

Mesotrione: Program for Bentgrass Removal and Overseeding (Fall Timing)

(Protocol #: HMS805B4-2007US)

Final Report

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A field study was conducted at the Washington State University Turfgrass and Agronomy Research Center (TARC), in Pullman, WA, during late summer and early fall of 2007 to develop an effective program to remove creeping bentgrass (cv. 'T-1') from a cool-season turfgrass ('Gallery' perennial ryegrass) with mesotrione 4SC ('Tenacity'). The turf stand was actually a greens surround of a T-1 research green. Several different programs were tried (Table 1). Spray applications of Tenacity were made with a bicycle-wheeled CO₂ pressurized sprayer with 11002 flat fan spray tips at 25 GPA. A buffer of approximately 2 feet was maintained from the putting surface to the treated area. Plots were overseeded at 10 lbs/M with 'Auburn Trilogy', a 3-way perennial ryegrass (33% 'SR4600', 33% 'Mach 1', and 32% 'Firebolt') mixture from United Agri Products (UAP). The following steps were taken to overseed treatments 1, 2, 3, and 6 at 2 WAT (8 Aug) and treatment 4 at 4 WAT (22 Aug):

- 1) Mowed at 0.290" w/ Greens King IV triplex mower.
- 2) Verticut in 2 directions w/ Greens King IV.
- 3) Removed residue w/ Goosen turf vacuum.
- 4) Core aerified w/ Ryan Greensaire II using 1/2" hollow tines.
- 5) Removed cores w/ Goosen Turf vacuum.
- 6) A single pass was made over each of the overseed plots with a 6'-wide tractor-mounted Land Pride slicer seeder. This was used to verticut only. No seed was applied through the slicer seeder.
 - On uneven ground in Reps 2 and 3 a small dethatcher was used to simulate the slice operation of the Land Pride.
- 7) To overseed, a Scott's SS-2 drop spreader was used to apply Auburn Trilogy at 10 lbs/1000 ft².
- 8) Heavy topdress w/Turfco topdresser setting 1.5.
- 9) Drag in sand with drag brush (Hand broomed in heavy sand areas to evenly distribute sand).
- 10) Rolled w/ water ballast roller.
- 11) Applied 2nd Tenacity treatment.

12) Site irrigated 16 hours after applying Tenacity.

Percent bentgrass cover was taken every week beginning at 2 WAT (8 Aug). Percent perennial ryegrass cover was taken every week beginning at 2 WAT (8 Aug). Perennial ryegrass phytotoxicity was rated using a scale of 0-10, with 10 = dead turf and values above 2 as unacceptable injury. The experiment was a randomized-complete block design with four replications and individual treatment plots were 6' x 16'.

Bentgrass cover at any rating date, up to 8 WAT, showed virtually no difference among any of the Tenacity treatments (Table 1 and Figure 1). However, looking at the trends over time, percent bentgrass cover for treatments 1, 2, or 3 sharply declined following the 2nd Tenacity application at 2 WAT (8 Aug) and up to 5 WAT (29 Aug) (Figure 1). Surprisingly, following the 3rd Tenacity application 5 WAT (29 Aug) for treatments 1 or 2, bentgrass cover did not show any further decline. Treatment 3 showed a small decline in bentgrass cover following the 4th application 8 WAT (12 Sept). Although treatment 4 sharply declined to 0% bentgrass cover by 6 WAT (5 Sept) it was not significantly different, for the most part, than treatments 1, 2, or 3. Interestingly, treatment 4 went to 0% bentgrass cover 1 week before the 4th application (12 Sept) of Tenacity was made.

Perennial ryegrass cover showed no differences among any of the Tenacity treatments at any of the rating dates, except at 4 WAT because of the offset in the 4 week overseeding of treatment 4 (Table 2 and Figure 2). The trend over time showed that percent ryegrass cover increased sharply from 3 to 5 WAT for treatments 1, 2, or 3 and from 4 to 6 WAT following the 4 WAT overseeding for treatment 4. There was only a slight increase in perennial ryegrass cover after that up through 8 WAT. Even though treatment 4 showed no bentgrass cover present by 6 WAT it was not completely filled in either. Treatments 1, 2, 3, or 4 had anywhere from 10 to 20% exposed ground (no cover) from 6 to 8 WAT. It may, in this case, be advisable to do a second overseeding in order to develop a more complete turfgrass stand more quickly. An additional overseeding at 5 to 6 WAT may be advisable.

