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NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Dollar spot research findings and challenges from a Nordic perspective

Tatsiana Espevig, PhD



STERF Anniversary Webinar on Dollar Spot
October 27, 2026

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NIBIO Turfgrass Research Group



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Photo: Karin Normann

Outline

- Dollar spot in Scandinavia
- Diversity of *Clarireedia* spp. in Europe
- Turfgrass resistance to dollar spot
- Cultural practices in prevention and control of dollar spot

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Dollar spot in Scandinavia

Denmark
- Fredensborg GC and Helsingør GC since 2008-2009
- damage up to 70-80% on some golf courses

Sweden
- incidences of dollar spot since 2009
- officially documented in 2014
- damage up to 70-80% on some golf courses

Norway
- officially documented in 2013
- not yet very widespread in Norway.



plant disease

Editor-in-Chief: Alison E. Robertson
Published by The American Phytopathological Society

February 2015, Volume 99, Number 2
Page 287
https://doi.org/10.1094/PDIS-07-14-0775-PDN

Disease Notes

First Report of Dollar Spot, Caused by *Sclerotinia homoeocarpa*, of Creeping Bentgrass in Norway

T. Espevig, Bioforsk—Norwegian Institute for Agricultural and Environmental Research, Øst Landvik, NO-4886 Grimstad, Norway; M. B. Brurberg, Bioforsk—Norwegian Institute for Agricultural and Environmental Research, Plant Health and Plant Protection, NO-1430 Ås, Norway; and A. Kvalbein, Bioforsk—Norwegian Institute for Agricultural and Environmental Research, Øst Landvik, NO-4886 Grimstad, Norway

Open Access.

In September 2013, symptoms similar to dollar spot caused by *Sclerotinia homoeocarpa* F.T. Benn., were observed on creeping bentgrass (*Agrostis stolonifera* L.) fairways at Losby Golf Course, Lørenskog, Akershus County, in Norway (59.8864° N, 10.9862° E). There were small, circular spots and larger irregular patches of sunken, bleached, straw-colored turf. Affected leaves had light-tan lesions with light reddish-brown margins (2). Abundant aerial mycelium was observed in the diseased turf after incubation for 24 h at room temperature in a moist chamber. The mycelium was septate with y-shaped branches. No spores were observed. Diseased leaf segments were washed 30 min in cold running water, surface-sterilized for 60 s using 70% ethanol, placed on water agar, and incubated at room temperature. After 4 days, water agar plugs containing the fungus were transferred to 50% potato dextrose agar (PDA; 19.5 g PDA and 7.5 g agar per 1 liter of media). The fungus colonized the entire 9-cm PDA plates in 6 days. The diameter of the hyphae varied

RESEARCH

First Report of Dollar Spot Disease, Caused by *Sclerotinia Homoeocarpa*, of *Agrostis Stolonifera* in Sweden

Tatiana Espevig,* May Bente Brurberg, Marina Ussiebova, Åsbjørg Dahl, Agnar Kvalbein, Karin Normann, and Jo Anne Crouch

ABSTRACT

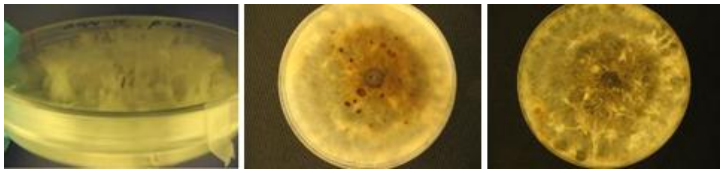
Dollar spot is a destructive and widespread disease affecting many turfgrass species, but until recently it has been absent from the Scandinavian countries of northern Europe. In the fall of 2014, disease symptoms consistent with dollar spot were observed on a golf course fairway in Sweden. A fungus was isolated from symptomatic turf and identified as *Sclerotinia homoeocarpa* on the basis of ribosomal deoxyribonucleic acid (rDNA) internal transcribed spacer (ITS) sequence homology with *S. homoeocarpa* and *S. sclerotiorum*. The ITS sequence was identical to isolates of *S. homoeocarpa* from the eastern and midwestern United States. Koch's postulates were fulfilled, confirming the *S. homoeocarpa* isolate as the causal agent. This is the first report of turfgrass dollar spot in Sweden and only the second report of the disease from Scandinavia. The cultivation of Scandinavian turfgrass, dollar spot disease may prove difficult to control through conventional means and potentially represents a major threat to the industry.

