

# Use of Foramsulfuron (TADS) as a Transition Agent to Remove Poa Trivialis from an Overseeded Tifgreen Bermudagrass Putting Green

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## ***Abstract***

*Five sulfonylurea urea herbicides and one PGR were applied to a Tifgreen bermudagrass putting green to determine their response as spring applied transition aids to enhance the removal of Poa trivialis overseed. All sulfonyl urea herbicide caused marginal to extreme injury to Poa trivialis by 9 DAT, which lasted at least a minimum of 3 weeks. Manor caused the least amount of injury and discoloration, but had little effect in promoting the transition back to bermudagrass. Transit caused extreme plot injury (leaf bronzing), but forced transition. The injury resulted in unacceptable quality. Embark PGR enhanced transition at 9 DAT only, with acceptable quality. After a second application of Embark, quality was reduced to sub-marginal levels, which was caused by straw colored leaf sheaths. TADS increased Bermuda transition at 9 DAT, but not at 23 DAT, regardless of the addition of fungicides, or not. The addition of fungicides to TADS in general did not affect color, quality or turf transition, with the exception on Jens 7 (38 DAT) when the lower rate (0.10 ounce/p/M) with fungicide had excellent quality (6.8) due to readily observed visual density (7.5). Trifloxysulfuron caused increased transition at 9 DAT only, and developed moderate turf injury, as well as poor turf color at 9 and 23 DAT. All entries produce turfs with good color, quality and density by 31 July. After a standard aerification and topdressing, and fertilization with 1.5 lbs of additional -N- / M. No treatments produced enhanced transition without marginal to unacceptable turf performance. TADS at 0.10 ounce/p/M were safer to the turf than was the 0.20 ounce/p/M rate of TADS.*

## Introduction

All bermudagrass greens are overseeded with ryegrass, *Poa trivialis*, or both in the early fall in order to promote an actively grown putting surface throughout the fall winter and spring seasons. *Poa trivialis* is preferred over ryegrass for greens use because of (1) its small seed size, (2) tolerance to close mowings, (3) growth in cold weather, and (4) it offers less contrast against annual bluegrass than does perennial ryegrass. In an arid environment which (1) lacks disease pressure conditions, (2) has cool night temperatures into late May, and (3) excellent daytime growth conditions, both perennial ryegrass and *Poa trivialis* very often results in an extended transition and prove counterproductive to the incoming bermudagrass. The fact that *Poa trivialis* produces short stolons produces another hardship in transition (compared to bunch-type ryegrass) in that space availability for bermudagrass stolon growth becomes a physical limitation. Therefore, the old adage that the "less heat tolerant" *Poa trivialis* is always better than (heat tolerant) perennial ryegrass for spring transition has become a non-issue. Since *Poa trivialis* has an extended transition for the reasons above, it would be beneficial to use herbicides as transition aids for removing *Poa trivialis* from overseeded greens.

## Materials and Methods

A 12 year old Tifgreen bermudagrass green (USGA specifications) overseeded with *Poa trivialis* at 9 lbs/PLS/M was selected as the test site. The green was overseeded in October 2002, and mowed at 1/8 inch. Foramsulfuron (TADS) was applied at 0.10 and 0.20 ounce/product/M (1000 ft<sup>2</sup>), either alone or coupled with the 1x rate of Signature and Fore fungicides. Other treatments included Embark applied twice at 0.0625 lb ai/a, Tranxit at 1.0 ounce/P/M, trifloxysulfuron at 5.33 gm/P/acre, and Manor (metsulfuron) at 0.4 ounce/P/M. Tranxit, trifloxysulfuron and Manor received ¼% nonionic surfactant as per label recommendations. The Alliete Signature and Fore fungicides were applied early morning to the appropriate treatments on May 1, 2003. All herbicide/PGR treatments were applied on May 1 at 4:00 PM and were watered in 30 hours later. The second application of Embark was made on May 22, 2003. Plot size was 5x10 and all treatments were applied with a CO<sub>2</sub> backpack sprayer, using 8006 nozzles, producing a spray solution delivery rate of 57 GPA. Plots were mowed 6 times weekly at 0.125 inches and irrigated to prevent stress. The test was fertilized with ¾ lb N/M for the months of January to May, 2003.

