Fungicide Programming for Dollar Spot Disease Control on Chicago Golf Fairways

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Introduction

This study was generated by a golf course superintendents' need to create a fungicide program to control dollar spot in fairways within a limited budget. Fungicide programs are composed of different strategies (preventative, curative, or both), timing, intervals, and rates. Fungicide application decisions impact their efficacy and cost. The objective of this study was:
1) Compare fungicide programs which rotate mode-of-action to target dollar spot disease (*Sclerotinia homoeocarpa*) on Chicago golf fairways 2) Compare programs that employ a curative, preventative, or a curative-preventative strategy mixture.

Materials and Methods

Two fairway locations in greater Chicago were used in this study.
- **Coyote Run Golf Course, Flossmoor, IL (south suburb)**
  - **50:50 blend of 'L-93' and 'Shouthshore'**
- **North Shore Country Club, Glenview, IL (north suburb)**
  - **Mixture of creeping bentgrass and *Poa annua***
  - **Partial resistance to DMI (e.g., Banner Maxx) and Dicarboximide (e.g., Chipco 26GT) fungicides.**

Plots were 4ft x 6ft and arranged in a randomized complete block design with four replications. Fungicides were applied with a CO_2 backpack sprayer and 8004 nozzles at 40 psi in water equivalent to 2 gal/1000 ft^2. Dollar spot was visually estimated by rating percent plot area damaged. Visual quality was rated (0-9 scale, 9 best and 6 acceptable) to evaluate potential phytotoxic effects of treatments and determine if disease control was acceptable. Curative fungicides (treatments 3,4, and 5) were not applied until a 5% dollar spot damage threshold was achieved in at least one of four replicates. A minimum of 14 days occurred between each curative application. Costs of each fungicide were obtained from Coyote Run GC and used to calculate program costs. Programs were then compared by using Daconil Ultrex (14 day) as a standard of relative cost.

Table 1. Fungicide programs applied at two Chicago suburb locations during 2008.

Trt number	Fungicide and its strategy	per 1,000 sq ft
1	No Fungicide	na
2	Daconil Ultrex – Preventive 14d	3.2 oz
3 *as needed*	Daconil Ultrex – Curative	3.2 oz
4 *as needed*	Daconil Ultrex + Emerald – Curative	2.4 oz + 0.13 oz
5 *as needed*	Daconil Ultrex + Chipco GT – Curative	2.4 oz + 2.0 fl oz
6	Bayleton DG rotate Emerald – Prev. 28d	0.5 oz then 0.13 oz
7	CDGA bookend Program – see below	varies
8	3-way rotation – see below	varies
9	North Shore CC Program – see below	varies
10	Coyote Run GC Program – see below	varies
#7 (5 total)	***CDGA 'bookend' Program (varies)***	***per 1,000 sq ft***
9-Jun	Emerald (then wait for dollar spot) ~35 days	0.18 oz
21-July	Banner Maxx 21 days	1.0 fl oz
11-Aug	Chipco GT	4.0 fl oz
2-Sep	Banner Maxx	1.0 fl oz
29-Sep	Emerald	0.18 oz
#8 (8 total)	***3-way rotation (varies every 21 day)***	***per 1,000 sq ft***
19-May	Banner Maxx	0.5 fl oz
9-Jun	Chipco GT	2.0 fl oz
30-Jun	Emerald	0.13 oz
21-Jul	Banner Maxx	0.5 fl oz
11-Aug	Chipco GT	2.0 fl oz
2-Sep	Emerald	0.13 oz
22-Sep	Banner Maxx	0.5 fl oz
13-Oct	Emerald	0.13 fl oz
#9 (8 total)	***North Shore Program (varies)***	***per 1,000 sq ft***
19-May	Daconil Ultrex + Emerald	2.2 oz + 0.1 oz
2-Jun	Daconil Ultrex	2.2 oz
9-Jun	Emerald	0.1 oz
23-Jun	Daconil Ultrex + Emerald	2.2 oz + 0.09oz
3-Jul	Daconil Ultrex + Emerald	2.92 oz + 0.1oz
21-Jul	Daconil Ultrex + Emerald	3.2 oz + 0.1 oz
11-Aug	Daconil	2.4 oz
12-Sep	Daconil	2.2 oz
#10(6 total)	***Coyote Run Program (varies)***	***per 1,000 sq ft***
11-Jun	ChloroStar (chlorothalonil)	2.0 oz
23-Jun	ChloroStar	2.0 oz
1-Jul	Primera One Propiconizole + ChloroStar	0.75 fl oz + 2.0 oz
28-Jul	ChloroStar	2.0 oz
11-Aug	Iprodione E-Pro	3.0 fl oz
22-Sep	ChloroStar	2.4 oz

Results

Table 2. Fungicide strategy and their effect on dollar spot and visual quality on two suburban Chicago fairways.

