Evaluation of Herbicides for Postemergent Control of Mature, Highly Stoloniferous Kikuyugrass *(Peranisetum clandestinum)* Maintained Under Rough Conditions

Mark Mahady, President
Mark M. Mahady & Associates, Inc.
P. O. Box 1290
Carmel Valley, CA 93924
(831) 236-2929
markmmahady@aol.com

Introduction

Kikuyugrass *(Pennisetum clandestinum)* is a warm season grass native to East Africa. Kikuyugrass was introduced into Southern California during the I920's by the Soil Conservation Service to control erosion along water ways. This highly aggressive and invasive perennial exhibits medium leaf texture and a yellow green color that spreads by rhizomes, stolons and seeds.

Kikuyugrass exhibits better cool temperature tolerance than other warm season grasses. Germination temperatures range from 66° F to 93° F, with 78° F representing the optimum germination temperature. In many respects kikuyugrass represents a warm season grass that enjoys growth conditions generally best suited for cool season grasses. Kikuyugrass is able to maintain relatively high rates of photosynthesis, even greater than that of cool season grasses, at low temperatures, and, exhibits a higher temperature optimum (86° F) for photosynthesis than tall fescue (57° F). In the moderate Mediterranean climate of the Monterey Peninsula, the peak growth period for kikuyugrass occurs from May to October. Kikuyugrass exhibits slow growth and in some cases under cold conditions, a semi-dormant growth phase during Northern California winters.

In field research trials conducted in the Monterey Peninsula during 2006, SpeedZone Southern (PBI Gordon) applied at standard label rates of 5 pints per acre (pt/A) showed dynamic knockdown on young, non-stoloniferous stands of kikuyugrass 7 days after application (DAA). The addition of QuickSilver (FMC) at 2.7 oz/A enhanced kikuyugrass desiccation, collapse and dissipation. Three sequential treatments of SpeedZone Southern applied at 5 pt/A showed 85% control of young, non-stoloniferous kikuyugrass.

The primary objective of this replicated field research trial was to determine if multiple applications of designated herbicide products would result in acceptable levels of control of mature, highly stoloniferous stands of kikuyugrass maintained under rough conditions.

Materials & **Methods**

This replicated field research trial was conducted in a rough area located on the 14th hole at the Pebble Beach Golf Links located in Pebble Beach, California. The site was heavily inundated with mature kikuyugrass. The first replication had a mixture of kikuyugrass, perennial ryegrass and *Poa annua.* Replications II, III and IV consisted of virtually 100% mature, highly stoloniferous kikuyugrass.

This coastal area is characterized as a Mediterranean climate with frequent early morning summer fog. During the summer, daytime high temperatures generally range from 62° F to 72° F. with nighttime low temperatures of 44° F to 56° F. Average yearly rainfall is 18.8 inches with a very high percentage of precipitation occurring during the winter months from November to March.

Treatments as presented in Table 1 were first deployed on September 23, 2010 and then followed the specific application schedule presented. The site was mowed one to two times per week at a mowing height of 2.0" and irrigated to avoid moisture stress. The kikuyugrass turf was lush and actively growing on the day of treatment deployment.

Table 1. Treatment and application protocol. Pebble Beach Golf Links. Mark M. Mahady & Associates, Inc., 2010.

Treatments	**Rate**	**Application** Frequency
1) Untreated Check		*
2) Turflon Ultra*	32 oz/A	3x: 21-Day Interval
3) Turflon Ultra + Drive XLR8**	32 oz/A + 43.5 oz/A	3x: 21-Day Interval
4) Drive XLR8**	43.5 oz/A	3x: 14-Day Interval
5) Drive XLR8**	43.5 oz/A	2x: 14-Day Interval
6) OneTime**	43.5 *oz/A*	2x: 30-Day Interval
7) SZS' + Drive XLR8** + QS2	6 pt/A + 43.5 oz/A + 2.7 oz/A	3x at 21-Day Interval
8) Drive XLR8** + QS2	43.5 oz/A + 2.7 oz/A	3x at 21-Day Interval
9) Drive XLR8** + QS2	65.3 oz/A + 2.7 oz/A	3x at 21-Day Interval

* Treatments included a non-ionic stufactant (NIS) at 0.125% v/v

** MSO (methylated seed oil) was added to Drive XLR8 tank mixtures at 21,8 oz/A

SpeedZone Southern

QuickSilver

Herbicides Reviewed

SpeedZone Southern - PBI Gordon

- Carfentrazone 0.54%: 0.04 lb. ai/gallon
- 2,4-D, 2-ethylhexyl ester 10.49%: 0.52 lb. ai/gallon
- Mecoprop-p acid 2.66%: 0.20 lb. ai/gallon
- Dicamba acid 0.67%: 0.05 lb. ai/gallon
- Other ingredients 85.64%

QuickSilver - FMC

- Carfentrazone-ethyl 21.3%: 1.9 lb. ai/gallon
- Other ingredients 78.7%

Drive XLR8 - BASF Corporation

- Quinclorac 15.93%: 1.50 lb. ai/gallon
- Other ingredients 84.07

Turflon Ultra - Dow AgroSciences

- Triclopyr 60.45%: 4.0 lb, ai/gallon
- Other ingredients 39.55%

OneTime - BASF Corporation

- Quinclorac 15.95%: 1.50 lb. ai/gallon
- Mecoprop-p acid 7.98%: 0.75 lb. ai/gallon
- Dicamba acid 2.13%: 0.20 lb. ai/gallon

Individual treatment plots measured 10' x 10' and consisted of a 5' x 10' application plot directly adjacent to a 5' x 10' in-plot check. Side-by-side in-plot checks are very valuable when attempting to observe and measure subtle treatment effects. Treatments were replicated four times. Prior to treatment deployment all plots were rated for percent kikuyugrass cover. A randomization was established that balanced kikuyugrass cover across all treatments in order to ensure equal weed pressure for all treatments.

