

GC2030

STERF

Sustainable Golf Courses: Integrated Turf Management

A Golf Course 2030 and STERF Symposium

18-19
September
2023

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This event was delivered as part of the Golf Course 2030 Scandinavia Programme and was a joint R&A and STERF initiative.

GC2030

Visit: randa.org/what-is-gc2030

Sterf

Visit: sterf.org

Symposium and Field Day supported by:
Swedish Golf Federation



**Svenska
Golfbundet**

Field Day hosted by:
Sigtuna Golfklubb



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Foreword.

Sigtuna, September 2023

The symposium *Sustainable Golf Courses: Integrated turf management* is a part of the Golf Course 2030 programme and is a joint R&A and STERF initiative. It is an arena established to exchange knowledge and experiences with the best experts in the field. It brings together researchers, greenkeepers, superintendents, technical experts, consultants and top industry delegates. This gives us the best opportunities to improve and extend important international collaboration, which is the only viable strategy to overcome the current challenges and create a sustainable future.

The production of healthy turf while safeguarding environmental quality and providing a toxin-free environment is a high priority within the European Union. In this context, the golf and turfgrass industry must play its part by providing high playing quality and at the same time reducing dependence on chemical plant protection products.

The aim of the symposium is to inspire the golf sector to take initiative, work proactively and create an integrated approach to pest and disease management as the driving force for producing healthy turf and to reduce the use of and dependence on pesticides.

Results from the joint R&A and STERF IPM-project, *"Integrated management of important turfgrass diseases, and insect pests on European golf courses"*, is an important part of the symposium. New and ongoing IPM-projects and practical experiences of implementing IPM are presented and discussed by more than 80 participants from 14 countries.

This folder presents short abstracts of the presentations given at the symposium.



John Kemp,
Project Manager, Golf Course 2030,
The R&A



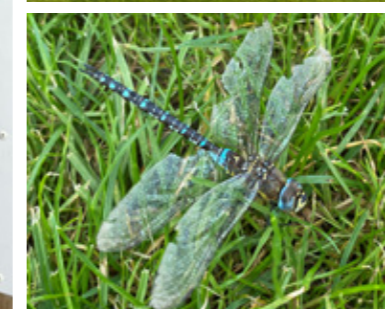
Maria Strandberg
Director of R&D, STERF

18 Sept.



Field Day at Sigtuna Golf Club, Sigtuna

Day One Itinerary	
14.00	Bus pick-up Sigtuna Busstation, in Sigtuna
14.15	Arrival at Sigtuna GC and a Swedish Fika (coffee)
14.30	Introduction and welcome to Sigtuna Golf Club <i>Lars Kjellberg, Chairman and Martin Lundin, Club Manager</i>
	<p>The Biodiversity Project at Sigtuna GC <i>Ola Jennersten and Sven Seeman, Project Managers</i></p> <p>A project that started to help the bees on the course has turned into a beneficial programme for the local environment, the cultural landscape as well as creating commitment from members and the community who help with the work.</p>
	<p>Sustainable Course Management <i>Martin Lundin, Club Manager & Acting Course Manager</i></p> <p>Sigtuna GC's sustainable management strategy has increased biological diversity on and off the laying field. We will hear about weed control on fairways, fertiliser strategy, investment in irrigation and drainage, minimising energy use and carbon emission through more efficient rough mowing as well as certification.</p>
15.30	<p>Field walks on course</p> <p>The tour will show the efforts made with insect hotels, birdhouses, mowers, sowing of meadow flowers, grazing animals etc and show how in many places it helped the game to flow better.</p>
16.30	Summary of the field trips
17.00	BBQ dinner and networking
19.30	Return bus to Sigtuna



Programme.

19 Sept.

Symposium, Hotel Stora Brännbo, Sigtuna

Morning Session

09.15	Welcome to Sigtuna and the IPM symposium <i>STERF, The R&A and the Swedish Golf Federation</i>
09.30	Keynote - Developing Strategies for the Future <i>Bruno Hedlund, Chairman, STERF</i>
09.50	Three Actions to Implement IPM <i>John Kemp, The R&A</i>
10.00	Sustainable Agronomy and Golf Course 2030 <i>Paul Woodham, The R&A</i>
10.20	European Golf Turfgrass Sustainability Roadmap 2023 -2030 <i>Niels Dokkuma, EGA</i>
10.35	Break & Networking
11.05	IPM implementation in Sweden Philosophy – Strategy – Result <i>Stefan Nilsson, STERF and SGF</i>
11.25	Data collection and how it relates to IPM <i>Patrik Niklasson, Skövde GC</i>
11.40	Introduction to IPM Research Programme – today and in the future <i>Tatsiana Espevig NIBIO</i>
12.00	Varieties and mixtures for integrated management of putting greens: Results from SCANGREEN 2019-22 <i>Karin Juul Hesselsøe, NIBIO</i>
12.20	Lunch & Networking

Afternoon Session

13.20	Insect pests on Scandinavian golf courses: An update on integrated management <i>Karin Juul Hesselsøe, NIBIO</i>
13.35	Managing important turfgrass diseases microdochium patch and dollar spot using less fungicides: Results from IPM-GOLF 2030 <i>Tatsiana Espevig, NIBIO</i>
13.50	Using rolling as a tool to reduce the severity of microdochium patch on greens <i>Martin Nilsson, Copenhagen GC</i>
14.05	Effects of UV-C Radiation and Sustane Slow-Release Fertiliser on Turfgrass Diseases on Golf Greens <i>Wolfgang Prämaßing, University of Applied Sciences Osnabrueck</i>
14.20	Coffee & Networking
14.50	Golf Course 2030 Integrated Turf/Pest Management European Project Update <i>John Kemp, The R&A and Valentine Godin, AFGolf</i>
15.25	Keynote - Sustainable Championship Agronomy at The Open and AIG Women's Open <i>Richard Windows, The R&A</i>
15.45	Three actions to implement IPM – Conclusions <i>John Kemp, The R&A</i>
15.55	Thanks and goodbye!
16.00	End of the Symposium



Presentation Abstracts.