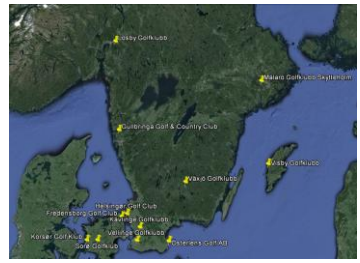
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STERF Dollar spot project 2014-2016

- Nearly 30 turf samples were collected in Scandinavia
- Presence of *Clarireedia* spp. was confirmed on 7 Swedish, 4 Danish and 1 Norwegian golf course
- 6 isolates from USA
- ITS (internal transcribed regions) of the ribosomal DNA







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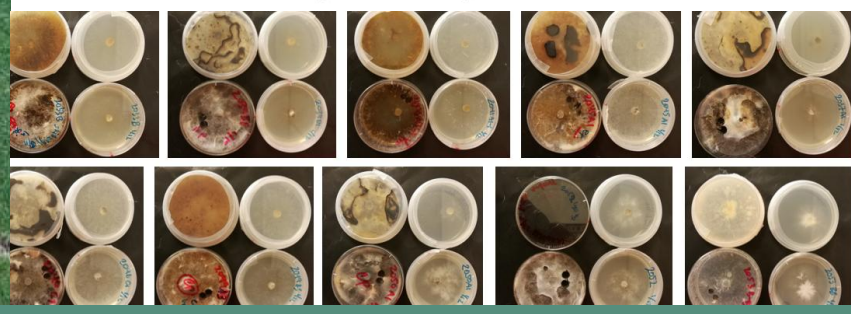
In June-November 2020 NIBIO Landvik received:

- 37 turfgrass samples from golf courses in Denmark (3), Sweden (6), Norway (1), UK (4) and Germany (23)
- 2 pure cultures:
  - 1 from Portugal
  - 1 from Germany

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DOI: 10.1002/its2.70060
International Turfgrass Society Research Journal
SHORT COMMUNICATION
Integrated Turfgrass Management: Diseases, Insect Pests and Nematodes

Causal species for dollar spot disease of turfgrass in Europe

Tatsiana Espevig[1] | Kristine Sundsdal[1] | Victoria Stornes Moen[1] | Kate Entwistle[2] | Marina Usoltseva[3] | Sabine Braitmaier[4] | Daniel Hunt[5] | Carlos Guerrero[6,7] | Monica Skogen[8] | Erik Lysøe[8]



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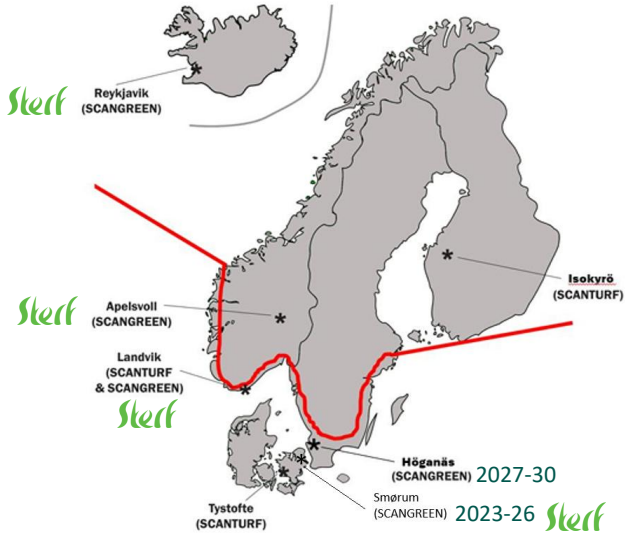
Blast identity of 22 isolates using ITS1, ITS2 and CAL primers.