Treatment and strategy *ranked by dollar spot AUDPC*	Application rate (per 1000 ft^2)	Coyote Run start date, application number	Coyote Run Dollar Spot AUDPC[1]	Coyote Run Visual Quality AUC[2]	Relative cost for Coyote Run[3]	North Shore start date, application number	North Shore Dollar Spot AUDPC[1]	North Shore Visual Quality AUC[2]	Relative cost for North Shore[3]
No Fungicide	n/a	n/a (0)	594.8 b	72.6 d	n/a	n/a (0)	245.8 b	118.7 c	n/a
Daconil Ultrex (curative)	3.2 oz	9 June (8)	64.0 a	120.4 c	-$250	11 June (7)	53.3 a	140.8 b	-$330
Daconil + Chipco GT (curative)	3.2 oz + 2 fl oz	9 June (4)	42.5 a	129.0 bc	-$320	11 June (7)	60.3 a	138.0 bc	+$120
Daconil + Emerald (curative)	3.2 oz + 0.13 oz	9 June (4)	35.8 a	127.9 bc	-$270	11 June (4)	13.7 a	163.2 a	-$270
Coyote Run Program (varies)	see Table 1	9 June (6)	28.6 a	135.3 b	-$595	11 June (6)	28.2 a	153.7 ab	-$595
Bayleton then Emerald (28 day)	0.5 oz, 0.13 oz	19 May (6)	23.8 a	133.1 b	-$295	19 May (6)	38.0 a	138.3 bc	-$295
CDGA Program (varies)	see Table 1	9 June (5)	16.9 a	132.3 bc	-$270	11 June (5)	27.5 a	149.0 ab	-$270
Daconil Ultrex (14 day)	3.2 oz	19 May (11)	12.3 a	139.1 ab	---	19 May (11)	8.2 a	164.5 a	---
North Shore Program (varies)	see Table 1	19 May (8)	9.5 a	149.9 a	-$95	19 May (8)	17.7 a	161.5 a	-$95
3-way rotation (21 day)	see Table 1	19 May (8)	3.0 a	135.3 b	-$300	19 May (8)	10.3 a	162.7 a	-$300

[1] Area Under Disease Progress Curve summarizes 19 rating dates from 9 June to 13 Oct. Means not followed by the same letter are significantly different (P<0.05) by Fisher LSD.
[2] Area Under Curve summarizes 19 rating dates from 9 June to 13 Oct. Means not followed by the same letter are significantly different (P<0.05) by Fisher LSD.
[3] Program costs are calculated using Daconil Ultrex (14 day) as a standard and basing each program as relatively more or less expensive.

Conclusion

Dollar spot disease pressure remained low during June of 2008. Scouting and tolerating low levels of dollar spot led some fungicide programs to control dollar spot with few applications.

- **Systemics provided longer control than expected during low disease pressure.**
- **Preventative 14 day programs required up to 11 applications in 2008.**
- **More applications are needed when fungicides are used on a fungal population that contains resistant strains.**
- **A product's costs/day of control is lessened when long control is provided and utilized by scouting for new symptoms to develop.**

The CDGA program utilized Emerald when dollar spot first appeared and waited until symptoms reappeared. Then applications of Banner Maxx and Chipco GT are rotated. The last application is timed to utilize Emerald's long efficacy again during this low disease pressure. This program controlled dollar spot consistently with only 5 applications.

Other research points towards early applications of dollar spot control can delay the second application until June. However, the first symptoms of dollar spot do not develop rapidly and the first application can be saved until fungal conditions are favorable, therefore saving money. In 2008 and 2009 the first applications could have been in June without sacrificing quality.

- **The 3-way rotation program is an example of using low rates to save money.**
- **The CDGA program uses some curative applications and stretching the application interval to save money.**
- **The Coyote Run program uses curative applications and generic products to save money.**

This research was repeated in 2009 and similarly dollar spot development was delayed due to a cool weather.

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