

# International Turfgrass

The Newsletter of the International Turfgrass Society

September 2020

## Conference and Hotel Registration for the 14<sup>th</sup> International Turfgrass Research Opens 20 October 2020

By Maria Strandberg, ITS President

STERF director, Sweden

We very much hope to see you at the 14<sup>th</sup> International Turfgrass Research Conference (ITRC2021), to be held in Copenhagen **11 -16 July 2021** and arranged by the Scandinavian Turfgrass and Environment Research Foundation (STERF).

ITRC2021 will be held at the University of Copenhagen, Frederiksberg Campus (Thorvaldsensvej 40) in Marmorhallen (Figure 1). The campus is located in the city center of Copenhagen within a short walk of about 15-20 minutes from the Main Copenhagen Central Station. A number of hotel rooms have been reserved for the conference participants at the following hotels: **Scandic Falkoner** and **Cabinn Scandinavia**. Both hotels are within walking distance from Marmorhallen at the Frederiksberg Campus. The rooms can be booked at favorable prices via online registration at [www.itrc2021.org](http://www.itrc2021.org).

Marmorhallen is a large conference building and several different auditoriums are available for

conference speakers (Figure 2). This will be an ideal location for ITRC2021 with plenty of space for attendees to move around, view posters, visit with colleagues, and meet new turfgrass professionals from around the world. Directly across the street from Marmorhallen you can wander under many rose



Figure 1: The University of Copenhagen, Frederiksberg Campus.

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I hope everyone has been able to stay safe and healthy. I expect my story of life since the last May edition of IT is similar to everyone else's. With much time now free because we can't do much else, 15 years of outside clutter is gone, I purchased jewelry making tools to replicate an item I saw in a museum to make as a gift, successfully accomplished! An old 6 m x 9 m storage shed I had is complete gone, my only incomplete task has been getting rid of a rubbish bin (the company stopped service in my rural area). I called them to pick it up, I was told it was my problem to resolve, anyone need a rubbish bin?

I hope you will consider submitting an article for the next newsletter in January 2021.

I hope you enjoy the very good articles in this edition.

Sincerely,  
Nathan R. Walker

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Figure 2: One of the presentations venues at the University of Copenhagen, Frederiksberg Campus.

trellises to the well manicured Garden of the Royal Danish Veterinarian and Agricultural College (Figure 3). Given the very mild July weather we can expect during the conference I expect many will enjoy a stroll through the gardens.

This is one conference that you will not want to miss. The ITRC2021 will be packed with educational and social activities, so be sure to check out the ITRC2021 Website [www.ITRC2021.org](http://www.ITRC2021.org) for updates and additional details about the conference.



Figure 3: The well manicured Garden of the Royal Danish Veterinarian and Agricultural College.

### Online Conference and Hotel Registration Opens 20 October 2020

Conference and Hotel Registration opens 20 October 2020 at [www.ITRC2021.org](http://www.ITRC2021.org)

So, register next month and join us for one of the largest and most comprehensive gatherings of turfgrass professionals anywhere in the world. Learn

about the latest discoveries in turfgrass science and get inspired by the scientific sessions, field tours, and stimulating discussions. Share your research with colleagues from throughout the world, meet friends, and network.

We believe that the COVID situation will be mostly under control by the summer 2021 and we are planning to arrange the ITRC2021 as an onsite conference in Copenhagen. If there will be any changes of the conference due to consequences of the corona crisis, this will be announced in December 2020. Registration fees will be refunded if the circumstances require the conference to be postponed until 2022.

### ITRC2021 Highlights

Development and Sustainability is the theme of the conference and The United Nations' Sustainable Development Goals (SDGs) set out in Agenda 2030 will constitute the conference programme framework. The programme will focus on increased sustainability by a multidisciplinary approach; science in action by ready-to-use research; and mobilising forces from academia to industry.

There will be a special **Pre-Conference Turfgrass Industry Session** in the afternoon on Sunday, 11th July just prior to the evening welcome reception. The Industry Session will focus on the need for competence building and innovation for the turfgrass industry. Conference industry sponsors will give their opinions on the industry's expectations on scientists and the scientific community; important areas for research and development the coming five years; and also present some coming innovations.