No	ID Landvik	Country	Turfgrass host	Fungal specimens	ITS1		CAL		ITS2	
					%[3]	GenBank ID	%	GenBank ID	%	GenBank ID
1	2033	Germany	Agrostis, Festuca rubra	*Clarireedia homoeocarpa*	98.4	PQ879989	99.0	PV005876	98.0	PQ880002
2	2021	Sweden	Agrostis, Festuca rubra	*Clarireedia homoeocarpa*	NA[1]	-	98.7	PV005877	98.0	PQ880004
3	2017	Germany	NA	*Clarireedia homoeocarpa*	NA	-	98.7	PV005878	98.0	PQ880005
4	2023	Germany	Poa annua, Agrostis	*Clarireedia homoeocarpa (CAL)* *Clarireedia jacksonii (ITS2)*	NA	-	98.7	PV005879	97.2	PQ880006
5	2037	Germany	Poa annua	*Clarireedia homoeocarpa (CAL)* *Clarireedia jacksonii (ITS2)*	NA	-	98.7	PV005880	97.2	PQ880007
6	2039	Germany	Poa annua, Agrostis	*Clarireedia homoeocarpa (CAL)* *Clarireedia jacksonii (ITS2)*	NA	-	98.7	PV005881	97.2	PQ880008
7	2020-2-1	Sweden	Agrostis, Festuca rubra	*Clarireedia homoeocarpa (CAL)* *Clarireedia jacksonii (ITS2)*	NA	-	98.7	PV005885	97.2	PQ880015
8	2022	Sweden	Poa annua	*Clarireedia homoeocarpa (CAL)* *Clarireedia jacksonii (ITS2)*	NA	-	98.7	PV005886	97.2	PQ880016
9	2050	Germany	Agrostis	*Clarireedia homoeocarpa*	NA	-	NA	-	98.0	PQ880003
10	2045	Germany	Festuca rubra, Poa annua, Agrostis	*Clarireedia jacksonii*	100	PQ879990	100	PV005882	100	PQ880009
11	2016	Portugal	Agrostis, poa (pure culture)	*Clarireedia jacksonii*	100	PQ879993	100	PV005883	100	PQ880013
12	2019	Spain	Agrostis	*Clarireedia jacksonii*	99.8	PQ879994	100	PV005884	100	PQ880014
13	2046	Germany	Agrostis, Poa annua	*Clarireedia jacksonii*	100	PQ879991	NS[2]	-	100	PQ880010
14	2049	Germany	Poa annua	*Clarireedia jacksonii*	100	PQ879992	NS	-	100	PQ880011
15	2052	Germany	NA (pure culture)	*Clarireedia jacksonii*	NA	-	NS	-	97.2	PQ880012

ITS – internal transcribed regions of the ribosomal DNA; CAL – calmodulin;
NA – not applicable; NS – not sequenced; % – percent similarity.

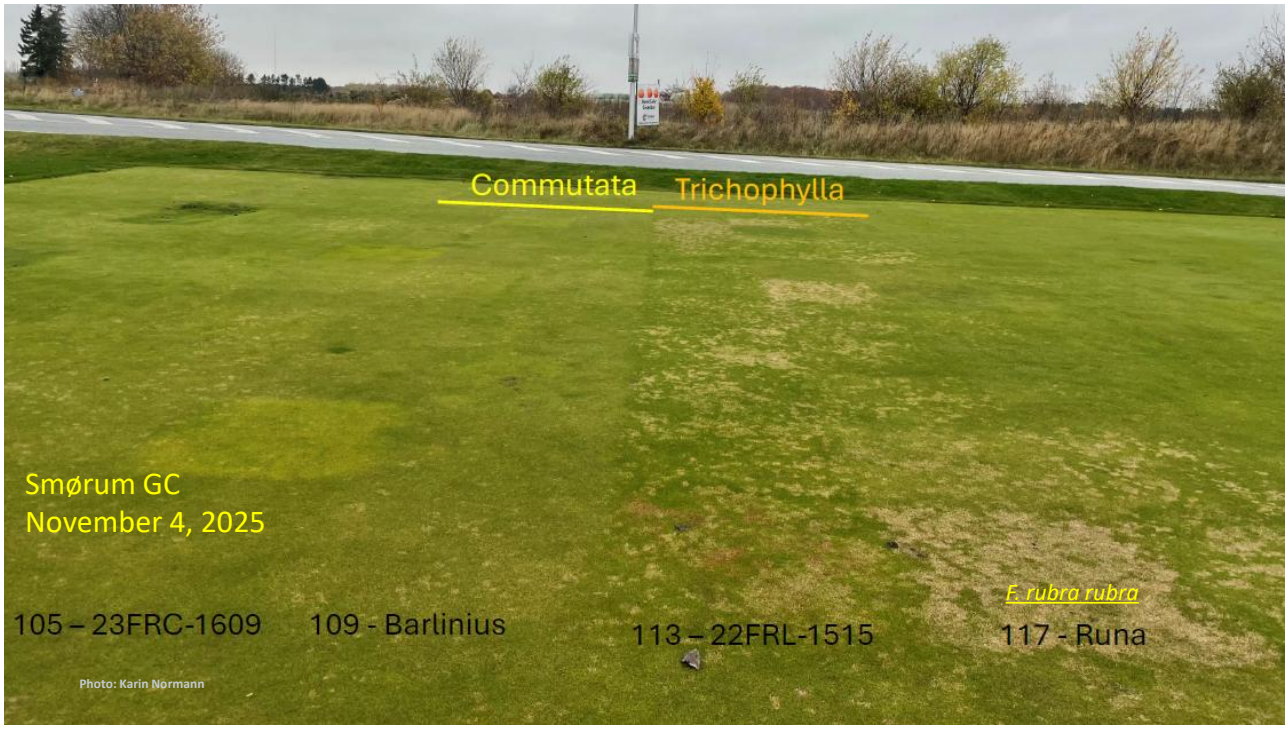
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Variety testing in the Nordic countries: SCANGREEN & SCANTURF



