Does MiniVerde Bermudagrass Respond Differently to Trinexapac-ethyl Applications throughout the Season?

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Introduction

PGRs

Trinexapac-ethyl (TE) is a plant growth regulator commonly used on turfgrass. Properly-timed TE applications can suppress vertical clipping growth significantly without reducing turfgrass quality. Timing TE reapplications to maintain growth suppression is difficult because trinexapac acid, the plant active form of TE, is metabolized faster as temperatures increase[1]. This renders a day-based schedule ineffective as temperatures change throughout the season.

GDDs

Reapplications based on growing degree day (GDD) accumulation is theorized as a possible solution. With a GDD model, GDD accumulation is monitored following a TE application and a repeat application is made after the predetermined threshold is reached. Previous research has established GDD models for creeping bentgrass (*Agrostis stolonifera* L.) putting greens[2].

Objective

- ❑ Develop a GDD model for TE reapplications on ultradwarf bermudagrass (*Cynodon dactylon* X *C. transvaalensis* Pers. L.) putting greens.

Materials and Methods

A field trial was conducted on a MiniVerde bermudagrass putting green at the Sports Surface Field Laboratory in Auburn, AL during the summer of 2016 and repeated in 2017. The putting green was maintained at 3.4 mm and received 12.2 kg N ha^{-1} per week.

This trial was designed to evaluate clipping yield following a single application of TE at 0.044 kg a.i. ha^{-1}. This application was made to previously untreated plots on the 1st and 15th of each month, May through August. Clippings were collected three times per week from May 1 to August 31 of both years. After collection, clippings were dried for at least 48 hours at 60°C before weighing. Weekly color ratings and NDVI readings were recorded.

Statistical Analysis

Data was analyzed using generalized linear models with SAS. A significant year interaction was *not* detected. An appropriate regression was applied using SigmaPlot 13.

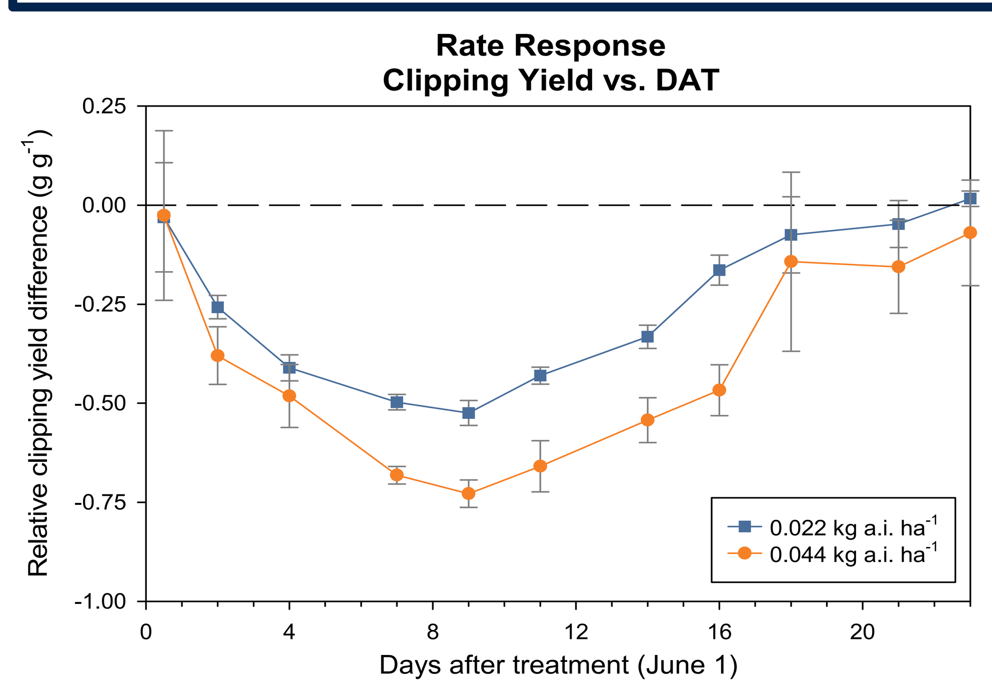

Figure 3

Figure 3. Increasing rate from 0.022 to 0.044 kg a.i. ha^{-1} did not increase duration to the maximum suppression point. Changing the rate only affected suppression magnitude.

