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Volume 8, Number 11
June 1, 2009

PURPOSE

The purpose of *USGA Turfgrass and Environmental Research Online* is to effectively communicate the results of research projects funded under USGA's Turfgrass and Environmental Research Program to all who can benefit from such knowledge. Since 1983, the USGA has funded more than 350 projects at a cost of $29 million. The private, non-profit research program provides funding opportunities to university faculty interested in working on environmental and turf management problems affecting golf courses. The outstanding playing conditions of today's golf courses are a direct result of ***using science to benefit golf***.

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Utilizing Soil Sterilants to Control Bermudagrass and Re-establish Zoysiagrass for Fairway Renovation

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SUMMARY

Ongoing research at Auburn University is being conducted to evaluate methods for converting bermudagrass fairways to zoysiagrass turf using various cultural and chemical methods. Study results from summer 2008 indicate:

- Siduron (Tupersan) applied 24 lb/acre at zoysiagrass establishment resulted in poor bermudagrass control.
- Dazomet (Basamid) and EPTC (Eptam) applied with siduron or glyphosate (RoundUp Pro) resulted in less than 12% bermudagrass cover 15 weeks after establishment.
- Dazomet and EPTC applied with siduron produced greater than 85% zoysiagrass cover by 15 weeks after establishment.

Bermudagrass (*Cynodon spp.*) is extensively used throughout the southern United States for a variety of turfgrass purposes. Under high light intensity and warm temperatures, bermudagrass is a highly desirable turf species with many positive qualities. However, bermudagrass can also be difficult to control as a perennial weed when it contaminates other grass species.

A mixture of different grass species in the same area often leads to a poor turfgrass stand due to differences in color, texture, and growth-habit. A poor stand or mixture of grass species often necessitates control of the existing species prior to replanting of another grass. Bermudagrass especially presents a problem in zoysiagrass due to the limited availability of selective herbicides that do not excessively injure zoysiagrass (3, 5).

Renovating golf course fairways is an arduous task especially when converting from a mature stand of bermudagrass to another turf species. Current renovation procedures of turf areas contaminated with bermudagrass are to fumigate or to treat with glyphosate and replant with the desired species (2, 10). Due to inconsistent control and turf regrowth, renovation with glyphosate has not proven to be a reliable method for eradicating unwanted bermudagrass (1, 4).

The alternative option for turfgrass renovation utilizes soil sterilants. Until 2005, methyl bromide was commonly used to kill established turf and fumigate the soil prior to replanting (6). However, with the phase-out process of methyl bromide already in motion, alternative soil fumigants have been assessed for their efficacy of disease and weed control (6, 7, 9, 10). Currently, little information is available about using alternative fumigants to eradicate bermudagrass and re-establish zoysiagrass for fairway renovation. Ongoing research at Auburn University is being conducted to evaluate methods for converting bermudagrass fairways to zoysiagrass using various herbicides and soil sterilants.

Bermudagrass can be difficult to control as a perennial weed when it contaminates other grass species.

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USGA Turfgrass and Environmental Research Online 8(11):1-5.
TGIF Record Number: 148530

Herbicide Treatments	Active Ingredient	Product Rate	Application Timing
RoundUp Pro	Glyphosate	1 gal/acre	5 Weeks Prior
Eptam	EPTC	1 gal/acre	3 Weeks Prior
RoundUp Pro	Glyphosate	1 gal/acre	5 Weeks Prior
Basamid	Dazomet	200 lb/acre	3 Weeks Prior
Eptam	EPTC	1 gal/acre	3 Weeks Prior
Basamid	Dazomet	200 lb/acre	3 Weeks Prior
Tupersan	Siduron	24 lb/ acre	At Establishment
RoundUp Pro	Glyphosate	1 gal/acre	5 Weeks Prior
Eptam	EPTC	1 gal/acre	3 Weeks Prior
Tupersan	Siduron	24 lb/acre	At Establishment
Basamid	Dazomet	200 lb/acre	3 Weeks Prior
Tupersan	Siduron	24 lb/acre	At Establishment
Non-treated	----------	----------	----------

Table 1. Herbicide treatments with related product rates and application timings.