A spike in phytotoxicity was observed at 5 WAT, which was one week after the 4 week overseed and 3rd Tenacity application for treatment 4 (Table 3 and Figure 3). This spike may have been due to the aggressive overseeding procedure coupled with the Tenacity treatment that followed. However, no phytotoxicity was noted following any of the 2 week overseed and Tenacity treatments. A slight amount of phytotoxicity was noticed at 6 WAT (5 Sept) 1 week following the 3rd Tenacity application for treatments 1, 2, or 3. No phytotoxicity was observed 1 week following the 4th Tenacity application on 12 Sept for treatments 3 or 4.

Overall, statistically all of the Tenacity/overseeding programs worked equally well, however, complete bentgrass removal was achieved when the plots were overseeded at 4 weeks following the initial Tenacity application (treatment 4). An additional overseeding at 5 to 6 WAT would be advisable to facilitate a faster more complete cover of the turf. For the most part, the maximum bentgrass cover reduction occurred 1 week prior to the last Tenacity application for each of the programs. Whether one can say that the last treatment is necessary or not it is hard to conclude from this study.

As discussed earlier, each of the treatments will be split in half this year (2008) in which one half will be treated with Tenacity and the other half will not. We need to devise a protocol for this study such as: number of Tenacity applications, rate, and when to apply these treatments.

Table 1. Percent bentgrass cover following multiple applications of Tenacity and overseeded with 'Auburn Trilogy', a 3-way perennial ryegrass mixture.

Trt#	Treatment	Rate (g ai/ha)	NIS (% V/V)	Tenacity Dates applied	Overseed date	Bentgrass cover (%)						
						8/8/07 2 WAT	8/15/07 3 WAT	8/22/07 4 WAT	8/29/07 5 WAT	9/5/07 6 WAT	9/12/07 7 WAT	9/19/07 8 WAT
1	Tenacity + NIS	140	0.25%	25-Jul	8-Aug	75.0	61.3	26.3 b*	16.3 b	13.8 b	15.0 bc	13.8 b
	Tenacity + NIS	140	0.25%	8-Aug								
	Tenacity + NIS	140	0.25%	29-Aug								
2	Tenacity + NIS	175	0.25%	25-Jul	8-Aug	63.8	51.3	21.3 b	12.5 b	10.0 b	11.3 bc	6.3 b
	Tenacity + NIS	175	0.25%	8-Aug								
	Tenacity + NIS	175	0.25%	29-Aug								
3	Tenacity + NIS	140	0.25%	25-Jul	8-Aug	61.3	52.5	20.0 b	11.3 b	17.5 b	18.8 b	13.8 b
	Tenacity + NIS	140	0.25%	8-Aug								
	Tenacity + NIS	140	0.25%	29-Aug								
	Tenacity + NIS	140	0.25%	12-Sep								
4	Tenacity + NIS	140	0.25%	25-Jul	22-Aug	57.5	48.8	30.0 b	15.0 b	0.0 b	0.0 c	0.0 b
	Tenacity + NIS	140	0.25%	8-Aug								
	Tenacity + NIS	140	0.25%	22-Aug								
	Tenacity + NIS	140	0.25%	12-Sep								
5	Check	0	0			65.0	65.0	68.8 a	71.3 a	71.3 a	71.3 a	71.3 a
6	Overseed Check	0	0		8-Aug	67.5	68.8	66.3 a	63.8 a	62.5 a	62.5 a	62.5 a

* Values within a column followed by the same letter are not significantly different LSD $P=0.05$.

Figure 1. Percent bentgrass cover following multiple applications of Tenacity and overseeded with 'Auburn Trilogy', a 3-way perennial ryegrass mixture.