09.30 Keynote - Developing Strategies for the Future
Bruno Hedlund, Chairman, STERF



Bruno Hedlund is operative chairman of the Scandinavian Turfgrass and Environment Research Foundation, STERF, since 2004 and has also been on the Board of Directors for the Swedish Golf Federation, SGF, for 12 years. Bruno Hedlund has worked for more than twenty years in sustainable golf development and strategic development of the sport of golf.

Professionally, Bruno Hedlund has been chief executive for different industrial research companies and institutes and is also a member of several international scientific boards and committees.

Developing strategies for the future

Bruno Hedlund

A stable and predictable climate and availability of natural resources is critical for the development of the turfgrass sector, but this is not the situation today and calls for developing new strategies and knowledge for the future.

Climate change is accelerating and during this summer we've had 36 consecutive days with global heat records, since first of June more than 2.380 temperature records was set in the US, there is extreme flooding all over Asia and we have now the warmest oceans ever recorded. We also have deficit in several critical resources for greenkeeping and political and economic instability causing dramatic cost increases. Therefore, we need to adapt to climate change and minimise factors affecting climate changes and also ensure sustainable use of energy and natural resources.

The warmer climate also gives the effect that harmful microorganisms and invasive species of insects and weeds now are recorded in places they never been found, making developments of sustainable solutions for control of diseases, weeds and insects crucial.

Today it is difficult to find skilled and educated people so we must increase development and education in new technology, knowledge, and techniques.

We must also demonstrate to the public, authorities and legislators, the value of our fantastic sports ground and present the golf course as a huge resource for restoring and enhancement of biodiversity and natural assets. We must build trust!



10.00 Sustainable Agronomy and Golf Course 2030
Paul Woodham, The R&A



Paul Woodham, Head of Agronomy Europe, has over 30 years' experience in golf course management. Paul's career began in greenkeeping and progressed with 14 years as a professionally qualified and experienced agronomist. He has worked across all types of course ranging from public and private operations and across Members courses to Tour and Resort venues with experience in resort tournament monitoring.

Paul has a degree in Turfgrass Science and is a member of the BASIS Professional Register. Paul is also a regular contributor to industry publications and presents education seminars and workshops on the national and international stage.

Sustainable Agronomy and Golf Course 2030

Paul Woodham, The R&A

Paul will be discussing the challenges and threats our industry is seeing across Europe. Issues such as weather extremes, player expectation, increased wear, legislation, costs and materials are areas where we are seeing change in addition to staffing and public scrutiny. In response to this, The R&A launched the Sustainable Agronomy Services in 2022 to support all levels of golf clubs with the management

of golf courses. Paul gives insight into the work R&A agronomists are doing to influence positive change in how golf courses are managed and how the landscape of the course may need to change in the coming years as we look ahead to the future implementation of Integrated Turf Management practices.



10.20 European Golf Turfgrass Sustainability Roadmap 2023 -2030
Niels Dokkuma, EGA



Niels Dokkuma acts for the European Golf Association on the fields of sustainability, agronomy and public affairs with a focus on the EU's draft Sustainable Use Regulation in pesticides.

European Golf – Turfgrass Sustainability Roadmap 2023 – 2030

Niels Dokkuma

The European Golf Turfgrass Sustainability Roadmap 2023 – 2030 presents a voluntary, sector specific approach towards the safe, responsible and sustainable management of golf turfgrass, that delivers on the stated human safety and environmental protection priorities of the European Union.

It has been produced collaboratively by diverse stakeholders across the European Golf sector, and prepared by expertise in golf, agronomy, environmental protection, human health and sustainability. It was drafted by the European Golf Association's national golf federation's sub-committee in consultation with the GEO Foundation for Sustainable Golf and is supported by The R&A, International Golf Federation, Federation of European Golf

Greenkeepers Associations, the European Tour Group and Ladies European Tour.

The Roadmap aims to demonstrate how committed the sport and sector is, as well as set out a plan of action for voluntary and co-regulatory initiatives, that will be tracked, monitored and reported over the coming years.

It should be read in conjunction with other resources including the European Turfgrass Sports' Impact Assessment, which helps demonstrate the fundamental importance of these playing surfaces to the wide range of economic, social and environmental benefits that golf delivers to people, communities, businesses and landscapes across Europe.



While focused on the management of turfgrass, the Roadmap also demonstrates the wider commitment to sustainability and climate action. It emphasises golf's desire to maintain small and yet highly important areas of fine turfgrass in a safe, responsible and sustainable way. These being the playing surfaces upon which the sport depends.

Building on the last decades of chemical reduction, the Roadmap drives further, ensuring all management decisions are based on the principles and practices of Integrated Turf Management, and tracked accordingly.

The Roadmap sets out the basis for an action plan, leveraging existing

initiatives as well as investing in new ones where needed. This will require new resources to support an unprecedented set of data collection in a harmonised way across Europe.

The Roadmap also includes European Golf's positioning on pesticide, which in consensus is formulated as: European golf has the ambition and aim to ensure golf surface playability with a drastic reduction in chemical pesticide use.

The Roadmap will need to be refined in order to meet evolving demands and needs. As such, the European Golf Association welcomes and will encourage dialogue with stakeholders in order to seek their input, views, advice and support.

11.05 | IPM implementation in Sweden Philosophy – Strategy – Result
Stefan Nilsson, STERF and SGF



IPM implementation in Sweden Philosophy – Strategy – Result

Stefan Nilsson

Stefan Nilsson is an agronomist at the Swedish Golf Federation. He has also been a greenkeeper representative on STERF's board for many years. Stefan has more than 30 years of experience in golf course maintenance and development of golf courses. The focus over the years has been to create a sustainable golf experience with sustainable playing surfaces in harmony with nature.

IPM is about creating a good plant environment in interaction with nature. It is the plant environment that determines which types of grass thrive, how durable the grass is and how good playing surfaces can be presented over time. What factors do we need to focus on and how can we know that we are doing the necessary?