Materials and Methods

A fairway conversion study was initiated in May 2008 on 'Tifway 419' bermudagrass (*Cynodon dactylon* x *C. transvaalensis*) at the Auburn University Turfgrass Research Unit in Auburn, AL. Plot units measured 5 X 10 ft and were arranged in a randomized complete block design with four replications. Herbicide applications were applied at 3 mph with a CO_2 pressurized sprayer calibrated at 30 gal/acre with four Tee Jet XR8002US nozzles.

All areas were tilled and rolled prior to application of treatments. Soil sterilant treatments were incorporated with a second tillage. 'Zorro' zoysiagrass [*Zoysia matrella* (L.) Merr] was sprigged at a rate of 10 bushels/1000 ft^2 A total of nine treatments were applied at either five weeks prior, three weeks prior, or at establishment. Herbicide/sterilant treatments, rates, and application timings are listed in Table 1.

All plots received 0.5 lb N/1000 ft2 every two weeks beginning six weeks after establishment. Tank mixtures of 2,4-D (0.95 lb/acre), dicamba (1.0 lb/acre), and halosulfuron-methyl (1.0 oz/acre) were used to control annual broadleaf and grassy weeds throughout the study. Treatments were visually rated at five, 10, and 15 weeks after establishment for percent zoysiagrass cover and bermudagrass contamination.

Bermudagrass and zoysiagrass cover were also subject to plant counts using a 48-inch (122 cm) dowel rod divided into 25 increments. The dowel rod was randomly placed twice within each plot. A species was counted upon intersection of an increment on the rod.