The Conference itself will kick off with a **Welcome reception** on Sunday night. The reception takes place in Copenhagen Plant Science Center, connected with the Marmorhallen, and is something that the entire family will enjoy. This is an opportunity to socialize and to enjoy the Nordic midsummer light with a walk in the Garden of the Royal Danish Veterinarian and Agricultural College.

The following week will be packed with educational and social opportunities that will allow you to reengage with old friends and network with new acquaintances from all over the world.

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Some major highlights of ITRC2021 will include **keynote addresses** from internationally renowned government officials, scientists, and turfgrass managers focusing on the conference theme “Development and Sustainability” and Agenda 2030; a one-day seminar for practitioners entitled, “**Modern Cool Season Sports Turf Management**” (see below); a **graduate student oral and poster competition** (see below) that will showcase some of the future stars in our discipline; and an **evening reception** on Monday, 12 July to recognize Dr. James Beard - one of the pioneers in the ITS and the turfgrass industry.

**Posters** will be displayed on Monday, Tuesday, and Thursday (12, 13 and 15 July) and one-minute oral synopses of posters will be featured. This, as well as a late-afternoon social hour in the poster viewing area, will entice meeting attendees to meet poster authors and discuss their latest findings over light refreshments and hors d’oeuvres.

A full day of **technical tours** is planned for Wednesday, 14 July highlighting the extraordinary range of turf venues and areas of interest in the Öresund area (Denmark and Sweden). Depending on the tour you choose, attendees will for example visit multifunctional golf courses, historical castle gardens, high quality sport arenas, and green areas important for urban sustainability. All tours will end at the DLF research station in Store Heddinge (Figure 4) where we will get an introduction to their breeding programme and a tour to experimental facilities and field trials. The day will conclude by a BBQ dinner hosted by the DLF.



Figure 4: The DLF research station in Store Heddinge.

Immediately following the ITS Quadrennial Business Meeting on Thursday, 15 July, attendees will board buses for **Dinner and dancing** at one of Carlsberg’s venues next to the Old Carlsberg Brewery, founded in 1847. Join us for dinner in the unique settings of the Carlsberg Business Center where beautiful paintings and sculptures cover the rooms and enjoy the famous Danish beer.

The last day of the conference will include oral presentations and **two special symposia** on turfgrass management in the Winter cold zones and Transition zone. Friday morning showcasing invited speakers who will give a world-wide perspective on turfgrass management in these two contrasting climatic zones (see below).

### **Modern Cool Season Sports Turf Management, Tuesday July 12<sup>th</sup>**

New for this conference is The One-Day Practitioner Seminar, a meeting arena for practitioners and turfgrass researchers, which will strengthen the ambition to take a lead in making research results and new knowledge easy accessible to end-users and to provide support to implement changes.

We have chosen a number of top scientists and some upcoming stars to bring highlights from their field of expertise directly to practical turfgrass managers. This seminar will be the most important event for golf course and stadium managers in 2021.

The seminar will conclude with a dinner party at Furesøe golf club where you will mingle with the seminar lecturers and colleagues from many countries. A good portion of the menu for this dinner will be sourced from local golf courses, showing a perspective of multifunctionality of Danish golf courses.

Groundsmen and golf course superintendents are encouraged to save the date and come to Copenhagen to update their qualifications and expand their professional network at this seminar. The seminar is arranged as a part of the ITRC2021, and is open to ITRC2021 conference delegates. The number of participants will be limited so register as early as possible. Information about the seminar is available at [www.itrc2021.org](http://www.itrc2021.org)

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## Two special symposia

On the last conference day, Friday 16 July, delegates are invited to attend two parallel symposia of approximately four hours duration highlighting challenges for turfgrass management in two contrasting climatic zones:

**Winter cold zones.** This symposium will be organized by a group of ITS members from North America and Scandinavia under the leadership of Dr. Eric Watkins, University of Minnesota. Topic include turfgrass selection and management in a changing winter climate, winter stress physiology, breeding of winter-hardy turfgrasses etc.

**Transition zone.** This symposium will be set up by ITS members from Italy, Spain, USA and Japan under the leadership of Dr. Alessandro De Luca, Italian Golf Federation.

## Student Travel Award

There will be multiple awards available to support student travel to the ITRC2021. Award recipients will receive partial to full travel support for airfare, lodging, registration expenses (see page 7). To apply for a student travel award, applicants should visit the [www.itrc2021.org](http://www.itrc2021.org) after 20 October 2020 to download the ITRC2021 Student Travel Award Application.