Plots were rated for visual percent bermuda plot cover on three occasions at 9, 23, and 40 days after initial treatment (DAT). Turfgrass injury scores were assigned using a progressive visual scale and turfgrass color. Quality values were assigned to plots using the approved NTEP 1-9 visual rating scales. All data were analyzed using SAS software as a RBC field design. The test received a standard summer aeriification on June 8, as the entire green was core aerified and topdressed. The green then received 1.5 lbs -N- form the same fast release 10-4-16 fertilizer. The plots were rated once more for color, quality, and density on 31 July (60 DAT).

## Results and Discussion

### Transition:

On May 10 (9 DAT), percent plot bermuda among treated turfs ranged from 18-30% bermuda, with the control producing 13% bermuda cover. Embark PGR, Tranxit, and TADS at the 0.10 ounce/P/M rate and trifloxysulfuron had the greatest amount of bermuda cover soon after treatment (Table 1).

By May 24 (23 DAT), the effect of herbicides on transition was not greatly enhanced over that of the UTC, which now had 44% bermuda plot cover. Treatments which had the greatest bermuda return now included TADS as 0.10 ounce/P/M (53%), TADS at 0.20 ounce/P/M plus fungicides (49%), Tranxit (50%) and Trifloxysulfuron (53%). Manor had little effect on transition of *Poa trivialis* at greens height, as it produced less bermudagrass than the UTC (Table 1).

By June 7 (38 DAT), the UTC had 52% bermuda plot cover, whereas treated turfs averaged 52% to 67% bermuda. Embark and Tranxit (Embark now with 2 applications) ranked first in transition with 64% and 68% Bermuda, respectively at that time. On June 10, the green was aerified and topdressed as part of standard summer maintenance (Table 1).

### Turf Injury:

Herbicides did cause injury to the closely mowed *Poa trivialis*. Degree of injury scores were correlated with percent plot injury, which took the form of leaf bleaching and "tip bronzing." Degree injury scores above 3.0 (slight/moderate) would be not acceptable for tournament play. On May, Manor and Embark caused the least amount of injury. Treatments which had enhanced bermuda transition on May 10 had differential turf tolerance in that Embark was safe (2.0 injury / 19% degree injury; while Transit produced moderate / severe injury score of 5.0, with 81% of the plot showing these symptoms. Manor was very safe, but had no effect on transition.

By May 24 (23 DAT), the least damage remaining among TADS plots was for the 0.10 ounce/P/M, plus fungicide treatment (2.5 degree of injury, 31% plot affected). Embark produced a marginally acceptable turf at this time, noting that this was the ONLY treatment which increased in actual percent plot injury (11% previously to 19% now), while all others decreased dramatically (Table 2). Manor had essentially no damage, but also had no transition affect either (Table 1). Transit had slight/moderate injury at 24 May, with 20% plot expression. Basically Transit produced moderate transition with slight/moderate discoloration injury at 24 DAT, but injury was severe at 9 DAT.

By June 7, (38 DAT), Transit had the greatest numerical transition (68% bermuda) and also had 15% plot straw evident (Tables 1,2). Embark (which now had two applications total) had the greatest percent plot straw (visible on the stolon sheaths) at 20%, although overall color and quality were fair (see below).

### Turfgrass Color and Overall Quality:

There were noticeable and dramatic differences between treatments relative to turfgrass color and quality throughout the test (Table 3).

On May 10 (9 DAT), only Embark and Manor treatments had turf color and turf quality scores of 6.0 or greater among treated turfs. Transit and trifloxysulfuron did have very poor color and unacceptable quality (scores of 4.0 or less). A quality score of 5.0 would be marginally acceptable during transition (Table 3).