11.25 | Data collection and how it relates to IPM
Patrik Niklasson, Skövde GC



Patrik Niklasson. I am 34 years old and have been working in the industry since I was 15. I have been head greenkeeper for the last three years. As I have an engineering background, when trying to learn the profession, data was the easiest way to get a grasp of the new role. I didn't have much prior education or experience on how to manage a golf course but I've always been quite good at absorbing and finding information and a lot of what I do is based on Micah Woods research. I'm hoping that more people in the industry will start to record more data so that we can all learn together.

Data collection and how it relates to IPM

Patrik Niklasson

Three years ago I started recording and collecting data at Skövde GC to get a better understanding of how to manage a golf course.

We started by recording clip volume and the amount of fertiliser applied to all surfaces. The aim was to use the correct amount of fertiliser to get the playing conditions and repairability that we want.

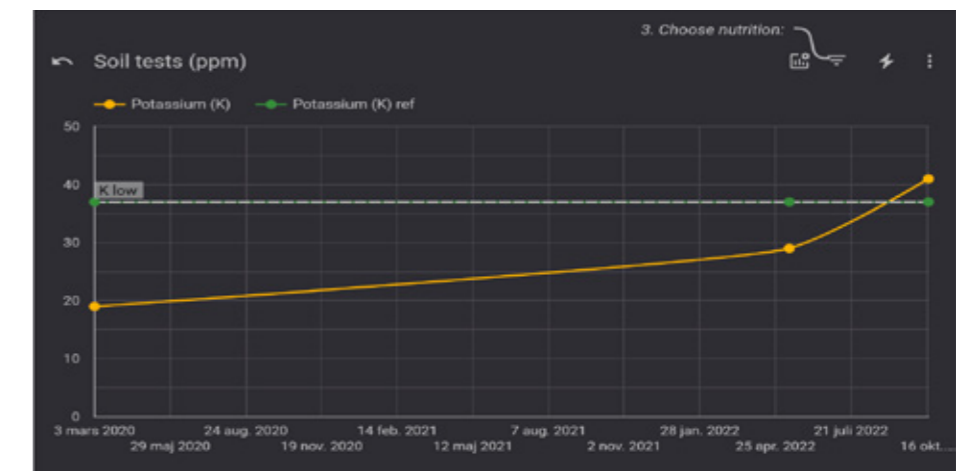
We use a simple system: the operator dumps the clippings in a bucket and measures after every green and sends me the recordings of the day. We use growth potential to make sure that we're not using more fertiliser than the grass can use. This is mainly to not use too much fertiliser in the summer that will result in undesirable playing conditions and in the spring and autumn so we don't apply more than the grass can use. An easy way to

think of it is when GP is 100 % the grass can use x amount of N then you just take the GP times max N and you get the max amount of N the grass can use at this time.

Example: you know that your greens can use 1 gN/m² per week when GP is 100 %. Then if the GP is 60 % you take 1x0,6 = 0,6 gN/m² per week. Then the max N the grass can use that week is 0,6gN/m². Max uptake will vary from site to site and with different grass types.

When you know how much nitrogen you put on your greens you can also follow pretty simple guidelines on how much of the phosphorus and potassium the grass will use; K 50 % of N and P 20 % of N.

We also do a mehlich 3 soil sample test two times a year. This we do to track the buffer of all the elements



we have in the soil. If we start to deplete one or more of them we know that we need to increase it next year.

The goal in the future is to connect clip volume, topdressing and organic matter (OM). For X amount of clip volume we need to put our y amount of topdress to keep OM stable (if that's the goal).

Another good way to see the result of your inputs is to use null spaces, put a 1x1 m² over your target area and you can put a value from 1-5

when 5 is the desired result and 1 is no result.

How does this then help with IPM?

By not over fertilising and correctly timing the fertilisers with the right amount of topdressing we can promote fescue and bent grasses over poa and rye while also getting dryer and harder playing surfaces.

You can email me for the programme, created by Clas Christensson, we use to collect data and have a more detailed look at the data we have collected, hgk@skovdekg.se

11.40 Introduction to IPM Research Programme – today and in the future

Tatsiana Espevig NIBIO



Tatsiana Espevig (PhD), research scientist at NIBIO Landvik since 2006. Moved to Norway from Belarus in 2005. Main investigator and manager of ongoing STERF and R&A project IPM-GOLF 2020-23. Her research focuses on turfgrass pest management, winter stress management, turfgrass establishment and reestablishment. She also runs Disease diagnostic laboratory at NIBIO Landvik. More than 200 scientific and popular-science articles, reports and presentations at conferences and meetings on turfgrass science.

Introduction to IPM research programme – today and in the future

Tatsiana Espevig

Integrated pest management (IPM) is integration of all available techniques for management and protection of plants from diseases, pests and weeds. It is plant management which discourages the development of pest populations and keep the use of pesticides to levels that are economically justified and environmentally sustainable. Since 2009 and EU DIRECTIVE 2009/128/EC on establishing a framework for Community action to achieve the sustainable use of pesticides, the overall aims of IPM research programme within golf have been to allow the golf sector to take responsibility for and influence the implementation of the EU Directive on the sustainable

use of pesticides; provide golf with access to information and tools based on research and development for IPM; stimulate international collaboration and encourage more researchers to work on issues relating to IPM within golf; and act as support in applications for funding for R&D, communication and expertise development from the Nordic authorities in conjunction with implementation of the new EU Directive on sustainable use of pesticides. IPM research has been focused on implementation of eight IPM principles such as prevention and suppression of turfgrass pests (P1), their monitoring (P2), decision making (P3), non-pesticide methods (P4), pesticide selection (P5), reduced

pesticide use (P6), strategies to counteract pest resistance to chemicals (P7), and evaluation on assessments of IPM programmes and adoption of new standards (P8).