Applicants should submit a copy of the abstract(s) to be presented at the ITRC2021, a 1-page personal statement explaining how attendance at the meeting will help the student achieve their career goals, and a signed statement from a major advisor verifying that the student is studying turfgrass science and is in good academic standing at their institution.

Applicants must be a current student studying turfgrass science at the time of the ITRC2021 and be scheduled to give an oral or poster presentation at the conference. Students entered in the Graduate Student Competition will receive priority for a travel award. Applicants will be judged on their personal statement, the quality of their abstract(s), and their involvement and leadership at their respective universities. Applications will be accepted from 20 October to December 31, 2020, and award recipients will be notified by 1 February 2021.

## Bring the Family

Copenhagen is a very easy city to discover on your own. A number of enjoyable activities will be suggested by the conference organizer for example, the more than 100-year-old amusement park Tivoli (Figure 5), the Freetown of Christiania, the Louisiana art museum, and of course the famous Little Mermaid Statue (Figure 6) at the Langelinie Promenade. A trip to Malmö in Sweden only takes 45 minutes by train. More information will be available on the website closer to the conference.



Figure 5: The famous Tivoli amusement park.

## Excellent Sponsorship Opportunities are Still Available

A number of important organizations including Syngenta, Bayer, Aquatrols, DLF, TORO, the R&A, Copenhagen University, and the Nordic Golf Federations have already become major supporters of the ITRC2021 and plenty of excellent sponsorship opportunities are still available. So, show your organization's support of turfgrass research and become an ITRC2021 Sponsor today! The ITRC2021 sponsor manual is available at [www.itrc2021.org](http://www.itrc2021.org)



Figure 5: The famous Little Mermaid Statue.

# Conference Sponsors for the 14<sup>th</sup> International Turfgrass Research Conference

## Confirmed Sponsors

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# Status for manuscript submissions and review for ITSC 2021 as of Sep. 5<sup>th</sup>, 2020

By Trygve S. Aamlid, ITSRJ Editor-in-Chief and leader of ITSC 2021 publishing and scientific program committees

As indicated in the January and May editions of this newsletter, the initial interest for the 14th International Turfgrass Conference in Copenhagen was great with 259 titles and short abstracts submitted by 1 January 2020. However, due to Covid 19 and probably a number of other reasons, far from all authors were able to fulfil their intentions and submit a full paper by the deadline 1 June. About one third of the papers intended for Crop Science (CS) and Agronomy Journal (AJ) were never submitted despite reminders. For full papers to the International Turfgrass Society Research Journal (ITSRJ), the drop out was less with 70 submissions of an expected number of 76. Different drop-out rates in the different journals can partly be explained by the fact that eight of the papers originally intended for Crop Science or Agronomy Journal were actually submitted to ITSRJ instead.

Prior to the 1 June deadline, the CS editorial board had assigned Drs. Stacy Bonos and Dale Bremer as technical editors for the special ITSC issue of Crop Science. Correspondingly, Dr. Elizabeth Guertal was assigned to handle manuscripts for the special issue of AJ. Thanks to a steady follow up from these editors, the review for CS and AJ is well underway and a fair number of papers accepted already, especially for the conference issue of CS.

As of 5 Sept. about half of the submissions to AJ and CS are still under review or revision, hence, we don't know how many will eventually end up being accepted. The good thing is that a rejection in AJ or CS does not necessarily imply that the research is not presented at the conference. For papers that are denied publication in those journals, authors automatically get the option to have their paper transferred to ITSRJ. If they, before this resubmitting to ITSRJ, also revise their paper according to the first review by CS or AJ, such papers will also be subjected to a simplified and hopefully faster review in ITSRJ.

So far, six of the authors who received rejections from CS or AJ have refused transfer to ITSRJ and responded that they will rather submit to a journal with impact factor, which the ITSRJ does not have. This is understandable, but nonetheless

regrettable, as it means that the research is not presented and, in the worst case, that the author will not attend the conference.

As far as the ITSRJ is concerned, the 70 full paper submissions (plus the 16 papers transferred from CA and AJ so far) have all been assigned to eight very competent technical editors depending subject area. Here the reviews are a little behind those in CS and AJ, but we expect many decisions to be taken and revisions to be completed from September to November. The rejection rate will be lower than in CS and AJ, although some authors may be advised to condense their paper into a short communication / technical paper. So far, this has mostly been the case for reports on field trials that were not replicated in either time or space.