https://www.scanturf.org/

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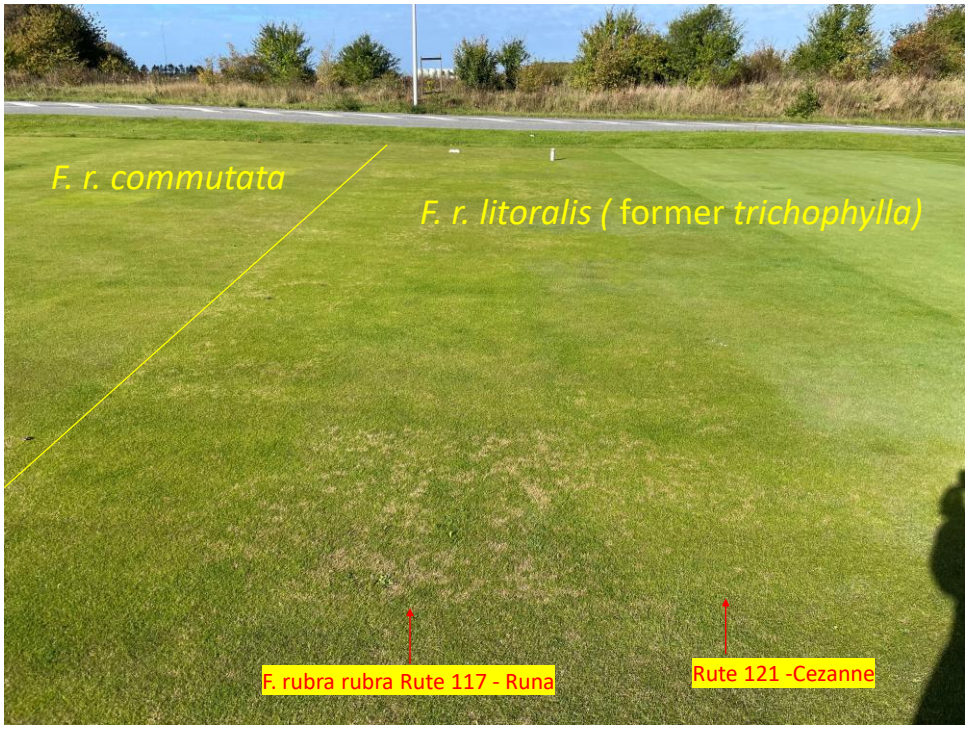


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Sterf

Smørum GC
October 6, 2026

Photo: Karin Normann



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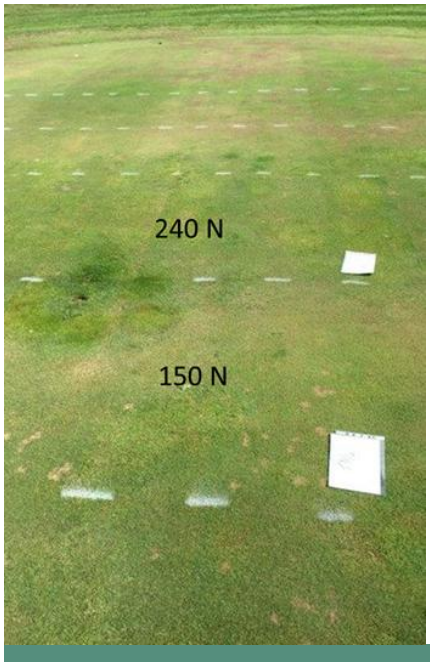
SCANGREEN
Smørum, Denmark
Dollar spot, %

Turfgrass species		Scangreen 2019-22 2022	Scangreen 2023-26 2024	2025	2026
Velvet bentgrass	*Agrostis canina*	0	-	-	-
Colonial bent	*Agrostis capillaris*	0	0	0	0
Creeping bent	*Agrostis stolonifera*	0	0	0.1	0.3
Chewings fescue	*Fectuca rubra commutata*	0.4	0.04	1.8	3.1
Slender creeping red fescue	*F. rubra litoralis*	3.6	0.21	2.5	11.2
Strong creeping red fescue	*F. rubra rubra*	-	0	0	21.7
Perennial ryegrass	*Lolium perenne*	0	0	0	na
Kentucky bluegrass	*Poa pratensis*	0	0	0	0
Rough bluegrass	*Poa trivialis*	0	-	-	-