Future IPM research programme can be for sure influenced by at least the following two things. In June 2022, the European Commission tabled a proposal for a regulation on the sustainable use of pesticides, which would repeal and replace Directive 2009/128/EC. The proposal sets legally targets at EU level not only to reduce the use and the risk of chemical pesticides by 50% by 2030, but it would also ban the use of all pesticides in sensitive areas including sport fields and within three metres of those areas. The second thing is climate change. On one hand, the higher temperatures and higher annual precipitation may lead to higher pressure of fungal diseases, insects pests and nematodes in Europe and even to new or/and

unusual pests. On the other hand, the increased frequency of prolonged periods of drought in early summer and during the summer in Europe may possibly influence and weaken resistance to turfgrass diseases that occur in the second half of summer, autumn and winter. All this will require more research on at least prevention, suppression and prediction of turfgrass diseases and pests and on non-pesticide methods for IPM.



Experimental fertilisation of a golf green which is highly affected by anthracnose at Landvik, Norway. Photo: Tatsiana Espevig



Spring registration of snow moulds on SCANGREEN at Landvik, Norway. Photo: Tatsiana Espevig

12.00 Varieties and mixtures for integrated management of putting greens:
Results from SCANGREEN 2019-22
Karin Juul Hesselsøe, NIBIO



Karin Juul Hesselsøe, Research Scientist, NIBIO Landvik. Responsible for SCANGREEN 2019-2022 at NIBIO Landvik. M.Sc in Agriculture 1996, Copenhagen University. From 2006-2019 employed at the Greenkeepers College Sandmoseskolen in Denmark as teacher in greenkeeping and landscape gardening. From June 2019 employed as Researcher at NIBIO, Landvik. Project manager in ongoing STERF projects: ROBOGOLF 2020-2023, SCANGREEN 2023-2026 and FAIRWAYS4FUTURE 2023-25.

Varieties and mixtures for integrated management of putting greens

Karin Juul Hesselsøe

The objective of SCANGREEN 2019-22 was to find species, varieties and seed blends/mixtures of bentgrass, fescue, bluegrass and ryegrass that are suited for pesticide-free management of putting greens in the two major climatic zones of the Nordic countries. The trials included 30 candidate varieties representing eight different species and subspecies: Velvet, creeping and colonial bentgrass, Chewings and slender creeping red fescue, Kentucky and rough bluegrass and perennial ryegrass. Three seed mixtures of red fescue and colonial and creeping bentgrass, a seed mixture of creeping bentgrass and perennial ryegrass and a seed blend of red fescue were also tested.

In the ranking of species creeping bentgrass and second velvet bentgrass had the best overall impression, both significantly better than slender creeping red fescue, Kentucky bluegrass and Chewing's fescue, which were all equal. The perennial ryegrass was rated at the lowest or second lowest at all sites except at Smørum, Denmark. Rough bluegrass was rated with the lowest turfgrass quality at all sites and years. Among varieties of Chewing's fescue (*Festuca rubra commutata*) the new variety 'Euro Carina' performed best, in line

with the control variety 'Barlineus' followed by the two new varieties 'Orionette', 'Gima' and the control variety 'Musica'. Among varieties of slender creeping red fescue (*Festuca rubra litoralis*) 'Sybille' performed the best followed by the control 'Cezanne'. Among varieties of colonial bentgrass (*Agrostis capillaris*) there was no difference between the varieties in overall turfgrass quality, but 'Jorvik' had the lowest overall winter damage and the least microdochium patch across all years. Among varieties of creeping bentgrass (*Agrostis stolonifera*) the results showed that the new varieties 'Matchplay', 'L-93 XD' and '777 Triple Seven' performed



the best, closely followed by 'Piranha' and 'Valderrama' which were in line with the control variety 'Luminary'. Among varieties of velvet bentgrass (*Agrostis canina*) 'Villa' remains the top variety. Among varieties of Kentucky bluegrass (*Poa pratensis*) the control variety 'Limousine' produced higher turfgrass quality, higher tiller density, finer leaves and less in-season disease than the candidate 'Professor'.

Only few clear differences were found between the mixtures and blends. At high maintenance the mixture with fescue and creeping bentgrass is to prefer in favor of the traditional mixture with fescue and colonial bentgrass, because of better winter survival and less microdochium patch, but with the risk that the creeping bentgrass

outcompetes the fescue. Varieties of creeping bentgrass with a lower tiller density should be preferred for the mixture with fescue. The mixture with creeping bentgrass and perennial ryegrass established significantly faster than any of the others, but after winter turfgrass quality decreased compared to the other mixtures.

More info at: <http://www.sterf.org/sv/projects/project-list/scangreen-turfgrass-species-and-varieties-for-integrated-pest-management-of-scandinavian-putting-greens-2019-2022>

Full NIBIO report can be downloaded here: <https://hdl.handle.net/11250/3065144>



13.20 Insect pests on Scandinavian golf courses: An update on integrated management

Karin Juul Hesselsøe, NIBIO



Karin Juul Hesselsøe, Research Scientist, NIBIO Landvik. Responsible for SCANGREEN 2019-2022 at NIBIO Landvik. M.Sc in Agriculture 1996, Copenhagen University. From 2006-2019 employed at the Greenkeepers College Sandmoseskolen in Denmark as teacher in greenkeeping and landscape gardening. From June 2019 employed as Researcher at NIBIO, Landvik. Project manager in ongoing STERF projects: ROBOGOLF 2020-2023, SCANGREEN 2023-2026 and FAIRWAYS4FUTURE 2023-25.

Insect pests on Scandinavian golf courses: An update on integrated management

Karin Juul Hesselsøe

Chafer grubs and leatherjackets can cause severe damages to Scandinavian Golf Courses – mainly in the southern areas. Damages from chafer grubs are occasional, damages from leatherjackets tend to be increasing. Restrictions on insecticides have necessitated the use of alternative control methods. Many experiments with microbiological agents like entomopathogenic nematodes (EPN) and strains of *Bacillus thuringiensis* have been conducted, but monitoring and warning, and methods for application, spraying equipment and technique, formulation of and effective species of microbiological agents must be improved. Good communication with the golfers is essential, as more damages from insect pests will occur now and in the future, and

alternative methods are often more expensive and less effective than the synthetic insecticides. Course managers and greenkeepers have to become experts in the use of microbiological control.