By May 24 (23 DAT), only Manor had a very good color score of 7.3 (ranking first among treated tests), but this treatment had no transition value. Likewise, quality scores ranked similar to color score results. Transit and TADS at 0.10 ounce P/M (without fungicide) produced marginal turf quality scores of 4.8 and 4.5, respectively among those treatments, which had any transitional value (Tables 4,1).

By June 7, (38 DAT), trifloxysulfuron treated turf had improved color (3.3 previously to 6.5 current), but this was a latent response to injury (Table 3). Quality for this turf averaged 5.0 (Table 4), but the transition effect was short lived as percent plot bermuda was identical to the UTC now (Table 1). TADS applied at either the 0.10 or the 0.20 ounce/P/M rates had good color (6.5 and 6.3, respectively) (Table 3), as well as fair quality (5.8 and 5.5, respectively) (Table 4). Transit and TADS at the high rate with fungicide had mean turf color scores identical to that of the UTC (5.8), although overall quality was slightly less (Table 4). TADS applied at the low rate of 0.10 ounce/P/M with fungicides produced excellent quality turf (6.8) (Table 4) with moderate color (5.8) (Table 3), along with only a slightly enhanced transition (56%) (Table 1). Embark treated turf was severely affected by the second application, producing the lowest turf quality scores at 4.0 (Table 4).

### Post Aerification Response:

On July 31, Twenty-one days after aerification and topdressing and 60 (DAT), all plots received final color, quality and visual density scores. All treatments received mean quality scores of 6.5 to 7.5, showing full recovery (Table 4). All plots had at least 90% or more bermuda (data not taken). Likewise, visual turf density was satisfactory for a Tifgreen bermuda surface, with TADS at the 0.10 ounce/p/M rate, plus fungicide producing a visually dense looking turf (7.5) (Table 4). Turfgrass color score ranged from 6.3-7.5 with the 0.20 ounce/p/M rate of TADS (no fungicide) now producing a dark color turf as latent response to after initial injury.

## Conclusions

1. All sulfonyl urea herbicide caused marginal to extreme injury to *Poa trivialis* by 9 DAT, which lasted at least a minimum of 3 weeks.
2. Manor caused the least amount of injury and discoloration, but had little effect in promoting the transition back to bermudagrass.
3. Tranxit caused extreme plot injury (leaf bronzing), but forced transition. The injury resulted in unacceptable quality.
4. Embark PGR enhanced transition at 9 DAT only, with acceptable quality. After a second application of embark, quality was reduced to sub-marginal levels, which was caused by straw colored leaf sheaths.
5. TADS increased Bermuda transition at 9 DAT, but not at 23 DAT, regardless of the addition of fungicides, or not.
6. The addition of fungicides to TADS in general did not affect color, quality or turf transition, with the exception on June 7 (38 DAT) when the lower rate (0.10 ounce/p/M) with fungicide had excellent quality (6.8) due to readily observed visual density (7.5)
7. Trifloxysulfuron caused increased transition at 9 DAT only, and developed moderate turf injury, as well as poor turf color at 9 and 23 DAT.
8. All entries produce turfs with good color, quality and density by 31 July. After a standard aerification and topdressing, and fertilization with 1.5 lbs of additional -N- / M.
9. No treatments produced enhanced transition without marginal to unacceptable turf performance.
10. TADS at 0.10 ounce/p/M were safer to the turf than was the 0.20 ounce/p/M rate of TADS.
11. Perhaps an early application of Embark PGR, or several regular applications of iron may limit turf discoloration from other SU herbicides. Chelated iron was applied 2 days before treatments were applied on this trial, but the effect was totally ineffective by 3 DAT of the herbicides.