Photo: Karin Normann

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Nitrogen vs. dollar spot on creeping bent+poa greens

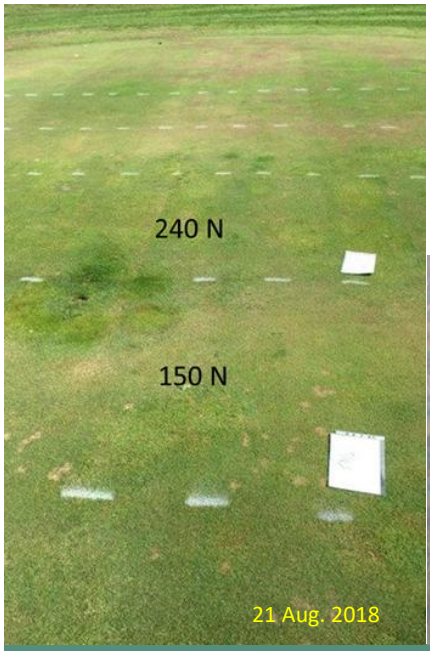
Kävlinge Golf Club, Sweden

	Dollar spot infection centers, number per plot	
	Year 1	Year 2
150 kg N / ha / yr	71	100
240 kg N / ha / yr	60	76
	-16 % (NS)	-24 %

Photo: Marina Usoltseva

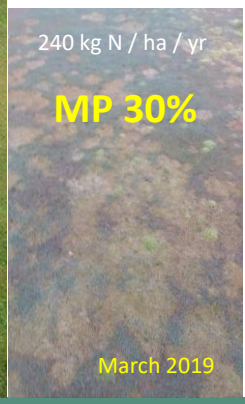
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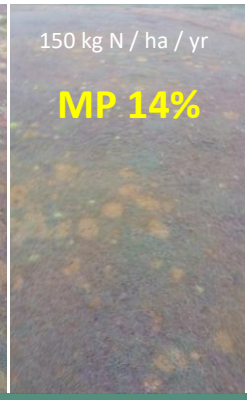
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Nitrogen vs. dollar spot on creeping bent+poa greens

Kävlinge Golf Club, Sweden







BIO Web of Conferences **18**, 00008 (2020) https://doi.org/10.1051/bioconf/20201800008
IV All-Russian Plant Protection Congress

Effects of rolling and N-fertilization on dollar spot and Microdochium patch on golf greens in Scandinavia

Tatsiana Espevig[1*], *Marina* Usoltseva[2], and *Karin* Norman[3]

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[2]Botanisk Analysgrupp, 413 19 Göteborg, Sweden
[3]Nyholt ApS, 5772 Kværndrup, Denmark

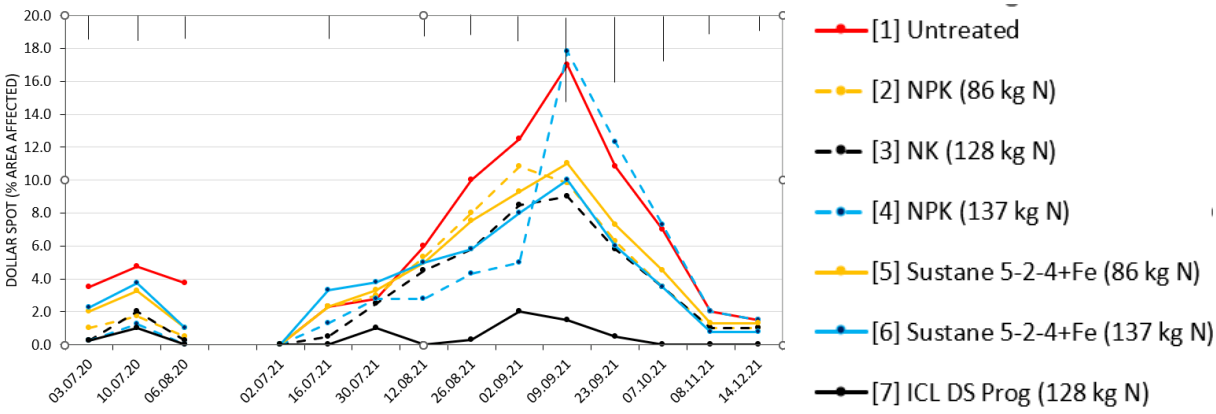
Abstract. Dollar spot was officially documented in Scandinavia in 2013 and the spread and damage from this disease has increased during last years. In summer 2017, on the golf greens with red fescue (Vallda GC, Sweden) and with the mixture of red fescue, colonial bentgrass and annual bluegrass (Roskilde GC, Denmark) rolling 2 times per week reduced dollar spot 61% and 37% and rolling 4 times per week reduced dollar spot 95% and 54%, respectively. Thus, rolling 3-4 times per week can be recommended on golf greens with dollar spot pressure. In the experiment 2018 dollar spot was reduced 24% with increase in nitrogen from 150 to 240 kg ha^{-1} yr^{-1} on creeping bentgrass/annual bluegrass golf green (Kävlinge GK, Sweden). However, the increased N-rate lead to a higher degree Microdochium patch from 14% to 30%.