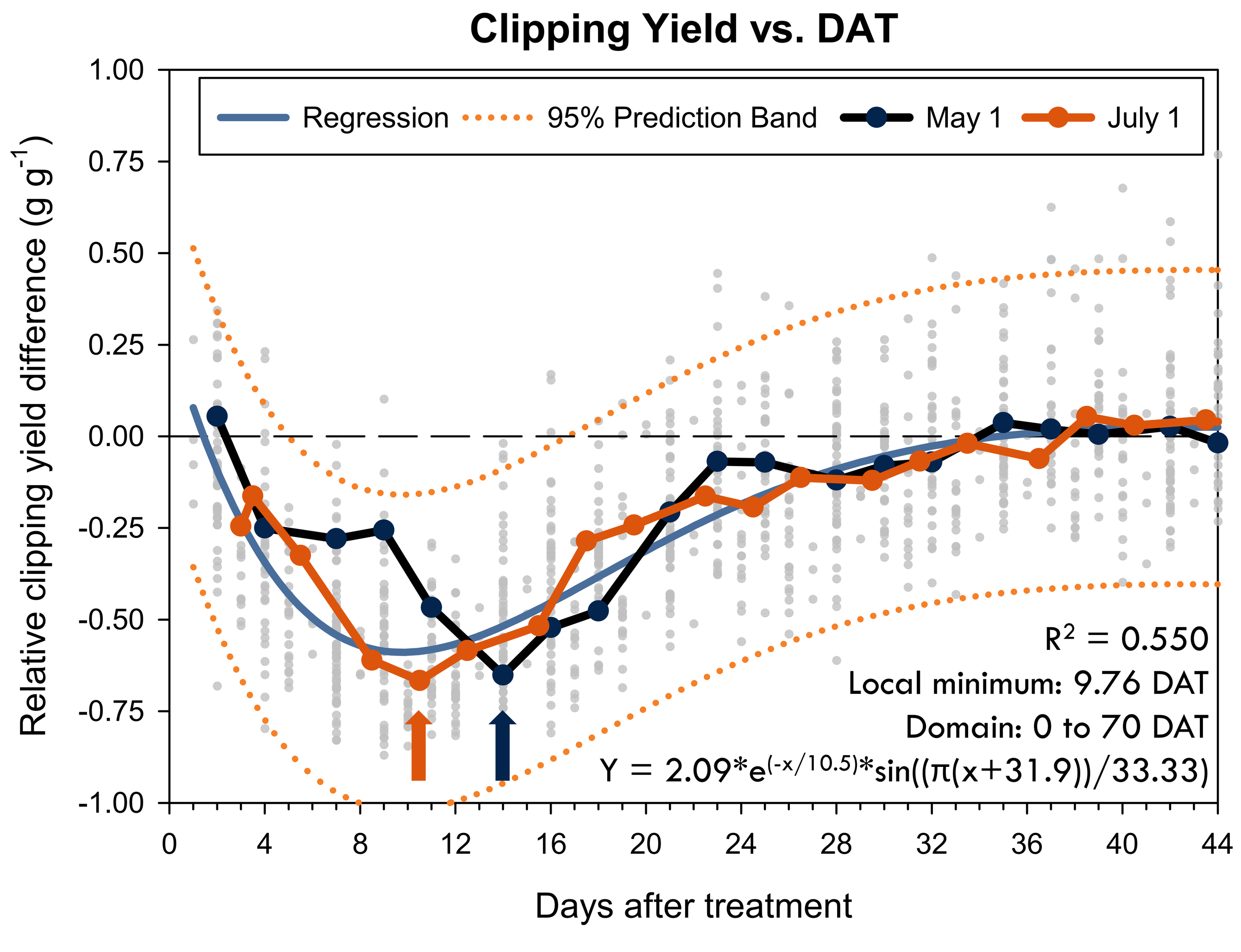

Figure 1

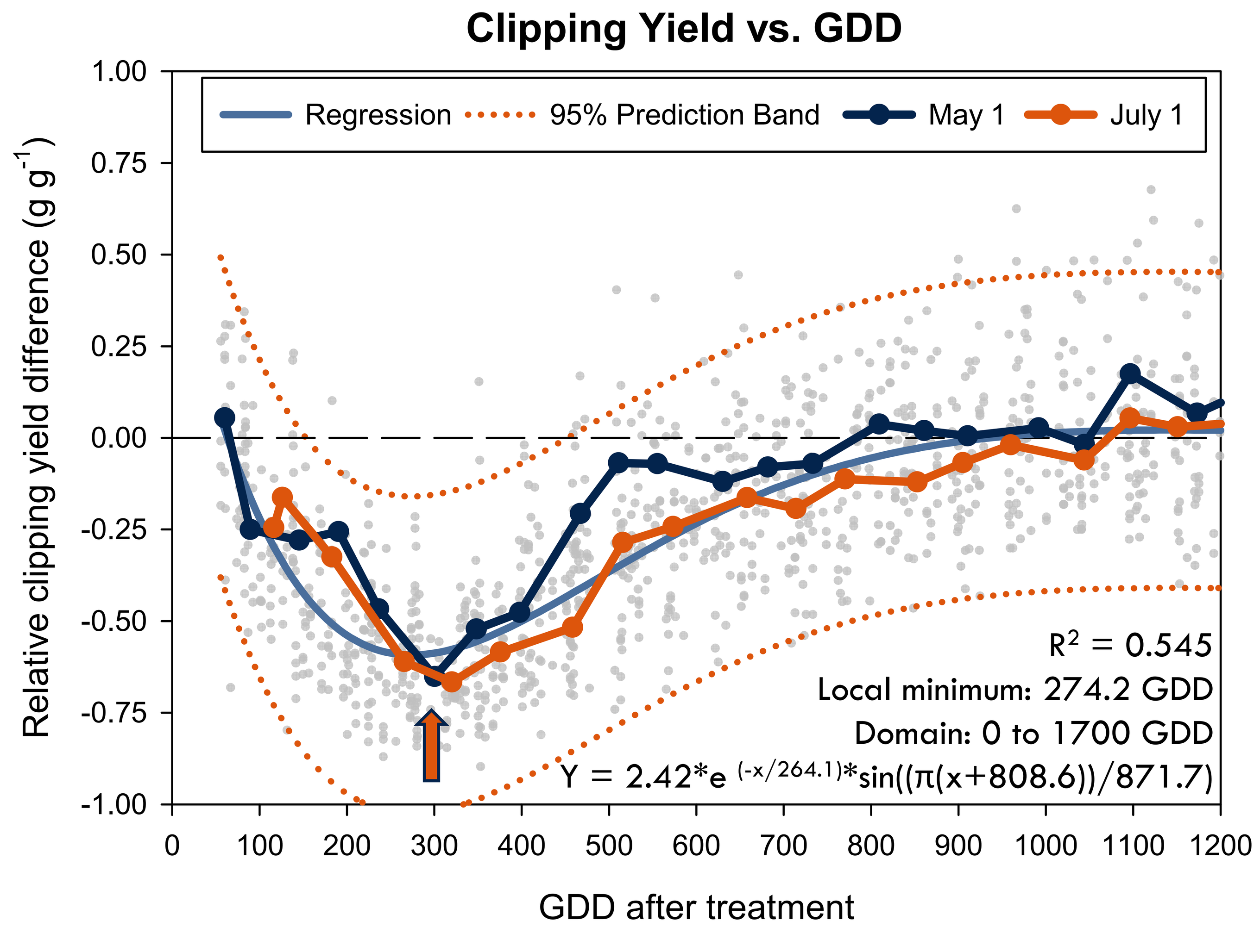

Figure 2

Results

Clipping Suppression

Properly-timed TE reapplications ensure daily turfgrass growth remains consistent, without fluctuations. This can only be accomplished by reapplying before the maximum suppression point occurs, i.e., the point before the effects of TE begin to decrease. Results indicate the maximum suppression point occurred at approximately 60% clipping reduction compared to the non-treated. Also, clipping data *did not* indicate a period of enhanced growth (rebound) following suppression.

Suppression vs. DAT

Results indicate the number of days after treatment (DAT) required to reach the maximum suppression point ranged from 14 DAT in May to 10 DAT in July (Figure 1).

