Impact of targeting soilborne disease with post-application irrigation on the efficacy of foliar disease control on golf putting greens

#1302

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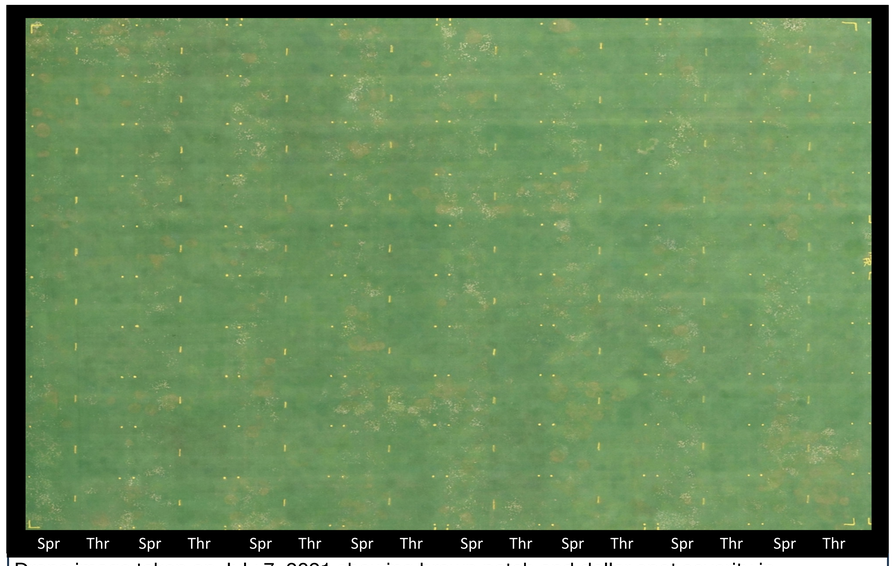
Introduction

Achieving control of more than one disease with a single fungicide application is desirable on both an environmental and financial scale. Spring fungicide applications are necessary for the control of several soilborne diseases on golf putting greens, including fairy ring, take-all patch, and summer patch. To reach the target zone in the profile, large amounts (5 mm or more) of post-application irrigation (PAI) are required. Previous research indicated two low-rate, watered-in applications of DMI fungicides resulted in dollar spot control vs. untreated plots. This research builds upon this premise, investigating the impact of irrigating in new fungicide chemistries, including newer mixture products and those in the QoI and SDHI classes, on foliar disease control. In addition, this research incorporates a season long view of foliar disease control after watered-in spring applications with fungicides applied subsequently on a threshold-based system.