Photo: Marina Usoltseva, Anders Olofsson

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Dollar spot on red fescue
Nutrient based IPM



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Rolling 4 and 2 times per week from June to September reduced **dollar spot** 95% and 61% vs. untreated control

Rolling vs. dollar spot on red fescue green

Vallda Golf Club, Sweden, 2017

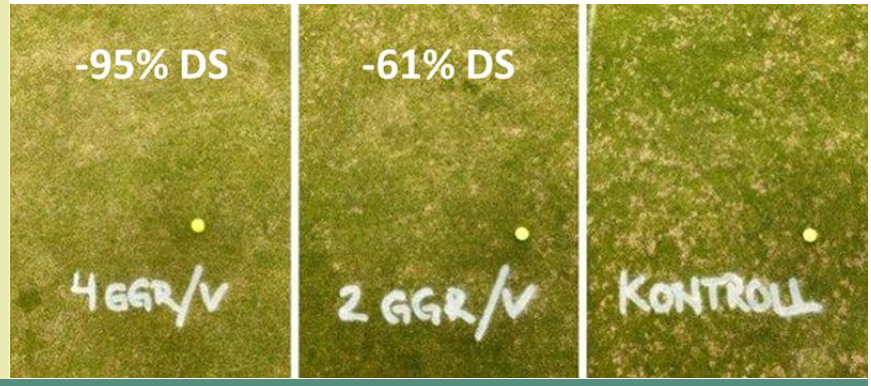


Photo: Stefan Nilsson

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International Turfgrass Society Research Journal
RESEARCH
Integrated Turfgrass Management: Diseases, Insect Pests and Nematodes

Ultraviolet-C radiation as an alternative method to control dollar spot and microdochium patch on golf greens

Daniel Hunt[1] | Lukas Borrink[2] | Tatsiana Espevig[3] | Wolfgang Prämaßing[1]



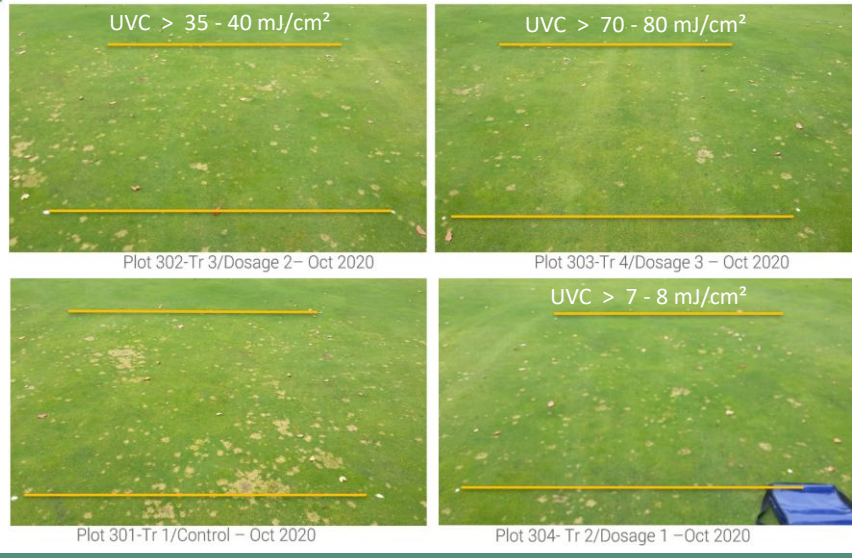


Photo: Prämaßing Wolfgang and Daniel Hunt

UV-C treatments - 3 times per week
not during unfavourable weather conditions like frost, snow or wet soil

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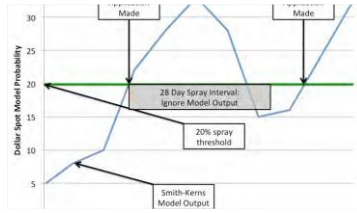
ITRI-project

Integrating alternative strategies to improve the sustainable management of dollar spot (DS)

Principal investigator:
Paul Koch, Department of Plant Pathology, University of Wisconsin – Madison, Madison, WI, USA.