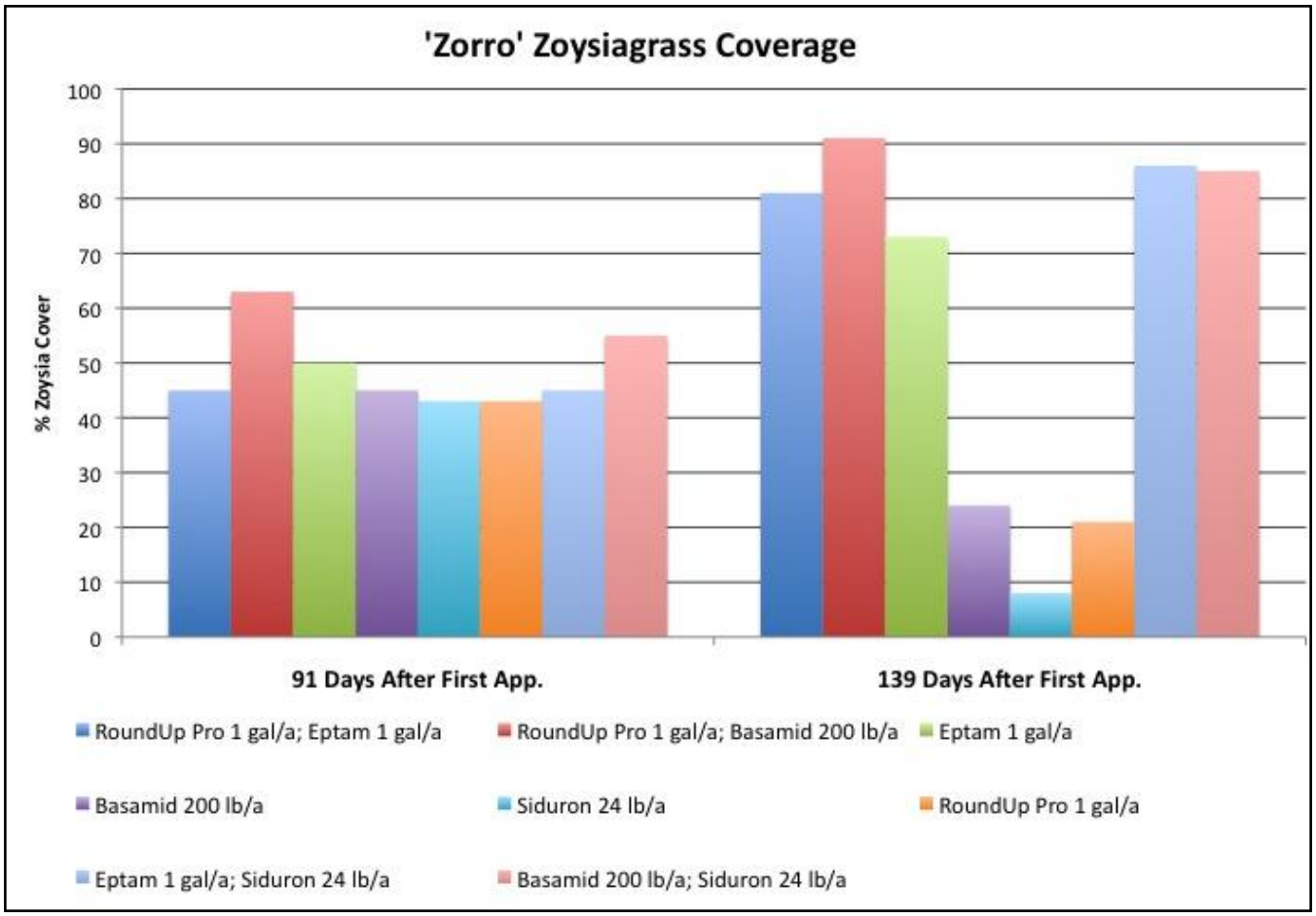

Figure 1. 'Zorro' zoysiagrass coverage 91 and 139 days after initial treatment.

Results

Percent zoysiagrass and bermudagrass cover is presented in Figures 1 and 2. At 35 days after initial treatment, all treatments applied prior to establishment significantly reduced the amount of bermudagrass, yielding less than 15% ground cover. At 91 days after initial treatment (DAIT), the glyphosate + EPTC, glyphosate + dazomet, EPTC, EPTC + siduron, and dazomet + siduron treatments controlled bermudagrass well, yielding less than 15% ground cover. The dazomet alone and glyphosate alone treatments provided fair bermudagrass control at 31% and 34% ground cover, respectively.

Siduron applied at establishment controlled bermudagrass poorly, yielding 56% bermudagrass ground coverage. At 139 DAIT, the glyphosate + EPTC, glyphosate + dazomet, EPTC + siduron, and dazomet + siduron yielded less than 12% bermudagrass ground cover. Treatments with good bermudagrass control yielded higher percent zoysiagrass cover than those with poor control. Dazomet and EPTC were the two dominant bermudagrass control treatments in this research. These two treatments applied with siduron or glyphosate provided equivalent control (less than 12% coverage).

EPTC equivalent control to dazomet is important economically. Dazomet can cost from $800 to $1400 per acre; whereas, EPTC estimated cost is approximately $10 to $20 per acre. However, comparing dazomet to EPTC applied alone, bermudagrass control was 25% and 75% respectively. Poor control using dazomet may be due to the low use rate (200 lb/acre) used in this research. Although previous studies with dazomet have used up to 350 lb/acre, we justify a lower use rate due to the high cost and the short time interval between application and replanting (three weeks). Trials will be replicated again in 2009 at the Auburn University Turfgrass Unit, Auburn,

