

Evaluation of Serenade AS for control of dollar spot in creeping bentgrass, 2003.

Serenade AS, a biological fungicide containing the bacterium *Bacillus subtilis*, was assessed for its ability to control dollar spot when applied alone, in rotations, or in tank-mixtures with Banner Maxx. This trial was conducted at North Carolina State University Turfgrass Field Lab in Raleigh, NC on 'Crenshaw' creeping bentgrass maintained under golf course putting green conditions. Mowing was performed three times weekly at a height of 0.157 in. with clippings collected, and the site was irrigated to prevent drought stress. Fertilizer was applied as 24-5-11 on 9 Apr (0.5 lb N/1000 sq ft) and as 18-3-18 on 5 May (0.5 lb N/1000 sq ft). Insect pests were suppressed with Dursban (1.5 fl oz/1000 sq ft) on 16 May, 27 Jun, and 25 Jul and with Talstar (0.25 fl oz/1000 sq ft) on 18 Aug. Canteen wetting agent (6 fl oz/1000 sq ft), was applied on 24 Apr, 12 May, 24 Jun, and 1 Aug to control localized dry spot. Plots were 3.33 ft x 5 ft and were arranged in a randomized complete block with four replications. Fungicides were applied in water equivalent to 2 gal per 1000 sq ft with a CO₂ powered sprayer at 40 psi using TeeJet 8004 flat fan nozzles. All treatments were initiated on 2 Apr. Fungicides were reapplied at the appropriate intervals as indicated in the table. Dollar spot incidence was assessed by counting the total number of infection centers in each plot on 26 Apr, 28 Apr, 30 Apr, 2 May, 5 May, 9 May, 13 May, 20 May, and 24 May. Turfgrass quality was evaluated on 27 Aug, using a 1 to 9 scale (9=best, 5=acceptable) based on color, density, and uniformity. Data were subjected to analysis of variance and means separation by Waller-Duncan k-ratio t test (k=100).

The first symptoms of dollar spot were observed on 25 Apr. Disease pressure was severe throughout Spring 2003 due to prevailing wet and overcast conditions. No treatments provided significant control of dollar spot until 30 Apr, when Serenade (2% v/v) alternated with Banner MAXX (1 fl oz), Serenade (2% v/v) tank mixed with Banner MAXX (0.5 fl oz), and Banner MAXX (1 fl oz) alone exhibited fewer dollar spot infection centers than the Untreated Control. This trend continued until 20 May, when Serenade (2% v/v) alone joined the group of treatments with dollar spot incidence significantly lower than the Untreated Control. Plots treated with Serenade (1% v/v) were characterized by higher dollar spot incidence than treatments containing Banner MAXX on all rating dates. Only Serenade (2% v/v) tank-mixed with Banner MAXX (0.5 fl oz) resulted in turf quality that was significantly higher than the Untreated Control on 24 May. These results indicate that Serenade AS, when applied at the 2% v/v rate, has a suppressive effect on dollar spot development in creeping bentgrass. The influence of Serenade AS in rotations and tank-mixtures with Banner MAXX could not be assessed, since Banner MAXX alone provided excellent dollar spot control throughout the trial.

Table 1. Effect of Serenade AS treatments on dollar spot incidence in ‘Crenshaw’ creeping bentgrass in Raleigh, NC.

Treatment and rate / 1000 sq ft	Application code ^z	Dollar spot incidence (infection centers/plot)				
		26 Apr	28 Apr	30 Apr	2 May	5 May
Serenade AS 1% v/v	A-F	27 a ^y	33 a	32 a	43 a	51 a
Serenade AS 2% v/v	A-F	13 ab	17 ab	13 abc	25 ab	29 ab
Serenade AS 2% v/v	AD					
<i>alt</i> Banner MAXX 1.24ME 1fl oz	BE	1 b	2 b	3 bc	4 b	6 b
Serenade AS 2% v/v	ACE					
+ Banner MAXX 1.24ME 0.5 fl oz	ACE	4 b	3 b	0 c	1 b	0 b
Banner MAXX 1.24ME 1.0 fl oz	ACE	1 b	1 b	1 bc	0 b	0 b
Monopotassium phosphate 0-52-34 1.8 oz	ACE	21 ab	23 ab	25 ab	35 a	39 a
Untreated Control	--	20 ab	28 ab	35 a	49 a	54 a

^z Application code indicates the application date(s) for each treatment component: A=2 Apr; B=14 Apr; C=23 Apr; D=1 May; E=8 May; F=15 May.

^y Values are means of four replicates. Means within columns followed by the same letter are not significantly different according to Waller-Duncan k-ratio t-test (k=100).

Table 2. Effect of Serenade AS treatments on dollar spot incidence and turfgrass quality in ‘Crenshaw’ creeping bentgrass in Raleigh, NC.

Treatment and rate / 1000 sq ft	Application code ^z	Dollar spot incidence (infection centers/plot)				Turfgrass quality ^y
		9 May	13 May	20 May	24 May	24 May
Serenade AS 1% v/v	A-F	55 a ^x	44 a	23 ab	31 a	4 b
Serenade AS 2% v/v	A-F	32 ab	21 bc	14 bc	16 bc	5 ab
Serenade AS 2% v/v	AD					
<i>alt</i> Banner MAXX 1.24ME 1fl oz	BE	8 bc	5 c	2 cd	1 cd	5 ab
Serenade AS 2% v/v	ACE					
+ Banner MAXX 1.24ME 0.5 fl oz	ACE	1 c	0 c	0 d	0 d	6 a
Banner MAXX 1.24ME 1.0 fl oz	ACE	0 c	0 c	0 d	0 d	5 ab
Monopotassium phosphate 0-52-34 1.8 oz	ACE	45 a	38 ab	18 ab	23 ab	4 b
Untreated Control	--	53 a	42 ab	30 a	34 a	4 b

^z Application code indicates the application date(s) for each treatment component: A=2 Apr; B=14 Apr; C=23 Apr; D=1 May; E=8 May; F=15 May.

^y Turfgrass quality on a 1 to 9 scale, where 9=highest quality and 5=acceptable quality.

^x Values are means of four replicates. Means within columns followed by the same letter are not significantly different according to Waller-Duncan k-ratio t-test (k=100).