73 a	100 a
Furloë 4EC	4.00	96 a	99 a	87 a	100 a
Pursuit 2AS	0.04	57 b	96 a	12 bc	100 a
Pursuit 2AS	0.08	58 b	98 a	33 b	98 a

<sup>1</sup>Mixed stand of henbit (*Lamium amplexicaule* L.) and cutleaf evening primrose (*Oenothera laciniata* Hill.).  
<sup>2</sup>Means within a column followed by the same letter are not significantly different at the 0.05 level of significance (Duncan's Multiple Range Test).

**TABLE 7. EFFECT OF HERBICIDE TREATMENTS ON KONDININ ROSE CLOVER FORAGE YIELD**

Treatment	Rate lbs a.i./A	Harvest Date		
		March 24	April 27	Total
		pounds of dry weight per acre		
Check	--	352 ab <sup>1</sup>	57 ab	409 ab
Surflan AS AS	0.75	370 ab	82 ab	452 ab
Surflan AS AS	1.50	617 a	166 ab	782 a
Sonalan 50 DWG	0.50	410 ab	110 ab	520 ab
Sonalan 50 DWG	1.00	288 ab	47 ab	335 ab
Furloë 4EC	2.00	241 ab	6 b	246 b
Furloë 4EC	4.00	202 b	48 ab	240 b
Pursuit 2AS	0.04	523 ab	177 a	700 ab
Pursuit 2AS	0.08	465 ab	170 ab	635 ab

<sup>1</sup>Means within a column followed by the same letter are not significantly different at the 0.05 level of significance (Duncan's Multiple Range Test).

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