Suppression vs. GDD

Results indicate the number of GDD after treatment required to reach the maximum suppression point ranged from 300 GDD in May to 320 GDD in July.
(For perspective, daily GDD accumulation ranged from 15 GDD per day in May to 30 GDD in July). A modified damped sine regression with relative clipping yield difference as a function of GDD accumulation was an appropriate model (Figure 2). The model predicted the maximum suppression point to occur at about 275 GDD.

Rate Response

Results from a separate trial indicate increasing TE rate from 0.022 to 0.044 kg a.i. ha^{-1} did not increase duration to the maximum suppression point. Only suppression magnitude increased at the higher rate (Figure 3).

Turfgrass Quality

Phytotoxicity was visible beginning 7 DAT, but subsided completely by 21 DAT for all application timings. After 21 DAT, color ratings were equal with or higher than the non-treated (Figures 4 & 5).

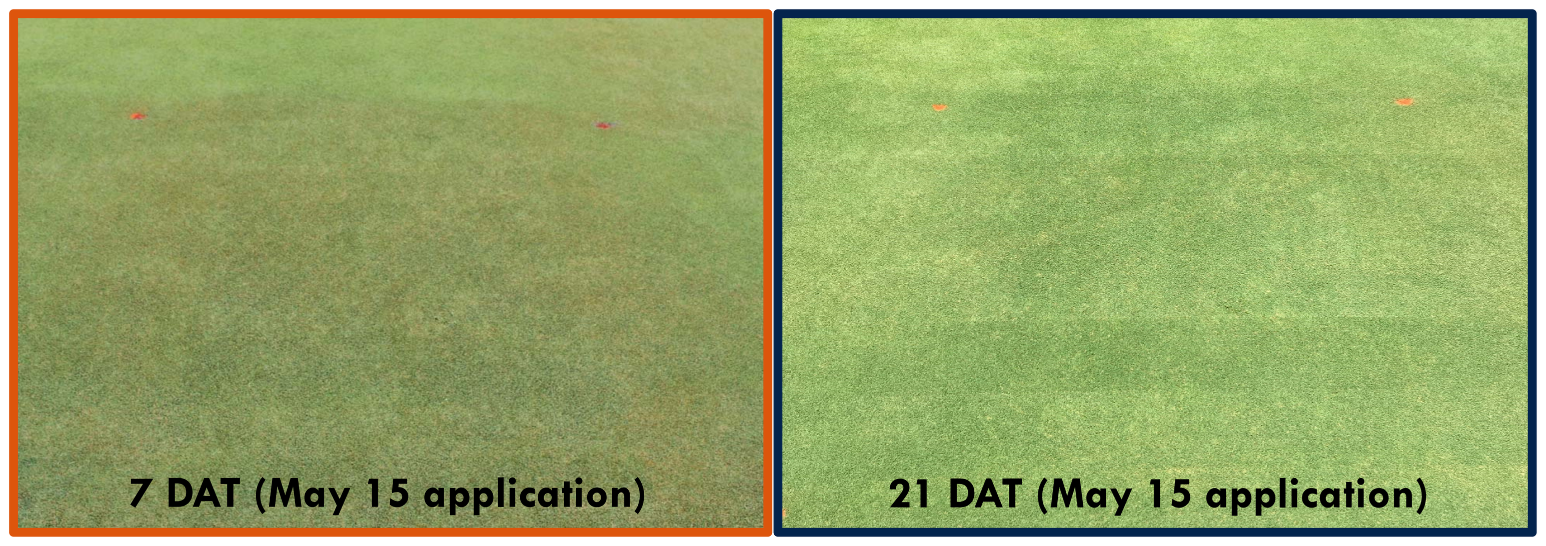

Figure 4. Phytotoxicity occurred 7 DAT following all application timings. Following 21 DAT, the color was equal with or higher than the non-treated.

Discussion

Results indicate a GDD model more accurately predicts the maximum suppression point than a day-based model. Proper GDD reapplications ensure turfgrass remains suppressed and minimize the number of applications, which reduces total environmental impact.