**Table 1. Average canopy composition of an Tifgreen putting green overseeded with Poa trivialis, Spring/Summer 2003. Karsten Turfgrass Research Facility, University of Arizona. Treatments applied May 1, 2003.**

| Treatment                         | AVERAGE canopy composition |                  |                 |               |
|-----------------------------------|----------------------------|------------------|-----------------|---------------|
|                                   | 10-May<br>% berm           | 24-May<br>% berm | 7-Jun<br>% berm | 7-Jun<br>%-C3 |
| TADS @ 0.10 ounce /P/M            | 20                         | 53               | 59              | 37            |
| TADS @ 0.20 ounce /P/M            | 18                         | 49               | 59              | 32            |
| EMBARK @ 0.0625 lb ai/a (twice)   | 29                         | 43               | 64              | 16            |
| TRANXIT @ 1.0 ounce /P/M          | 28                         | 50               | 68              | 18            |
| TRIFLOXYSULF @ 5.33 gm/P/Acre     | 25                         | 53               | 53              | 41            |
| MANOR @ 0.4 ounce/P/M             | 18                         | 37               | 52              | 45            |
| UTC                               | 13                         | 44               | 52              | 45            |
| TADS @ 0.10 ounce /P/M + Sig+Fore | 25                         | 45               | 57              | 40            |
| TADS @ 0.20 ounce /P/M + Sig+Fore | 18                         | 53               | 58              | 35            |
| <b>TEST MEAN</b>                  | <b>22</b>                  | <b>47</b>        | <b>58</b>       | <b>34</b>     |
| <b>LSD</b>                        | <b>11</b>                  | <b>ns</b>        | <b>11</b>       | <b>11</b>     |

TREATMENTS NO. 4,5,6 w/non ionic surfactant 0.25 % v/v.

% bermuda average=% plot bermuda cover (0-100%), 4 subsamples/plot.

Values are the mean of 16 observations/treatment/date.

% plot injury =percent plot exhibiting injury as "bronzing" of foliage. Values are he mean of 4 replications/teratment/date.

Degree injury=relative degree of injury severity, 1=none 2=slite 3=slite/moderate 4=moderate 5=moderate/severe 6=severe

percent straw and/or dead rye (0-100%). Values are mean of 4 replications/treatment/date

Turf Color,Quality,Density = 1-9, 1=dead, 5=marginal, 6=fully acceptable, 9=ideal. Values are the mean of 4 replications.

10 May = (9 DAT) : 24 May = (23 DAT) : 7 June = (38 DAT).

**Table 2. Herbicide injury (visual) of an Tifgreen putting green overseeded with Poa trivialis, Spring/Summer 2003. Karsten Turfgrass Research Facility, University of Arizona. Treatments applied May 1, 2003.**

| PLOT INJURY RATINGS               |                      |                       |                      |                       |                    |
|-----------------------------------|----------------------|-----------------------|----------------------|-----------------------|--------------------|
| Treatment                         | 10-May<br>% plot inj | 10-May<br>deg./injury | 24-May<br>% plot inj | 24-May<br>deg./injury | 7-Jun<br>%str/drye |
| TADS @ 0.10 ounce /P/M            | 51                   | 3.3                   | 28                   | 3.3                   | 5                  |
| TADS @ 0.20 ounce /P/M            | 65                   | 4.0                   | 36                   | 3.8                   | 9                  |
| EMBARK @ 0.0625 lb ai/a (twice)   | 11                   | 2.0                   | 19                   | 2.5                   | 20                 |
| TRANXIT @ 1.0 ounce /P/M          | 81                   | 5.0                   | 20                   | 2.8                   | 15                 |
| TRIFLOXYSULF @ 5.33 gm/P/Acre     | 60                   | 4.0                   | 38                   | 4.0                   | 6                  |
| MANOR @ 0.4 ounce/P/M             | 13                   | 1.8                   | 3                    | 1.3                   | 3                  |
| UTC                               | 0                    | 1.0                   | 3                    | 1.5                   | 3                  |
| TADS @ 0.10 ounce /P/M + Sig+Fore | 60                   | 4.0                   | 31                   | 2.5                   | 4                  |
| TADS @ 0.20 ounce /P/M + Sig+Fore | 74                   | 4.0                   | 39                   | 3.5                   | 7                  |
| <b>TEST MEAN</b>                  | <b>46</b>            | <b>3.2</b>            | <b>24</b>            | <b>2.8</b>            | <b>8</b>           |
| <b>LSD</b>                        | <b>18</b>            | <b>1.2</b>            | <b>15</b>            | <b>1.1</b>            | <b>7</b>           |