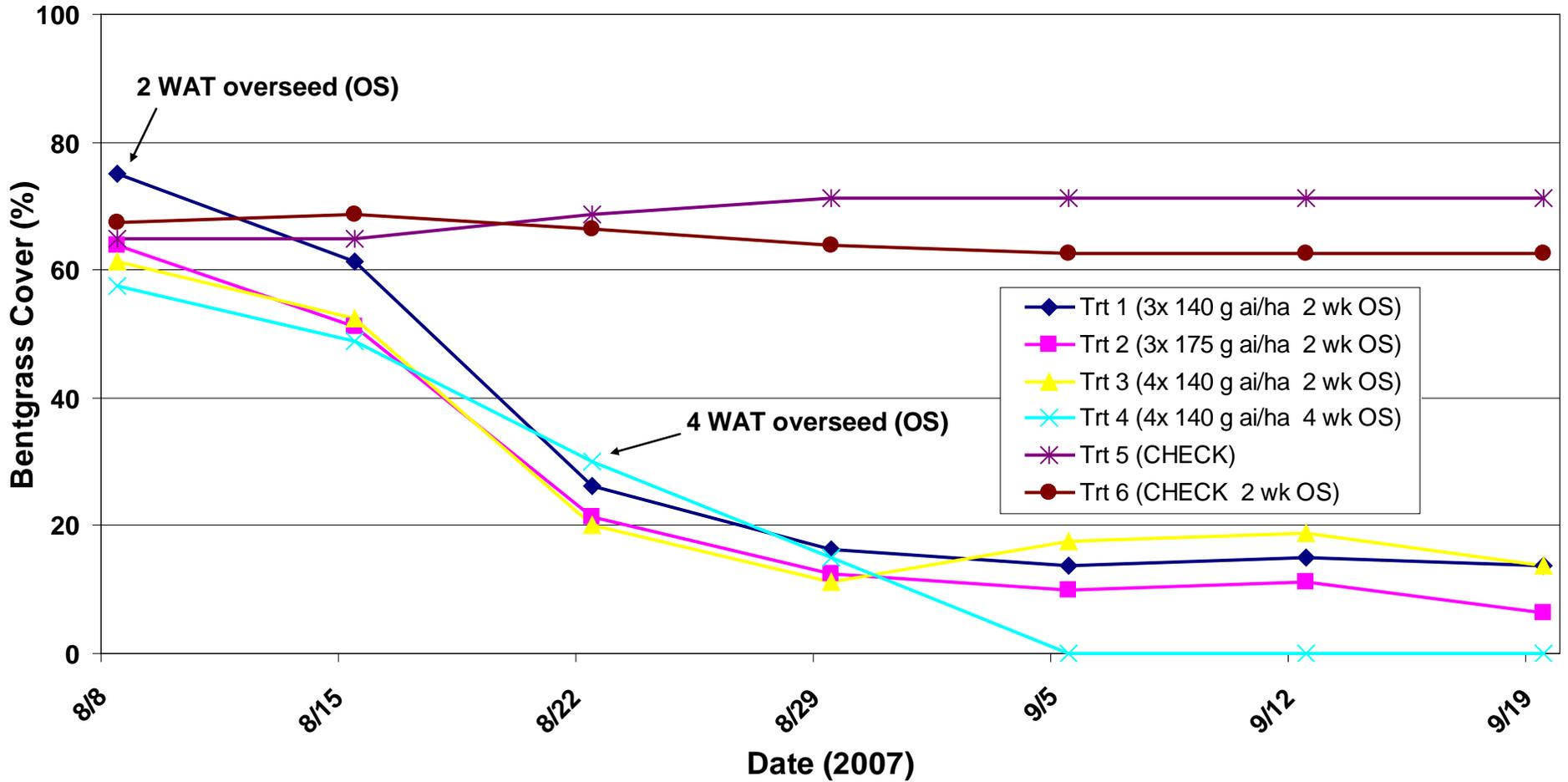


Table 2. Percent turfgrass cover following multiple applications of Tenacity and overseeded with 'Auburn Trilogy', a 3-way perennial ryegrass mixture.