More info in full NIBIO report at: <http://www.sterf.org/sv/projects/project-list/integrated-management-of-important-turfgrass-diseases-and-insect-pests-on-european-golf-courses>

Updated IPM Fact sheets (August 2023) on chafer grubs and leatherjackets (Danish versions) at: <http://www.sterf.org/sv/library/fact-sheets-ipm/pests/insects>



Garden chafer. Photo: Preben Nielsen



Crane fly. Photo: Frederik Fallesen.

13.35 | Managing important turfgrass diseases microdochium patch and dollar spot using less fungicides: Results from IPM-GOLF 2030
Tatsiana Espevig, NIBIO



Tatsiana Espevig (PhD), research scientist at NIBIO Landvik since 2006. Moved to Norway from Belarus in 2005. Main investigator and manager of ongoing STERF and R&A project IPM-GOLF 2020-23. Her research focuses on turfgrass pest management, winter stress management, turfgrass establishment and reestablishment. She also runs Disease diagnostic laboratory at NIBIO Landvik. More than 200 scientific and popular-science articles, reports and presentations at conferences and meetings on turfgrass science.

Managing important turfgrass diseases microdochium patch and dollar spot using less fungicides

Tatsiana Espevig

Microdochium patch (MP) caused by the fungus *Microdochium nivale*, is the economically most important disease on turfgrass in the Nordic countries. The use of fungicides against fungal diseases in Europe is strongly restricted. There is a big question whether prevention of microdochium patch can be successfully achieved by integrated turfgrass management without use of fungicides. The results from a field trial at NIBIO Landvik on annual bluegrass/creeping bentgrass putting green from March 2022 to May 2023 showed that the reduction of MP by rolling twice per week from the last week in August through September 2021 was from 47% (control) to 32% but only in Year 1. The following treatments reduced MP compared with control (no fung.,

weekly nutrition, 313 kg N/ha/yr): non-frequent (bi-weekly) nutrition, organic slow release nutrition 5-2-4+Fe Sustane (275 kg N/ha/yr) and 28% reduced N-nutrition. Late autumn fertilisation increased MP in this study. At STRI Bingley on bent/poa golf green the following treatments increased MP compared with control (no fung., weekly nutrition, 122 kg N/ha/yr): non-frequent (bi-weekly) nutrition and 28% reduced nutrition, but not late autumn fertilisation.

Another study was conducted in two sites (Landvik, Norway and Bingley, United Kingdom) from May 2020 to May 2022 to find out whether the

Dollar spot on a golf green on a Danish golf course. Photo: Karin Normann



Microdochium patch in the end of November on a experimental golf green with annual bluegrass as predominant species at NIBIO Landvik. Photo: Tatsiana Espevig.

incorporation of a pigment (Ryder, Syngenta) and a biostimulant (Hicure, Syngenta) into an IPM programme would allow to reduce number of fungicide applications against MP. The biostimulant Hicure could reduce the fungicidal use from three to two without loss of efficiency in treating MP.

Dollar spot caused by *Clarireedia* spp., becomes more widespread disease in Scandinavia and results in up to 80% dead turf on some golf courses in some years. Earlier studies on testing of resistance of 20 turfgrass species and varieties against 10 dollar spot isolates of different origin (Norway, Denmark, Sweden, USA and UK) showed significant differences in the

resistance among the turfgrass species and varieties, and there was also a significant difference in virulence among the isolates. Molecular analysis of the turf samples which were collected from golf courses in Sweden, Denmark, Germany and UK revealed that dollar spot fungi belonged to either *C. homoeocarpa* or *C. jacksonii*. The dollar spot fungi were not found in the seeds of 10 cultivars of turfgrasses grass which were analysed in this project.

Field trial at STRI on a golf green with red fescue showed that at low-moderate DS pressure proper nutrient inputs are efficient to prevent DS.



13.50 Using rolling as a tool to reduce the severity of Microdochium patch on greens
Martin Nilsson, Copenhagen GC



Martin Nilsson has been the head greenkeeper at Royal Copenhagen Golf Club since 2006.

Using rolling as a tool to reduce the severity of Microdochium patch on greens

Martin Nilsson

Martin Nilsson participated in a practical project on his workplace, Royal Copenhagen Golf Club. The 125 year old Golf Club is situated in a public park 15 km north of Copenhagen and is maintained entirely without the use of plant protection products. The result

from the two-year project confirmed his own experience from his day-to-day management that rolling greens has a suppressive effect on the development of Microdochium patch.



14.05 Effects of UV-C Radiation and Sustane Slow-Release Fertiliser on Turfgrass Diseases on Golf Greens
Wolfgang Prämaßing, University of Applied Sciences Osnabrueck



Wolfgang Prämaßing
Study of Agricultural Biology (University Diploma) at University of Hohenheim, 1991

Doctoral Dissertation (PhD) University of Bonn, subject: Soil physical Effects of Aeration on Turfgrass Soils, 2008

Occupation and activities: Professor for Sustainable Turfgrass Management, University of Appl. Sc. Osnabrueck. Agronomist/ Lecturer in Greenkeeper Education for golf and sport sites, DEULA Rheinland Education Center, Kempen

Board Member of German Turf Society

Member editorial staff of European Journal of Turfgrass Science

Member of Turf Expert Committee of German Soccer League (DFL)

Member of examination boards of Chamber of Agriculture Nordrhein-Westfalen, Golf Course Sport Sites Greenkeeper and Head-Greenkeeper

Effects of UV-C Radiation and Sustane Slow-Release Fertiliser on Turfgrass Diseases on Golf Greens

Wolfgang Prämaßing

The aim of the IPM-Project Golf 2020-2023 STERF-R&A in cooperation with NIBIO was to evaluate and assess new techniques and alternative products to control diseases such as Microdochium Patch (former known as pink snow mold caused by Microdochium nivale) and Dollar Spot (caused by Clarireedia spp. former known as Sclerotinia homoeocarpa) to reduce the use of fungicides. The objectives of this study were: (1) to investigate the effectivity of UV-C radiation with „SGL UVC 180“ to prevent Dollar Spot and Microdochium Patch, and (2) to investigate effects of two rates of an organic slow release fertiliser „Sustane 5-2-4+Fe“ on Dollar Spot, both on golf greens.