Of the 55 papers expected as ITSRJ short communication / technical paper in the first place, 35 had been received by the deadline 1 Sep. During the past week, most of these have been assigned to technical editors. A few authors have been allowed a two week extension with the submission of their manuscript.

All in all, I expect that we will end up with almost 200 voluntary papers to be presented orally or as posters at the conference. Although this is a little lower than the initial number of title submissions in December, I think it is not bad given that 2020 has been an unusual and very turbulent year for most of us. Special thanks are expressed to Elizabeth Gebhardt and Abby Morrisson the Wiley/ACSESS manuscript central, and to the many editors and reviewers in AJ, CS and ITSRJ who are currently devoting time and effort to secure the scientific quality of all papers submitted to ITSC 2021. (Click on Table to view)

# 2021 ITRC Graduate Student Competition and Student Travel Award

## Information

By Dr. Paul Koch, University of Wisconsin

A Graduate Student Competition will once again take place at the 2021 ITRC. Competitions will be held for both oral and poster presentations and entrants will be divided into multiple categories based on their topic of research. The top contestants in each category will receive a complimentary ITS student membership and a modest cash prize. The presenting author of an accepted manuscript must be a graduate student at the time of the 2021 ITRC to be eligible for the competition. To enroll in the Graduate Student Competition, please click 'I would like to enroll in the graduate student competition' while registering for the conference on the website (<https://itrc2021.org/>).

In addition to the Graduate Student Oral and Poster Competition, there will again be multiple awards available to support student travel to the 2021 ITRC. In 2017 there were 22 awards issued totaling nearly \$20,000 USD to students from the United States, Canada, Japan, and Europe. Travel support in 2021 will be based on the amount of funding available and the number of students that apply, and we expect to have more information on the level of support during the fall of 2020.

To apply for a student travel award, download and completely fill out the 2021 ITRC Student Travel

Award Application available from the ITRC website (<https://itrc2021.org/>). The application must include any abstracts to be presented at the 2021 ITRC, a 1-page personal statement stating how attendance at the meeting will help the applicant achieve their career goals, and a signed statement from their major advisor verifying that they study turfgrass science and that they are currently in good academic standing at their respective institution.

To be eligible for a travel award applicants must be a current student studying turfgrass science at the time of the 2021 ITRC and must be planning to present (oral or poster) at the 2021 ITRC. Applicants will be judged based primarily on their personal statement, the quality of their abstracts, and their involvement and leadership at their respective universities. Applicants who have entered the Graduate Student Competition will receive priority for an award over those who have not.

The completed application should be saved as a single PDF file and emailed to Paul Koch ([plkoch@wisc.edu](mailto:plkoch@wisc.edu)) by December 31st, 2020 at 11:59 PM. Award recipients will be notified on approximately February 1<sup>st</sup>, 2021. Questions regarding the application process or the Graduate Student Oral and Poster Competition should be directed to Paul Koch at [plkoch@wisc.edu](mailto:plkoch@wisc.edu) or 608-262-6531.

## Survey: Impact of COVID-19 on the Golf Course Industry in Japan

By Shin Nakamura and Takanori Miyoshi  
Bayer Crop Science K.K

To clarify the impact of COVID-19 on golf course management, Bayer CropScience K.K. carried out the survey on 149 - 153 golf courses out of around 2200 ones across Japan in May 2020. The participants answered to 7 questionnaires related to especially turf maintenance amid the unexpected pandemic. Through this survey, we can partially foresee what will happen following this crisis.

Questionnaire 1: What kinds of general impact on running a business from May to June?

34% mentioned that competitions and parties for players were refrain from carrying out. 21% decided to reduce work hours of employees to avoid the

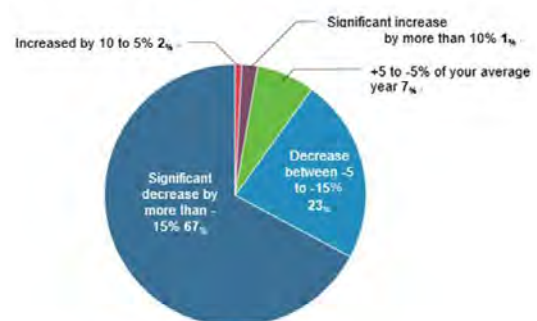


Fig.1 Answer to Questionnaire 2 (No. of players)

spread of infections with COVID-19. 11% reduced the business day or temporarily closed the golf

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courses for guests.