A calibrated CO_2 propelled spray system pressurized to 26 psi and equipped with four 11004LP Tee-Jet nozzles applied treatments at a spray volume of 1.5 gallons per thousand square feet (1000 ft^2). A pacing watch was used for spray applications to ensure uniform and accurate delivery. Field plots were not irrigated for 24 hours after application nor mowed for 72-96 hours after application.

Field plots were evaluated for percent cover day of application and 56 days after the third application. Percent kikuyugrass control was statistically calculated by comparing percent cover in treatment plots versus percent kikuyugrass cover in untreated check plots. Data were summarized and statistically analyzed. Differences between means were determined via LSD.

Results and Discussion

On the final rating date, 56 DAA3, the four treatments that exhibited the greatest reduction in percent kikuyugrass cover and the highest level of percent kikuyugrass control included the following.

1. Trt #3: Turflon Ultra + Drive XLR8 — 99.9% kikuyugrass control
2. Trt #2: Turflon Ultra — 99.2% kikuyugrass control
3. Trt #7: SZS + Drive XLR8 + QS — 94.7% kikuyugrass control
4. Trt #8: Drive XLR8 + QS — 93.9% kikuyugrass control

Table 2. Percent kikuyugrass control by treatment. Pebble Beach Golf Links. Mark M. Mahady & Assoc, Inc. 2010.

	Treatments	**Rate**	Application Frequency	% **Control**
1)	Untreated Check	*	*	*
2)	Turflon Ultra*	32 oz/A	3x: 21-Day Interval	99.2%
3)	Turflon Ultra + Drive XLR8**	32 oz/A + 43.5 oz/A	3x: 21-Day Interval	99.9%
4)	Drive XLR8**	43.5 oz/A	3x: 14-Day Interval	53.9%
5)	Drive XLR8**	43.5 oz/A	2x: 14-Day Interval	6.8%
6)	OneTime**	43.5 oz/A	2x: 30-Day Interval	45.5%
7)	SZS1 + Drive XLR8** + QS2	6 pt1A + 43.5 oz/A + 2.7 oz/A	3x at 21-Day Interval	94.7%
8)	Drive XLR8** + QS2	43.5 oz/A + 2.7 oz/A	3x at 21-Day Interval	93.9%
9)	Drive XLR8** + QS2	65.3 oz/A + 2.7 oz/A	3x at 21-Day Interval	87.0%

Treatments included a non-ionic surfactant (NIS) at 0.125% v/v
* MSO (methylated seed oil) was added to Drive XLR8 tank mixtures at 21.8 oz/A
SpeedZone Southern
QuickSilver

Summary and Practical Perspectives

Under these soil and turf conditions and under these timing and rate formats, the following conclusions are presented for control of mature, highly stoloniferous kikuyugrass maintained under rough conditions following three sequential applications of the described treatments:

- **Rank #1: 99.9% Kikuyugrass Control, Treatment #3, Turflon Ultra (32 oz/A)** + **Drive XLR8** (43.5 oz1A) + **MSO (21.8 oz/A):** Excellent performance. This top performing tank mix showed dynamic burn down and necrosis with very high levels of control and virtually no observable kikuyugrass regrowth. This tank mix is safe to use on solid stand perennial ryegrass and mixed perennial ryegrass/*Poa annua* turf stands. The high rate of Turflon may show yellowing on *Poa annua.* This tank mix would be highly injurious to fine fescue and creeping bentgrass.

- **Rank #2: 99.2% Kikuyugrass Control, Treatment** #2, **Turflon Ultra (32 oz1A) + NIS (0.125%** vlv): Excellent performance. Turflon Ultra showed consistent, uniform burn down and necrosis with very high levels of control and virtually no observable kikuyugrass regrowth. Turflon Ultra is safe to use on solid stand perennial ryegrass and mixed perennial ryegrass/*Poa annua* turf stands. The high rate of Turflon may show yellowing on *Poa annua.* Turflon Ultra would be highly injurious to fine fescue and creeping bentgrass.

- **Rank #3: 94.7% Control, Treatment** #7, **SpeedZone Southern (6 pt/A)** + **Drive XLR8 (43.5 oz/A)** + **QuickSilver** (2.7 **oz/A)** + **MSO (21.8 oz1A):** Good performance. The addition of Drive to this SpeedZone Southern and QuickSilver tank mix greatly improved activity and kikuyugrass control. This tank mix showed *very* rapid browning and necrosis of kikuyugrass. Minimal kikuyugrass regrowth.