Two different trials were conducted on a putting green at the golf course of Osnabrueck Golf Club (Bissendorf-Jeggen) on trialplots arranged

as randomized block design. The UV-C radiation was applied in three dosages, 7-8 mJ/cm², 35-40 mJ/cm² and 70-80 mJ/cm² compared to an untreated control from spring 2020 until spring 2022. The slow-release-fertilizer trial was conducted with two dosages of Sustane 5-2-4+Fe, 130 kg N/ha/yr and 70 kg N/ha/yr from spring to autumn in 2020 and 2021, applied every two weeks, compared to greenkeeping fertilizer programme with approx. 130 kg N/ha/yr applied according to individual requirements.

UV-C Trial

The higher UV-C dosages were able to successfully suppress Dollar Spot infestation in this trial showing lesser median disease coverage and AUDPC values. An efficient Dollar Spot disease control could be achieved with an UV-C radiation dosage from 35-40 mJ / cm² and higher. Regarding the infestation



with Microdochium Patch, a different pattern could be observed. None of the treatments showed significant differences to suppress disease outbreak. While median disease coverage and AUDPC values were least for UVC 3, some plots showed disease coverage values with higher variance. Thus UVC-radiation wasn't able to fully suppress or control outbreak of Microdochium Patch in this trial with the applied dosages, but showed a trend to be helpful as tool for disease control and enhanced UV-C dosages.

Slow Release Fertiliser Trial

The higher fertilisation rate with Sustane 5-2-4 + Fe showed no significant differences Dollar Spot coverages between the three variants, but peaks of median

disease coverages and AUDPC values were lesser for the treatment receiving 130 kg N/ha/yr in both years of the trial. Thus, there may be some effect of slow-release-fertilisation with Sustane 5-2-4 + Fe compared to the control with a trend to lesser Dollar spot infestation, but it wasn't strong enough to efficiently control Dollar Spot disease outbreak.

Both treatments showed a tendency to better turf quality during their application periods. They can be helpful tools in turfgrass management programmes as integrated measures to reduce chemical fungicides due to tolerance levels of disease infestation dependant on quality standards.



14.50 Golf Course 2030 Integrated Turf/Pest Management European Project Update

John Kemp, The R&A and Valentine Godin, AFGolf



John Kemp has worked in the golf industry for 18 years – from greenkeeper to club manager to golf course architect, for federations, industry bodies and and not-for-profits. He has worked internationally; from small public and rural courses to exclusive private member clubs, high-profile resorts, and professional championship venues.

Passionate about education, John holds degrees in Golf Management and Sportsturf Science. An R&A Greenkeeping Scholar, he has achieved professional diplomas in Golf Course Design from the EIGCA, and Club Management from the CMAE.

As Project Manager for Golf Course 2030 at The R&A, he is responsible for working in collaboration with the industry to support sustainability research which protects and promotes the places we play the game.

Golf Course 2030: Sustainable Agronomy

John Kemp

Established in 2019 as an industry roadmap addressing challenges from, and taking opportunities presented by, the changing climate, resource constraints and regulation. It's aim, as part of The R&A's overall purpose, is to secure optimal golf course condition and playability for current and future generations.

Working with R&A affiliates, industry bodies, academic and research institutes worldwide, we aim to identify key sustainability issues and explore opportunities for innovation and practical solutions for the golf industry to adopt.

To date 14 national and regional plans have been developed for 23 countries across Europe, Asia, Oceania and Africa. Led by golf Federations, the process of creating these plans has engaged over 200

organisations across golf courses, academic institutions, golf industry associations, commercial suppliers, environmental bodies, non-governmental agencies, and many more.

Global Challenges

Whilst the countries and regions covered by Golf Course 2030 are diverse and truly global the themes and pressures identified by those places are, perhaps, unsurprisingly, consistent. These have led to the core themes of Golf Course 2030:

- Sustainable Agronomy
- Resources
- Biodiversity
- Climate

Practical Solutions

The central focus of all Golf Course 2030 publications is to

produce solutions, guidance and resources for the industry to use. Projects are diverse in scope and focus, from literature reviews to laboratory testing, field trials, and case studies but all aim to produce guidance materials aimed at the key stakeholders in golf course management.

Integrated turf and pest management is central to the theme of Sustainable Agronomy, and there are multiple projects across different issues; from management of specific diseases, practical field trials, collation of established ITM and IPM practices, and testing biological alternatives to chemicals.

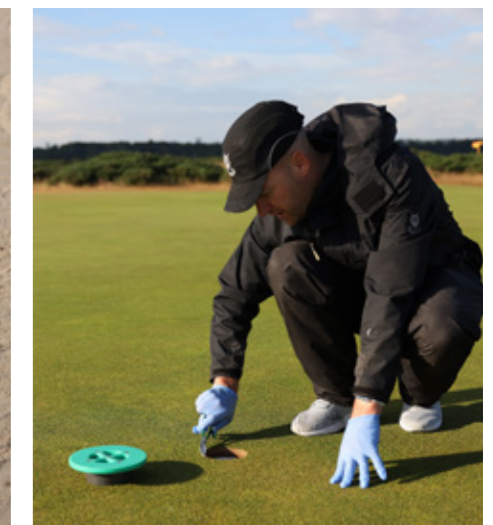
Establishing Expectations

As the industry continues to adapt to pest, disease and weed pressures, develop sustainable solutions, and implement ITM practices we must also establish standards for golf course conditioning now and into the future.

Communicating to our customers – golfers of all standards – our realistic expectations for playing surface conditions will be a critical step in supporting the practitioners who are careful custodians of courses.

It is important to educate golfers and non-golfers alike what a sustainable golf course looks like and the enjoyment that can be found by spending time in a carefully and respectfully managed landscape.