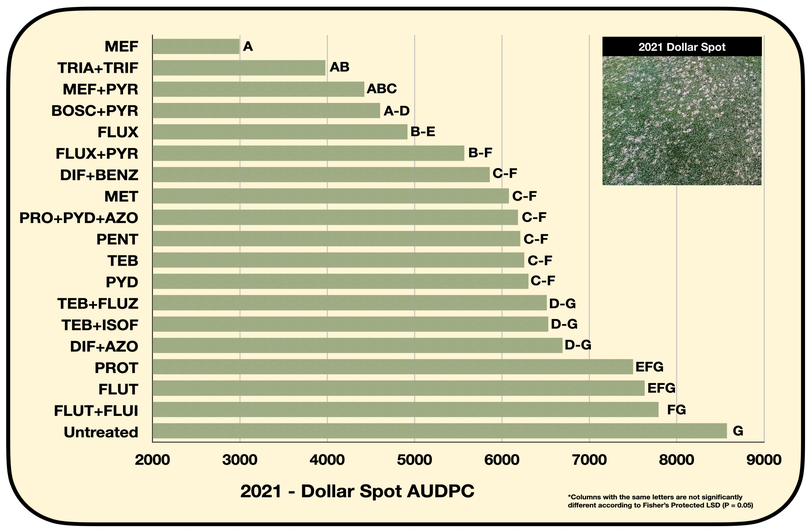
Methods

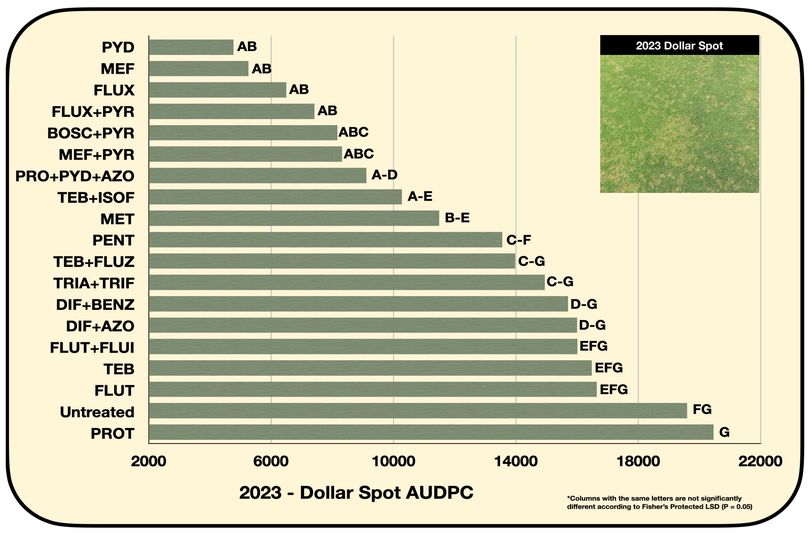
- Two-year field study conducted on creeping bentgrass putting greens in 2021 at the University of Missouri ('Penn A-4') and 2023 at Purdue University ('Pennlinks').
- Fungicides selected based on labeled control of dollar spot (*Clarireedia* spp.) and a soilborne disease such as fairy ring or summer patch (see Table 1).
- Plots arranged in a split plot design, with the whole plot treated with two watered-in (5 mm) applications in spring initiated when 5-d average soil temperatures reached 13°C, corresponding to 9 Apr & 7 May 2021 and 27 Apr & 25 May 2023.
- One half of the plot was left untreated while the other half was treated with the same fungicide and rate at a threshold when ≥ 5 dollar spot infection centers were present on the plot after a 14 d interval from the previous.
- Foliar diseases were rated weekly with visual counts of infection centers (bentgrass dead spot and dollar spot) or estimates of % disease severity (brown patch). Area under the disease progress curve (AUDPC) was calculated by the trapezoidal rule.
- Data subjected to ANOVA with PROC GLIMMIX in SAS. Where applicable means were separated with Fishers Protected LSD (∞ = 0.05).

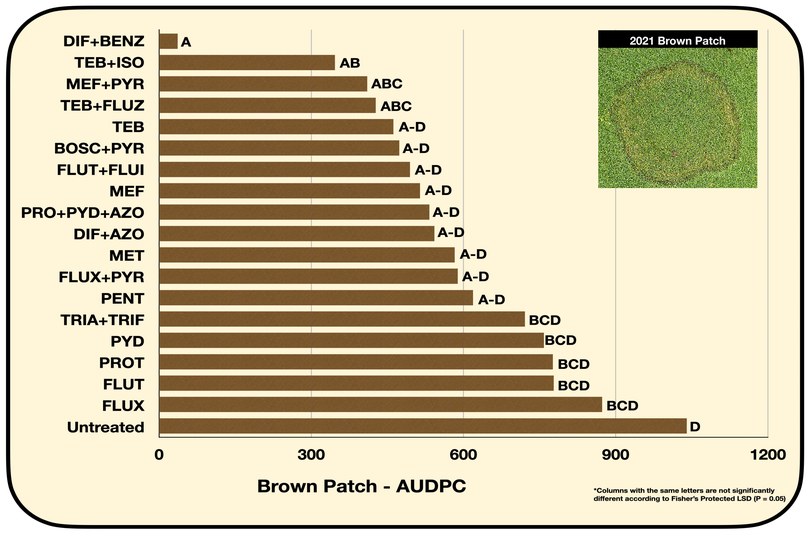


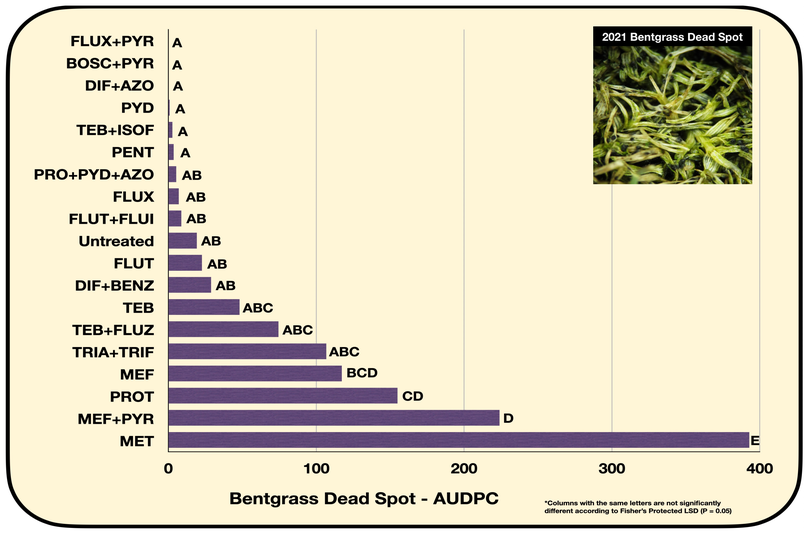
Drone image taken on July 7, 2021 showing brown patch and dollar spot severity in experimental area. Rows labeled Spr = spring applied fungicides only; Thr = threshold plots.