WP1. Assess robotic mowers and dew removers for their ability to suppress DS



WP2. Validate the Smith-Kerns Dollar Spot Model for use across Europe



WP3. Alternative DS management across a broad geographic area



WP4. Integrating UVC light with other alternative DS management strategies

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WP1: Assess robotic dew removers for their ability to suppress dollar spot - GREEN

Partisipants:

BOKSKOGENS GOLFKLUBB

HJORTESPRING GOLFKLUB

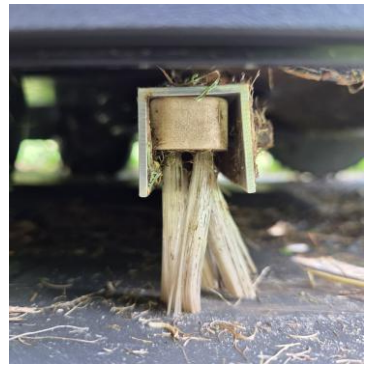
DANSK GOLF UNION Spil med

TURFHOUSE

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Svenska Golfförbundet





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WP1: Assess robotic mowers for their ability to suppress dollar spot - FAIRWAY

Partisipants:

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

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ROYAL SAINT BARBARA´S DORTMUND GOLF CLUB E.V.

DEPARTMENT OF PLANT PATHOLOGY
COLLEGE OF AGRICULTURAL & LIFE SCIENCES



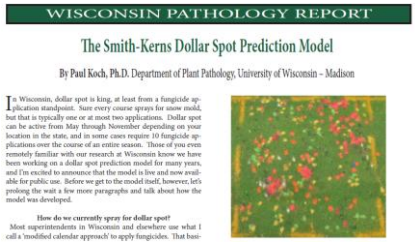


Sterf R&A USGA Husqvarna

Photos: Daniel Hunt

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WISCONSIN PATHOLOGY REPORT

The Smith-Kerns Dollar Spot Prediction Model

By Paul Koch, Ph.D. Department of Plant Pathology, University of Wisconsin – Madison

In Wisconsin, dollar spot is king, at least from a fungicide application standpoint. Sure every course sprays for snow mold, but that is typically one or at most two applications. Dollar spot can be active from May through November depending on your location in the state, and in some cases require 10 fungicide applications over the course of an entire season. Those of you even remotely familiar with our research at Wisconsin know we have been working on a dollar spot prediction model for many years, and I'm excited to announce that the model is live and now available for public use. Before we get to the model itself, however, let's prolong the wait a few more paragraphs and talk about how the model was developed.

How do we currently spray for dollar spot?

Most superintendents in Wisconsin and elsewhere use what I call a 'modified calendar approach' to apply fungicides. That basi-



WP2. Validation of the Smith-Kerns Dollar Spot Model for Use in Europe

- From May to October in 2026 and 2027
- Golf courses with a history of dollar spot
- Conducted on greens, tees and fairways
- Multiple golf courses in the UK, Germany, and the Netherlands
- Two golf courses in Denmark: Hjortespring and Furesø
- Two golf courses in Sweden: Bokskogen and Rya
- Every 14 days: Dollar spot % and infection centers
- Weather data - daily values:
  - Relative humidity
  - Air temperature

Sterf R&A USGA

Photo: Prämaßing, Wolfgang

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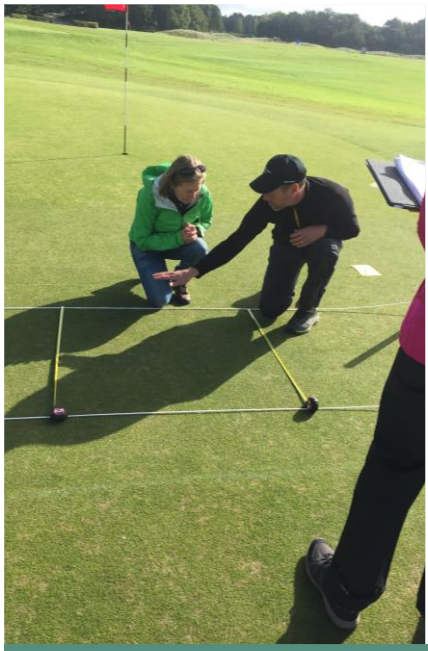


Photo: Botaniska Analysgruppen

Key takeaways

- Prevention is the cornerstone of dollar spot management.
- Use of resistant species and cultivars.
- Regular monitoring and weather-based risk assessments.
- An integrated approach is more effective than any single measure.
- Fungicides should be reserved for high-risk situations whether their use is allowed.