For more information about Golf Course 2030, including summaries and progress updates of projects related to integrated turf and pest management visit: randa.org/what-is-gc2030



14.50 **Golf Course 2030 Integrated Turf/Pest Management European Project Update**
John Kemp, The R&A and Valentine Godin, AFGolf



Valentine Godin, Sustainability Officer for Wallonia Golf Association (AFGOLF). Valentine is an active member of the team looking after the association's sustainability strategy. Alongside organising sustainability workshops and fostering awareness of best management practices

amongst clubs, Valentine is the co-lead of AFGOLF's pioneering research into pesticide free management and works closely with the rest of the team to deliver actionable solutions to the sector.

As an engineer, optimist and environmentalist, Valentine is convinced that innovation will allow us to find sustainable solutions to today's climate challenges. Placing innovation and technology at the forefront of her work, Valentine is a strong believer in leveraging data-analytics to drive transformational impact. Alongside her role within the

Belgian Federation, Valentine works with a portfolio of golf courses and sporting venues in Europe and in the UK to implement sustainable management practices and help clubs in their digital transition. She works with clubs to bring solutions aligned to their local conditions, strategic vision and available resources through her company Maya Global.

Sustainable Agronomy: alternative methods for dollar spot management on sand-based putting greens

Valentine Godin

After a year of on-site research on one testing putting green in Wallonia (Belgium) and some promising results, the project aims to find way to maintain the natural balance of the soil such that the pathogens are kept in a zone of "non-development". Forming part of Golf2030 research programme, this belgo-swiss international research seeks to evaluate the efficiency of various pesticide-free approaches against Dollar Spot (*Clariireedia* sp.) testing natural-based substances alongside

inorganic and organic amendments to reinforce the plant immunology and fight bio-aggressors on maintained sand-based putting greens. Testing a variety of active substances in field conditions, the research explores the potential of increasing the focus on soil agronomy and soil-plant synergies when implementing integrated pest management strategies, further advance industry knowledge and bring actionable solutions to disease management.

15.25 **Keynote - Sustainable Championship Agronomy at The Open and AIG Women's Open**
Richard Windows, The R&A



Richard Windows joined The R&A in January 2019 and is Head of Agronomy: Championship Venues having previously worked as an Agronomist for STRI for 20 years. He has been Championship Agronomist to The R&A for several Open Championships, the AIG Women's Open, the Amateur Championship and the Walker Cup. He has a passion for links golf and delivering sustainable turf surfaces to the highest standard for all levels of golf. He is a keen golfer and member of Royal Troon Golf Club playing off a handicap of 6.

Sustainable Agronomy for Championship Golf

Richard Windows

With all R&A championships, whether it be men or women, boys or girls, amateur or professional, we implement agronomy practices to create surfaces that challenge the best players in the world but do so in a sustainable and environmentally positive way. It is important that our championship venues are exemplar in every respect. For instance, all our Open venues support the fescue and bent grasses that require minimal inputs of fertiliser, pesticide and water to maintain but yet provide the canvas to challenge the best players in the world.

Regular data collection in the form of soil moisture, surface firmness, and a myriad of soil laboratory tests are carried out to optimize resource use and efficiency. Sand is harvested from each site for top dressing and construction, meaning imported material is not required. All electric triple mowers were used for the first time in a major championship

to prepare the greens each day reducing carbon dioxide emissions by as much as 90%.

Ecological consultants work with each venue to optimise the habitat value and biodiversity of each venue and ensure nature is protected as much as possible during the staging of the championship. With assistance from our media partners, we develop a range of positive stories that are broadcast to the millions who are watching from the comfort of their own home to champion these practices therefore encouraging wider adoption.

Our network of over 500 R&A Greenkeeping Scholars are utilised in the home venue greenkeeping teams as well as part of The R&A Agronomy Team. This talk will illustrate how all five pillars of the R&A's Sustainable Golf team are integrated into all aspects of R&A Championships.





Better Education

Green Construction Types

FEWER PESTICIDES

Grass Species Selection

Organic Matter Management

Manage Golfer Expectations

TECHNOLOGY AI DATA

Dew Management Weed Management

**Greenkeeping
Fundamentals**

Sustainable Energy Poa Annuua

Microclimate Conditions

Sustainable Water Management

Golf Course Biodiversity

Optimised Reduced Turf Inputs

International Collaboration Change Industry Culture

Dollar Spot Management

Snow Mold **Climate Action Greenkeeping**

More Research Collaboration

WORKING WITH NATURE

Minimise Disturbance

Soil Health

Actions for a more sustainable golf course.

During the Symposium delegates were invited to contribute what they see as priorities related to sustainable golf course management. This included their specific areas of sustainable golf course management practice or elements that they see as a priority from presentations and discussions at the Symposium.

The opposite graphic is a collated summary of the topics raised by attendees.

“We are focused on reducing our pesticide use as low as possible – and we are achieving this by ‘less is more’ greenkeeping. By doing the basic practices better we are able to manage our greens and course more sustainably.”

“For me it is so important that golf courses show they are sustainable – water, pesticides, energy, biodiversity, carbon emissions – these all must be part of a Greenkeeper’s plan and supported by their club.”

“Working together as an industry is critical. We need even more research, education, and more communication about sustainable golf courses. These can support golf courses to take positive steps forward.”

Sustainable Golf Courses: Integrated Turf Management, A Golf Course 2030 and STERF Symposium