Questionnaire 2: Has the number of players to your golf course changed between March and April 2020 in comparison with your average year?

Nearly 70% of respondents said that there has been a significant decrease in the number of visitors.

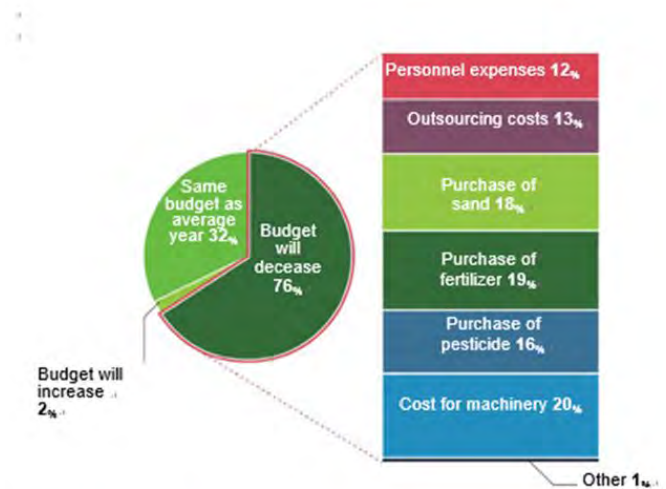


Fig.2 Answer to Questionnaire 4 (Budget for maintenance).

Questionnaire 3: Have there been any changes in how the golf course management operates?

There were obvious changes in how course management was operated in more than half the courses (56%). Specifically, shorter work shifts, reduction of workers, and limitation of operation-hours for course maintenance accounted for majority of responses.

Questionnaire 4: What do you anticipate the budget for course management in the coming year?

More than 70% of respondents said that their total budget will be constrained.

Questionnaire 5: How will the budget for chemical application on the putting green be affected in the coming year?

Many respondents looking to limit budget for their putting greens application with pesticides said they will lessen the frequency of pesticide spraying or choose cheaper pesticides.

Questionnaire 6: How about the budget of chemical application on the fairway or the rough?

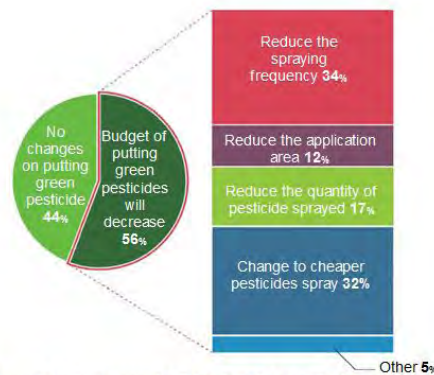


Fig.3 Answer to Questionnaire 5 (Budget for chemical application on putting green)

Many respondents (77%) believe that it is particularly necessary to cut the spraying frequency and limit the area to be applied in the rough and / or the fairway.

Questionnaire 7: Do you think that, in light of the current situation and COVID-19, it is necessary to improve how the management of courses are operated in the future?

Half of the respondents believe some form of improvement is needed. In particular, there are many who are contemplating mechanization and automation on every task.

### Short-Summary

As predicted, there seems to be obvious impact of COVID-19 not only on the revenue of golf courses but also the turf maintenance works due to the budget constraint. The cost to maintain the courses will be lessened or should be well reconsidered. For example, the purchase of fertilizers, chemicals, sand etc will be affected in the coming months. On the other hand, many courses are expecting the future digital technology to compensate this disadvantage following the end of pandemic