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**Table 3. Turf Color (visual) of an Tifgreen putting green overseeded with Poa trivialis, Spring/Summer 2003.  
Karsten Turfgrass Research Facility, University of Arizona. Treatments applied May 1, 2003.**

| Treatment                         | TURF COLOR      |                 |                |                 |
|-----------------------------------|-----------------|-----------------|----------------|-----------------|
|                                   | 10-May<br>Color | 24-May<br>Color | 7-Jun<br>Color | 31-Jul<br>Color |
| TADS @ 0.10 ounce /P/M            | 4.0             | 4.8             | 6.5            | 6.5             |
| TADS @ 0.20 ounce /P/M            | 4.0             | 4.0             | 6.3            | 7.5             |
| EMBARK @ 0.0625 lb ai/a (twice)   | 6.0             | 5.5             | 5.8            | 6.8             |
| TRANXIT @ 1.0 ounce /P/M          | 3.0             | 4.8             | 5.8            | 6.8             |
| TRIFLOXYSULF @ 5.33 gm/P/Acre     | 3.8             | 3.3             | 6.5            | 6.8             |
| MANOR @ 0.4 ounce/P/M             | 6.5             | 7.3             | 6.5            | 6.5             |
| UTC                               | 7.5             | 7.0             | 5.8            | 6.5             |
| TADS @ 0.10 ounce /P/M + Sig+Fore | 4.3             | 4.8             | 5.8            | 6.3             |
| TADS @ 0.20 ounce /P/M + Sig+Fore | 4.3             | 3.5             | 5.8            | 6.5             |
| <b>TEST MEAN</b>                  | <b>4.8</b>      | <b>5.0</b>      | <b>6.1</b>     | <b>6.7</b>      |
| <b>LSD</b>                        | <b>1.0</b>      | <b>1.2</b>      | <b>ns</b>      | <b>1.1</b>      |

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**Table 4. Turf Density and Quality (visual) of an Tifgreen putting green overseeded with *Poa trivialis*, Spring/Summer 2003. Karsten Turfgrass Research Facility, University of Arizona. Treatments applied May 1, 2003.**

| Treatment                         | DENSITY           | TURF QUALITY      |                   |                  |                   |
|-----------------------------------|-------------------|-------------------|-------------------|------------------|-------------------|
|                                   | 31-Jul<br>Density | 10-May<br>quality | 24-May<br>quality | 7-Jun<br>quality | 31-Jul<br>quality |
| TADS @ 0.10 ounce /P/M            | 6.3               | 4.3               | 4.5               | 5.8              | 6.5               |
| TADS @ 0.20 ounce /P/M            | 7.0               | 4.3               | 3.5               | 5.5              | 7.0               |
| EMBARK @ 0.0625 lb ai/a (twice)   | 6.8               | 6.0               | 5.3               | 4.0              | 7.5               |
| TRANXIT @ 1.0 ounce /P/M          | 7.3               | 2.5               | 4.8               | 6.0              | 7.0               |
| TRIFLOXYSULF @ 5.33 gm/P/Acre     | 6.8               | 3.3               | 3.5               | 5.0              | 7.3               |
| MANOR @ 0.4 ounce/P/M             | 6.8               | 6.5               | 6.8               | 5.8              | 7.5               |
| UTC                               | 6.8               | 7.8               | 7.0               | 6.8              | 6.8               |
| TADS @ 0.10 ounce /P/M + Sig+Fore | 7.5               | 4.3               | 5.0               | 6.8              | 6.8               |
| TADS @ 0.20 ounce /P/M + Sig+Fore | 6.8               | 3.8               | 3.8               | 5.3              | 6.5               |
| <b>TEST MEAN</b>                  | <b>6.9</b>        | <b>4.7</b>        | <b>4.9</b>        | <b>5.6</b>       | <b>7.0</b>        |
| <b>LSD</b>                        | <b>1.0</b>        | <b>0.9</b>        | <b>0.8</b>        | <b>1.4</b>       | <b>ns</b>         |

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