18-19 September 2023 Attendees

First Name	Surname	Company	Job title
Trygve S.	Aamlid	NIBIO /STERF Board	Research Professor
Ola	Åhlund	Stromstad GK	BKO
Mikael	Barkestad	Svensk Jordelit AB	Account Manager
Håkan	Blusi	Swedish Golf Federation	Agronomist
Stefano	Boni	Federazione Italiana Golf	Agronomist
Craig	Broksch	Ullna Golf AB	Golf Course Manager
Christian	Carlström	Vasatorps GK	Assisterande Head Greenkeeper
Alexander	Cawley	Syngenta Nordics	Technical Manager
Ann	Courtney	Golf Ireland	Head of Sustainability
Niels	Dokkuma	Royal Netherlands Golf Federation	Manager Sustainability / Agronomist
Rémy	Dorbeau	AGREF French Research Institute IEGE	Président
Peter	Edman	Swedish Golf Federation	Agronomist
Håkan	Eriksson	Indigrow AB	CEO
Tatsiana	Espevig	NIBIO	Researcher
Anders	Esselin	Man & Nature AB	Project Manager
Mats	Falk	Upplands Golf Association	Sustainability Consultant
Michael	Fance	Aquatrols Europe Limited	Technical Support and European Account Manager
Magnus	Friden	Bredareds Golfklubb	Club Manager
Valentine	Godin	AFGOLF	Sustainability Officer
Gunnar	Håkansson	Swedish Golf Federation	General Secretary
Bruno	Hedlund	STERF	Chairman
Karin Juul	Hesselsøe	NIBIO	Researcher
Saila	Innanen	Berner Ltd	Product Group and Sales manager
Fredrik	Jansson	Sälensfjällens GK	Banansvarig
Anne Mette Dahl	Jensen	DLF	Product Development Manager
Thomas Hoffmann	Jepsen	Dansk Golf Union	Golf Course Consultant
Einar Gestur	Jónasson	IGU	STERF Board
Torolf	Käld	Pirilö Golfcenter AB	Banmästare
Dirk	Kauter	RasenConsulting Kauter	Turfgrass Agronomist
John	Kemp	The R&A	Project Manager - Golf Course 2030
Hubert	Kleiner	Stuttgarter Golf-Club Solitude	Past President GVD
Jari	Koivusalo	Suomen Golfliitto ry	Golf Course Specialist
Joakim	Lagerkvist	Roslagens Golf Ab	Course manager
Soizick	Lidström	Kårsta Golfklubb	Greenkeeper
John	Lindberg	Swedish Golf Federation	Project Leader
Fritz	Lord	COMPO EXPERT	Global Crop Manager Turf
Amandine	Lucchin	Fédération française de golf	Agronomy Project Manager
Martin	Lundin	Sigtuna Golfklubb	Club Manager
Robert	Martin	Swedish Greenkeepers Association	Vice Chairman
Alicia	Moulin	Swiss Golf	Sustainability Manager

First Name	Surname	Company	Job title
Scott	Nightingale	TurfCare	Business Development Manager
Patrik	Niklasson	Skövde GK AB	Head Greenkeeper
Martin	Nilsson	Royal Copenhagen Golf Club	Head Greenkeeper
Stefan	Nilsson	Swedish Golf Federation	Agronomist
Per	Nyman	Växjö Golfklubb	Banchef
Marcus	Olsson	Royal Drottningholm Golf Course	Course Manager
Stefan	Olsson	Indigrow	Technical Sales Manager
Jørgen	Pedersen	Mølleåens Golf Klub	Superintendent
Allan Brandt	Petersen	Dansk Golf Union	Golf Course Consultant
Rauna	Pietarila	Laukaan Peurunkagolf	Golf Course Manager
Wolfgang	Prämaßing	University of Applied Sciences Osnabrueck	Professor Sustainable Turfgrass Management
Bianca Mignon	Pronk	AB Kristianstads GK	Sustainability and Environmental Manager
Kevin	Pryce	Ransomes Jacobsen LTD	Channel Manager, EMEA
Lars	Rildau	AMU Nordjylland	Teacher
Gareth	Rogers	ATT Infinicut	Territory Sales Manager
Calle	Sandegård	Högbo Golfklubb	Klubbchef
Sebastian	Sandler	Pickala Golf	Greenkeeper
Tomas	Sättlin	ICL	Country Manager Nordics
Elena	Sevostianov	NMSU	Research Scientist
Karin	Schmidt	STERF	Communications Consultant
Alexander	Solnør	Norwegian golf federation	Anleggskonsulent
Niels	Sørensen	Lyngbygaard Golf	Head Greenkeeper
Maria	Strandberg	STERF	Director of Research and Development
Agne	Strøm	Byneset GK and NGA	Head Greenkeeper
Peter	Strömberg	CropHealth AB	Managing Director
Pär	Stuesson Åman	Hofgårds Golf	Course Manager
Patric	Sundlöf	Arboga Golfklubb	Club Director
Erik	Svärd	Svensk Jordelit AB	Sales
Katrine	Svensson	Blekinge Arkipelag	Project Manager
Jacob	Thomsen	Dansk Golf Union	Sustainability Manager
Marina	Usoltseva	Botaniska Analysgruppen	CEO
Anna Maria	Viking	Husqvarna	Global Activation and Partnership Manager
Irmeli	Vilenius	St. Laurence Golf Oy	Superintendent
Mårten	Wallberg		GEO Verifier
Richard	Windows	The R&A	Head of Sustainable Agronomy - Championship Venues
Paul	Woodham	The R&A	Head of Sustainable Agronomy - Europe
		CropHealth AB	
		Högbo Golfklubb	
		Norwegian golf federation	
		Mølleåens Golf Klub	
		Roslagens Golf AB	
		Roslagens Golf AB	
		Royal Drottningholm Golf Course	
		Ullna Golf AB	



The R&A group of companies was formed in 2004 to take on The Royal and Ancient Golf Club of St Andrews' responsibilities for governing the Rules of Golf, staging The Open, golf's original championship, and developing the sport. The World Golf Museum in St Andrews is part of The R&A group.

Together The R&A and the USGA govern the sport of golf worldwide, operating in separate jurisdictions with a commitment to a single code for the Rules of Golf, Rules of Amateur Status and Equipment Standards. The R&A, through R&A Rules Ltd, governs the sport worldwide, outside of the United States and Mexico, on behalf of over 61 million golfers in 145 countries and with the consent of 164 organisations from amateur and professional golf.

The R&A has responsibility for running a series of world class amateur events and international matches in women's and girls' as well as men's and boys' golf. The R&A stages the AIG Women's Open and works with the DP World Tour to stage the Senior Open presented by Rolex.

The R&A is committed to investing £200 million over ten years in developing golf and supports the growth of the sport internationally, including the development and management of sustainable golf facilities. For more information, visit www.randa.org.



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