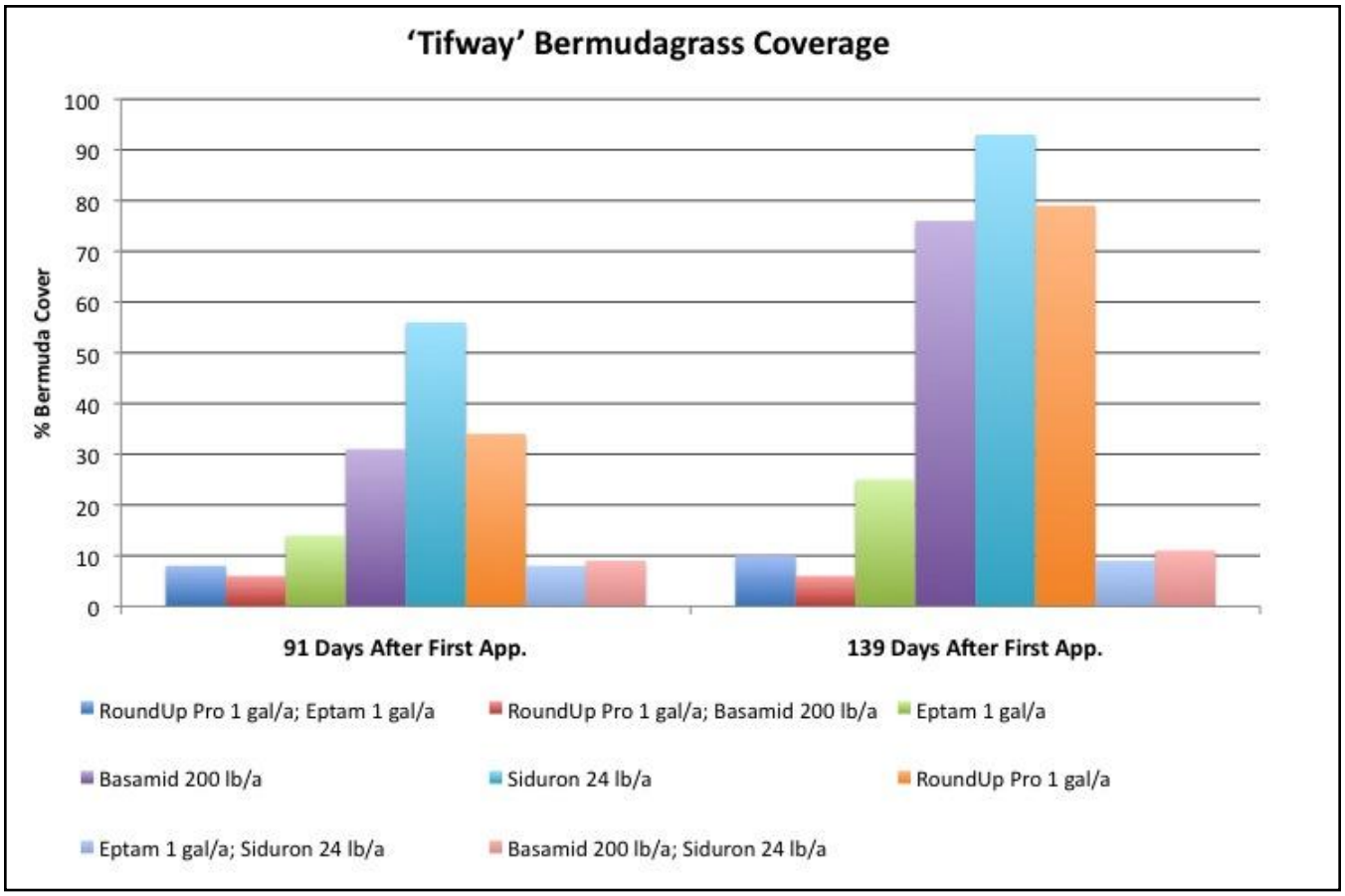

Figure 2. 'Tifway' bermudagrass coverage 91 and 139 days after initial treatment.

AL. Herbicide and soil sterilant treatments will remain the same as those in 2008.

Acknowledgements

The authors would like to thank the staff at the Auburn University Turfgrass Research Unit in Auburn, AL for their contribution to this work, as well as the USGA's Turfgrass and Environmental Research Program for providing funding for this research.

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