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Selected NIBIO publications on dollar spot

First report

1.Espevig, T., Brurberg, M. B., & Kvalbein, A. (2015). First report of dollar spot, caused by Sclerotinia homoeocarpa, of creeping bentgrass in Norway. Plant disease, 99(2), 287-287. https://doi.org/10.1094/PDIS-07-14-0775-PDN

2.Espevig, T., Brurberg, M. B., Usoltseva, M., Dahl, Å., Kvalbein, A., Normann, K., & Crouch, J. A. (2017). First report of dollar spot disease, caused by Sclerotinia homoeocarpa, of Agrostis stolonifera in Sweden. Crop Science. 57(S1), 349-353. (Short comm.) https://doi.org/10.2135/cropsci2016.10.0835

Clarireedia species

3.Espevig, T., Sundsdal, K., Moen, V. S., Entwistle, K., Usoltseva, M., Braitmaier, S., Hunt, D., Guerrero, C., Skogen, M. & Lysøe, E. (2025). Causal species for dollar spot in Europe. International Turfgrass Society Research Journal, 1-5. https://doi.org/10.1002/its2.70060

4.Espevig, T., Sundsdal, K., Moen, V. S., Lysøe, E., Skogen, M., Usoltseva, M., Entwistle, K., Braitmaier, S., Guerrero, C. (2024) Myntflekk: sopparter som forårsaker sykdommen i Europa. Gressforum 4:11-13.

Temperature

5.Entwistle K., T. Espevig, J. A. Crouch, K. Normann and M. Usoltseva. 2018. The effect of temperature on the in vitro growth rate of Sclerotinia homoeocarpa isolates of different origin. p. 14-15. In S. Brown et al. (ed.) Different shades of green. Eur. Turfgrass Soc. Conf., 6th, Manchester, UK. 2-4 July 2018. Eur. Turfgrass Soc. Quinto Vicentino, Italy. ISBN:978-3-88579-568-1

Resistance spp & cultivars

6.Espevig T., K. Normann, M. Usoltseva, K. Entwistle, J. A. Crouch and T.S. Aamlid. 2020. *In vitro* screening of turfgrass species and cultivars for resistance to dollar spot isolates of different origin. European Journal of Turfgrass Science 3:74-75. + STERF.org https://sterf.org/wp-content/uploads/2024/09/Dollar-spot-in-vitro-english.pdf

7. Espevig, T., Sundsdal, K., Aamlid, T. S., Crouch, J. A., Normann, K., Usoltseva, M., ... & Brurberg, M. B. (2022). In vitro screening of turfgrass species and cultivars for resistance to dollar spot. International Turfgrass Society Research Journal, 14(1), 873-882. https://doi.org/10.1002/its2.78

8. Hesselsøe, K. J., Borchert, A. F., Aamlid, T. S., Hannesson, B., Rasmussen, P., Normann, K., ... & Heltoft, P. (2023). SCANGREEN 2019-2022: Turfgrass species, varieties and seed mixtures for Scandinavian putting greens. Final results from a four-year testing period. NIBIO Rapport.

Rolling & N & other non-fungicide methods

9.Hunt, D., Borrink, L., Espevig, T. & Prämaßing, W. (2025) Ultra Violet - C Radiation as an alternative method to control dollar spot and microdochium patch on golf greens. International Turfgrass Society Research Journal, 1-9. https://doi.org/10.1002/its2.70058

10.Espevig T., K. Normann, S. Nilsson, N. Bosholdt and M. Usoltseva. 2018. Rolling reduces dollar spot on golf greens in Nordic countries. p. 18-19. In S. Brown et al. (ed.) Different shades of green. Eur. Turfgrass Soc. Conf., 6th, Manchester, UK. 2-4 July 2018. Eur. Turfgrass Soc. Quinto Vicentino, Italy. ISBN:978-3-88579-568-1

11.Espevig, T., Usoltseva, M., & Norman, K. (2020). Effects of rolling and N-fertilization on dollar spot and Microdochium patch on golf greens in Scandinavia. In BIO Web of Conferences (Vol. 18, p. 00008). EDP Sciences. https://doi.org/10.1051/bioconf/20201800008

Fungicide resistance

12.Gagkaeva, T., Orina, A., Gavrilova, O., Usoltseva, M., Crouch, J. A., Normann, K., ... & Espevig, T. (2022). In vitro fungicide sensitivity of Clarireedia, Fusarium, and Microdochium isolates from grasses. International Turfgrass Society Research Journal, 14(1), 972-980. https://doi.org/10.1002/its2.139

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Thank you!

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