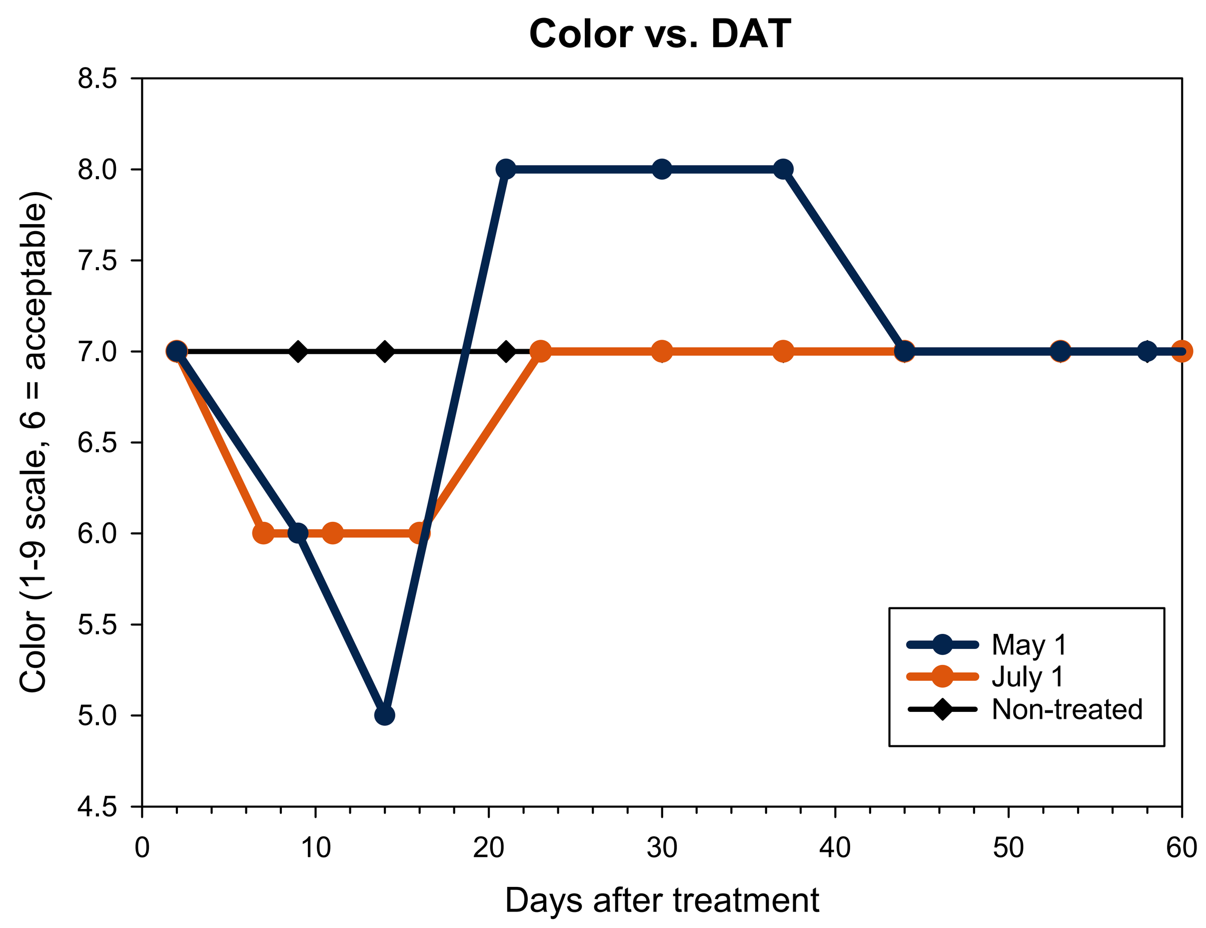

Figure 5

Conclusions

- ➢ Reapplying TE at 0.044 kg a.i. ha^{-1} before 275 GDD accumulate will provide constant clipping suppression throughout the season.
- ➢ Initial phytotoxicity subsided by 21 DAT. Afterwards color ratings were equal or higher than the non-treated.

Future Research

1. Develop GDD models on fairways and other turfgrasses.
2. Determine methods to reduce initial bronzing

1. Beasley, J. and B. Branham. 2005. Analysis of paclobutrazol and trinexapac acid in turfgrass clippings. Int. Turfgrass Soc. Res. J 10: 1170-1175.
2. Kreuser, W.C. and D.J. Soldat. 2011. A growing degree day model to schedule trinexapac-ethyl applications on *Agrostis stolonifera* golf putting greens. Crop science 51: 2228-2236.

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