Trt#	Treatment	Rate (g ai/ha)	NIS (% V/V)	App. date	Overseed date	Perennial ryegrass cover (%)						
						8/8/07 2 WAT	8/15/07 3 WAT	8/22/07 4 WAT	8/29/07 5 WAT	9/5/07 6 WAT	9/12/07 7 WAT	9/19/07 8 WAT
1	Tenacity + NIS	140	0.25%	25-Jul	8-Aug	21.3	30.0	61.3 ab*	71.3 a	73.8 a	75.0 a	77.5 a
	Tenacity + NIS	140	0.25%	8-Aug								
	Tenacity + NIS	140	0.25%	29-Aug								
2	Tenacity + NIS	175	0.25%	25-Jul	8-Aug	33.8	40.0	67.5 ab	76.3 a	78.8 a	80.0 a	84.3 a
	Tenacity + NIS	175	0.25%	8-Aug								
	Tenacity + NIS	175	0.25%	29-Aug								
3	Tenacity + NIS	140	0.25%	25-Jul	8-Aug	35.0	40.0	71.3 a	78.8 a	71.3 a	72.5 a	78.0 a
	Tenacity + NIS	140	0.25%	8-Aug								
	Tenacity + NIS	140	0.25%	29-Aug								
	Tenacity + NIS	140	0.25%	12-Sep								
4	Tenacity + NIS	140	0.25%	25-Jul	22-Aug	43.8	46.3	46.3 bc	66.3 a	80.0 a	81.3 a	86.0 a
	Tenacity + NIS	140	0.25%	8-Aug								
	Tenacity + NIS	140	0.25%	22-Aug								
	Tenacity + NIS	140	0.25%	12-Sep								
5	Check	0	0			35.0	35.0	31.3 c	31.3 b	28.8 b	28.8 b	28.8 b
6	Overseed Check	0	0		8-Aug	32.5	31.3	33.8 c	36.3 b	37.5 b	37.5 b	37.5 b

* Values within a column followed by the same letter are not significantly different LSD $P=0.05$.

Figure 2. Percent perennial ryegrass cover following multiple applications of Tenacity and overseeded with 'Auburn Trilogy', a 3-way perennial ryegrass mixture.

