

# Suppression of Dollar Spot on Creeping Bentgrass and Annual Bluegrass Turf with Compost-Amended Topdressings

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## ABSTRACT

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Topdressings formulated with mixtures of sand and various composts or organic fertilizers (70:30, v/v) were applied to putting greens of creeping Bentgrass and annual bluegrass and evaluated for their ability to suppress dollar spot disease development. When applied as preventive treatments at monthly intervals, topdressings amended with selected commercial organic fertilizers composed of animal and plant meals were highly suppressive to dollar spot consistently over a 3-yr period. The level of suppression in some experiments did not differ from that of the fungicide propiconazole. Additionally, a poultry litter compost and 2.5-yr-old sludge compost from Endicott, New York, also were consistently suppressive to dollar spot. All effective amendments remained suppressive for up to 1 mo after application, but by 2 mo after application, dollar spot incidence did not differ among treatments. When curative treatments of a poultry-cow manure compost, a sludge compost, and an organic fertilizer composed of animal plant meals were compared with the fungicide iprodione, only the organic fertilizer and the poultry-cow manure compost were effective in reducing dollar spot severity. Results indicated that application of certain composts and organic fertilizers of golf course turf may suppress dollar spot symptoms as effectively as conventional fungicides.

Additional keywords: biological control, cultural control, *Sclerotinia homoeocarpa*

Table 4. Suppression of dollar spot on a putting green in 1990 with amended topdressings<sup>a</sup>

Topdressing amendment	Disease rating 1 <sup>b</sup>		Disease rating 2 <sup>c</sup>	
	Spots per plot <sup>d</sup>	Disease reduction (%)	Spots per plot	Disease reduction (%)
Untreated control	3.0	...	26.0	...
MH manure compost	2.0	33.3	21.8	16.2
Endicott sludge compost	1.0	66.7	15.5	40.4
Paygro manure compost	0.8	73.3	19.8	23.8
EG manure compost	0.8	73.3	18.0	30.8
AB brewery compost	0.5	83.3	18.8	27.7
Organic fertilizer GR	0.3	90.0	23.5	9.6
<b>Sustane composted turkey litter</b>	<b>0.3</b>	<b>90.0</b>	<b>11.8</b>	<b>54.6</b>
Organic fertilizer CP	0.0	100.0	14.8	43.1
Propiconazole	0.0	100.0	15.5	40.4
LSD ( <i>P</i> = 0.05)	1.6	...	14.1	...

<sup>a</sup>Applied on 5 June, 18 July, and 16 August to a putting green at the Cornell University Turfgrass Field Research Laboratory, Ithaca, New York, at the rate of 500 cm<sup>3</sup>/m<sup>2</sup> as a topdressing composted of a 30% organic component and 70% fine sand (v/v)

<sup>b</sup>Evaluated on 4 September, 19 days after last application.

<sup>c</sup>Evaluated on 18 October, 63 days after last application.

<sup>d</sup>Spots per 0.81-m<sup>2</sup> plot.

## DISCUSSION

Results of this study support previous findings (6,16) that certain composted and uncomposted organic fertilizer sources can suppress dollar spot disease development on established turf. In particular, selected composts prepared from turkey litter and sewage sludge (Endicott sludge compost) as well as uncomposted blends of plant and animal meals (organic fertilizers CP and GR) were consistently suppressive. Additionally although other composted substrates (e.g., AB brewery compost and IPS poultry-cow manure compost) produced suppression that was inconsistent or did not persist under severe dollar spot pressure, their activity under low disease pressure was encouraging. Similar results have been obtained with these and other composted substrates against a number of other turfgrass diseases (18-21,23).

Our results suggest that both preventive and curative applications of composts and uncomposted organic fertilizers can provide levels of disease control equivalent to those achieved with some fungicides. As curative treatments, some composts and organic fertilizers were superior to iprodione in reducing dollar spot severity. Similarly, preventive treatments of a number of composts, and especially the organic fertilizer CP, were statically as effective as propiconazole in reducing dollar spot incidence.

The mechanisms by which composts and organic fertilizers suppress dollar spot are unknown. Although nutrients-poor conditions tend to favor dollar spot disease development (28), the putting greens used in this study were maintained under adequate fertility conditions. There was no evidence of dollar spot suppression arising from applications of nutrients with the composts and organic fertilizers use din this study. In face, those materials most suppressive to dollar spot (uncomposted organic fertilizers and turkey litter compost) contained extremely low levels of nitrate nitrogen compared with the other treatments. However, since most of the nitrogen in these materials is organic, the ammonium form of nitrogen and not the nitrate form is likely to predominate in nitrogen mineralized from these types of amendments (1). Therefore, nitrate nitrogen relationships may not be valid in predicting the relationship between nitrogen status and disease suppression. Additionally, levels of available phosphorus or potassium had no apparent relationship to dollar spot suppression, suggesting that suppression was not caused by the alleviation of nutrient stresses.

Although a number of complex factors may be involved in disease suppression by composts and other organic amendments, disease-suppressive properties are largely associated with chemical and microbial attributes of the organic amendment or with the resulting impacts on the native soil microflora following applications of organic matter (1,10,24). O'Neill (23) observed that composted municipal sludge applied as a topdressing was suppressive to brown patch on tall fescue turf. Furthermore, she observed that suppression persisted even when the compost had been sterilized by autoclaving, suggesting that a microbial component was not responsible for disease-suppressive properties.

Suppression of dollar spot following applications of some composted substrates such as Endicott sludge, IPS manure compost, and AB brewery compost likely resulted from their microbiological characteristics. In preliminary experiments, suppressiveness to *Pythium* spp. was destroyed by autoclaving (*unpublished*), suggesting that microbial antagonists in these composts may be important for disease suppression. We and other have shown that dollar spot can be suppressed biologically through the application of individual strains of antagonistic bacteria or fungi (8,9,17), so would not be surprising if microantagonists contained in composts were, in part, responsible for dollar spot suppression.

The use of topdressing materials amended with composts and organic fertilizers offers a promising means of incorporating fungicide alternative into disease control programs. Golf course superintendents routinely topdress greens and tees three to four times a season with a mixture of sand and some type of organic matter (usually peat) or soil, primarily to smooth the putting surfaces and manage thatch accumulation. The application of compost-amended topdressings, therefore, would not introduce additional practices into a turfgrass management program. By simply altering the topdressing amendment, turfgrass managers may be able to convert a relatively inert topdressing material into a biologically active material with fungicidal properties. Although the precise nature of disease suppression remains obscure, studies of the microbiology of suppressive composts may provide insight into ways in which composts and other organic amendments can be used more reliably for disease suppression on established turf.