Two Spring Apps w/PAI



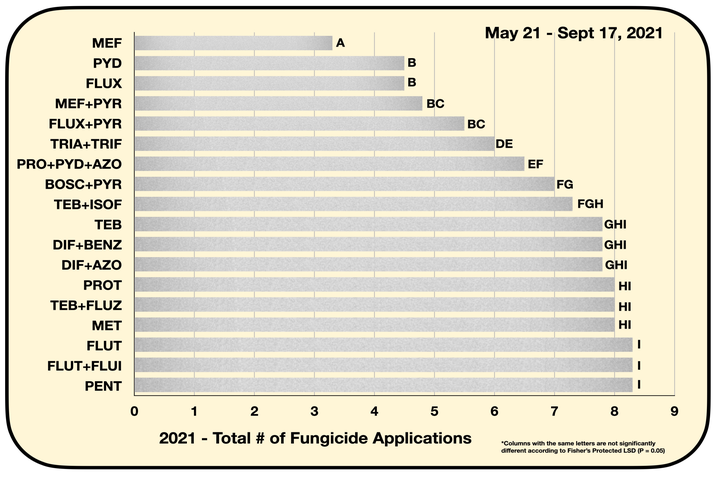


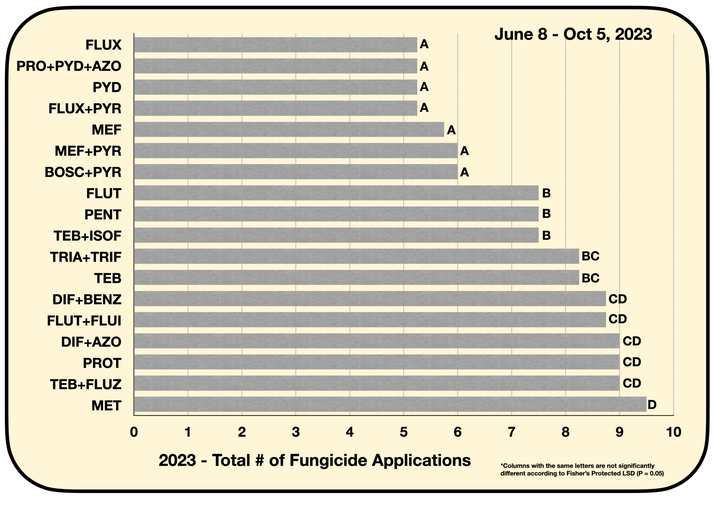




Fungicide A.I.	Abbreviation	Class	Product Rate (per 92.9 m²)	Rate (kg a.i. ha⁻¹)
Difenoconazole + Azoxystrobin	DIF+AZO	3 - DMI 11 - QoI	0.725 fl oz	0.29 0.46
Difenoconazole + Benzovindiflupyr	DIF+BENZ	3 - DMI 7 - SDHI	1.0 fl oz	0.25 0.076
Flutriafol	FLUT	3 - DMI	1.4 fl oz	0.56
Flutriafol + Fluindipyr	FLUT+FLUI	3 - DMI 7 - SDHI	0.41 fl oz	0.31 0.31
Mefentrifluconazole	MEF	3 - DMI	0.8 fl oz	1.0
Mefentrifluconazole Pyraclostrobin	MEF+PYR	3 - DMI 11 - QoI	0.85 fl oz	0.54 0.54
Metconazole	MET	3 - DMI	0.37 oz	0.56
Prothioconazole	PROT	3 - DMI	0.196 fl oz	0.30
Tebuconazole	TEB	3 - DMI	0.6 fl oz	0.82
Tebuconazole + Fluazinam	TEB+FLUZ	3 - DMI 29 - DNAL	1.3 fl oz	0.82 0.78
Tebuconazole + Isofetamid	TEB+ISOF	3 - DMI 7 - SDHI	3.0 fl oz	1.54 0.51
Triadimefon + Trifloxystrobin	TRIA+TRIF	3 - DMI 11 - QoI	2.0 fl oz	1.52 0.31
Propiconazole Pydiflumetofen Azoxystrobin	PRO+PYD+AZO	3 - DMI 7 - SDHI 11 - QoI	1.5 fl oz	0.50 0.05 0.30
Pydiflumetofen	PYD	7 - SDHI	0.16 fl oz	0.10
Fluxapyroxad	FLUX	7 - SDHI	0.26 fl oz	0.25
Fluxapyroxad + Pyraclostrobin	FLUX+PYR	7 - SDHI 11 - QoI	0.47 fl oz	0.25 0.50
Penthiopyrad	PENT	7 - SDHI	0.7 fl oz	0.13
Boscalid + Pyraclosbrobin	BOSC+PYR	7 - SDHI 11 - QoI	1.1 oz	0.38 0.56

Threshold





Results

- Over half of the two spring apps with PAI reduced dollar spot severity compared to untreated plots.
- Fungicides that resulted in the greatest dollar spot reduction from spring only applications also required the least number of applications in threshold treatments.
- In 2021, brown patch and bentgrass dead spot were observed. Fungicides that provided the highest dollar spot control did not result in the best control of these two diseases.