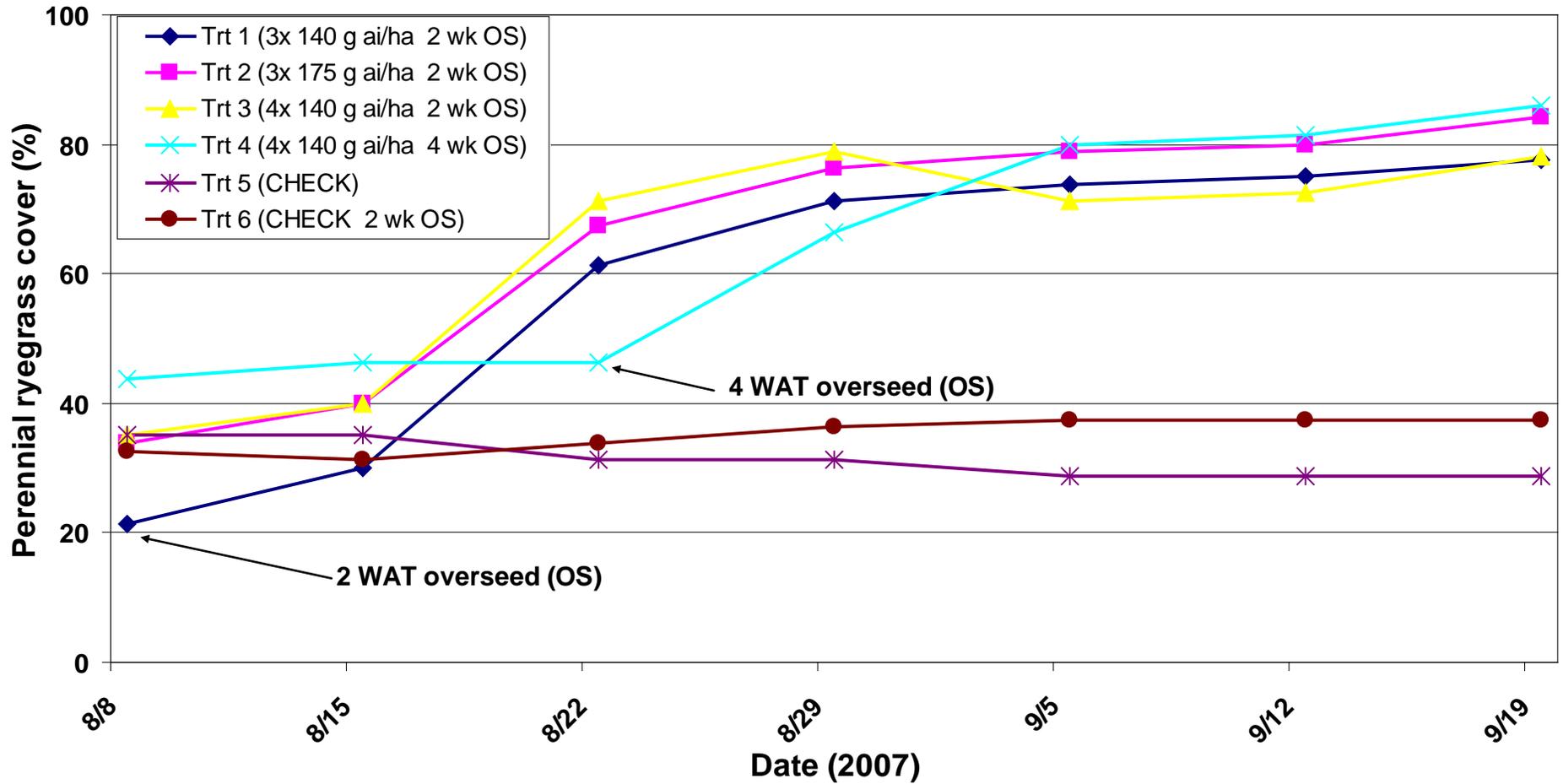


Table 3. Perennial ryegrass phytotoxicity following multiple applications of Tenacity and overseeded with 'Auburn Trilogy', a 3-way perennial ryegrass mixture.

Trt#	Treatment	Rate (g ai/ha)	NIS (% V/V)	App. date	Overseed date	Perennial ryegrass phytotoxicity*						
						8/8/07 2 WAT	8/15/07 3 WAT	8/22/07 4 WAT	8/29/07 5 WAT	9/5/07 6 WAT	9/12/07 7 WAT	9/19/07 8 WAT
1	Tenacity + NIS	140	0.25%	25-Jul	8-Aug	0.0	0.0	0.3	0.0 b**	0.8 ab	0.0	0.0
	Tenacity + NIS	140	0.25%	8-Aug		0.0	0.0	0.0	0.0 b	0.8 ab	0.0	0.0
	Tenacity + NIS	140	0.25%	29-Aug		0.0	0.0	0.0	0.0 b	1.0 a	0.0	0.0
2	Tenacity + NIS	175	0.25%	25-Jul	8-Aug	0.0	0.0	0.0	0.0 b	0.8 ab	0.0	0.0
	Tenacity + NIS	175	0.25%	8-Aug		0.0	0.0	0.0	0.0 b	1.0 a	0.0	0.0
	Tenacity + NIS	175	0.25%	29-Aug		0.0	0.0	0.0	0.0 b	1.0 a	0.0	0.0
3	Tenacity + NIS	140	0.25%	25-Jul	8-Aug	0.0	0.0	0.0	0.0 b	1.0 a	0.0	0.0
	Tenacity + NIS	140	0.25%	8-Aug		0.0	0.0	0.0	0.0 b	1.0 a	0.0	0.0
	Tenacity + NIS	140	0.25%	29-Aug		0.0	0.0	0.0	0.0 b	1.0 a	0.0	0.0
	Tenacity + NIS	140	0.25%	12-Sep		0.0	0.0	0.0	0.0 b	1.0 a	0.0	0.0
4	Tenacity + NIS	140	0.25%	25-Jul	22-Aug	0.0	0.0	0.0	2.5 a	0.5 ab	0.0	0.0
	Tenacity + NIS	140	0.25%	8-Aug		0.0	0.0	0.0	2.5 a	0.5 ab	0.0	0.0
	Tenacity + NIS	140	0.25%	22-Aug		0.0	0.0	0.0	2.5 a	0.5 ab	0.0	0.0
	Tenacity + NIS	140	0.25%	12-Sep		0.0	0.0	0.0	2.5 a	0.5 ab	0.0	0.0
5	Check	0	0			0.0	0.0	0.0	0.0 b	0.0 b	0.0	0.0
6	Overseed Check	0	0		8-Aug	0.0	0.0	0.0	0.0 b	0.0 b	0.0	0.0

* Perennial ryegrass phytotoxicity rated 0-10, with 10 = dead turf.

** Values within a column followed by the same letter are not significantly different LSD $P=0.05$.

Figure 3. Perennial ryegrass phytotoxicity following multiple applications of Tenacity and overseeded with 'Auburn Trilogy', a 3-way perennial ryegrass mixture.