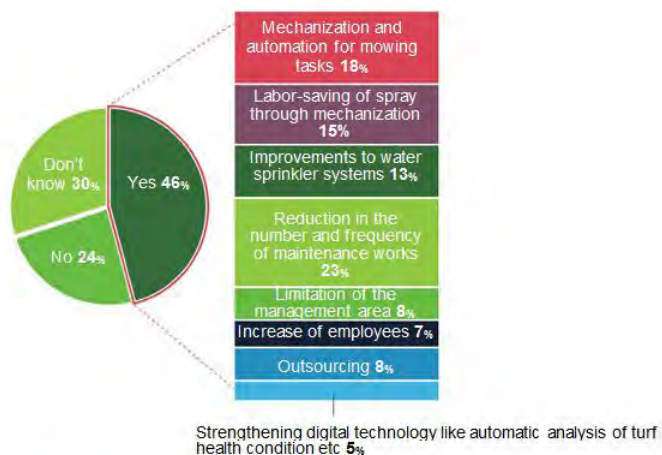


Fig.4 Answer to Questionnaire 7 (Solution for the future)



# ROBO-GOLF: Better grass quality, reduced fertilizer costs and less use of fossil energy when using fairway and semi-rough robotic mowers

By Trygve S. Aamlid and Karin Juul Hesselsøe  
NIBIO Turfgrass Research Group, Landvik.

Over the past five years, the use of robotic mowers in private gardens has increased significantly, but so far only a few Nordic golf courses have started to use this new technology. One of the exceptions is Bærheim Golf Club, Norway, which uses around 70 robotic mowers in the maintenance of semi-roughs. In December 2019, STERF decided to fund the new project ROBOGOLF, where the aim is to study agronomic, environmental and economic consequences by switching to robotic mowers. The project is a collaboration with the company Husqvarna, the “world leader in robotic mowing”.

## Inspiration from Italy

At Pisa University in Italy, the researchers Michel Pirchio and Nicola Grossi have worked for several years with robotic mowers in tall fescue-dominated lawns and semi-roughs. Tall fescue (*Festuca arundinacea*) is a coarse and drought-tolerant grass species not used on golf courses in the Nordic countries, but the results from Italy can be transferred to other grass species. Pirchio et al. (2019) found that the overall impression of the turf, rated on a scale of 1-9, increased from 6.4 on plots with manual rotor mowing to 7.3 on plots with robotic mowing (Table 1, click on table for larger view). This increase in grass quality was due to a lawn became denser lawn with finer leaves. The denser lawn was related to the fact that the height of cut on plots mown with the robotic mower was 3-3.5 cm, which was lower than on the manually mown plots (3-5 cm). If the leaf area does not become so small that it will repress the photosynthesis, a lower cutting height will lead to more and qualitatively better light reaching the soil surface, and this will usually stimulate tillering.



Photo 1: Mowing fairway at the ROBO-GOLF experiment at NIBIO Landvik. Photo: Karin J. Hesselsøe.

## A robotic mower is more than a driverless mower

A robotic mower is a small and light-weight electric mower that is programmed to mow a specific area in a random pattern (Photo 1). (There are also robotic mowers that can be programmed for systematic mowing, but these will not be used in this project). It is important to distinguish the robotic mowers in the ROBOGOLF-project from ordinary fairway or rough mowers which, using advanced technology, can be programmed or controlled remotely just like driverless cars or buses, but which, apart from reduced labor consumption, do not represent special advantages in turfgrass management.

When it comes to weeds, the Italian results were not in favor for the robotic mowers. Robotic mowing led to more daisies (*Bellis perennis*) and especially white clover (*Trifolium repens*) in the lawn (Table 1). The Italian researchers pointed out that this could be a problem when robotic mowers are used at lower cutting heights, e.g. on fairways.

Pirchio et al. (2019) also measured the consumption of electrical energy at the charging stations for the robotic mowers, as well as the fuel consumption by manual mowing. They found that

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switching to robotic mowers led to a reduction of 60 to 70 % in energy consumption. This was a pure energy calculation that did not take into account the type of energy used or whether it was renewable or not. Less CO<sub>2</sub> emissions and less noise are therefore additional benefits that were not accounted for in the Italian studies.

We are very pleased that Michel Pirchio and Nicola Grossi have agreed to join the reference group for our new project and thereby share their experiences with us.

### **What will be investigated in the ROBOGOLF-project?**

The project consists of three sub-projects. The first two will be conducted at NIBIO Landvik, Norway and the third will take place on golf courses in each of the Nordic countries.

In sub-project 1 we will investigate the effect of robotic mowing on density, leaf fineness, diseases, weeds (including *Poa annua*), repair of divots, soil compaction, energy consumption and CO<sub>2</sub>-emissions on newly established fairway. The plots will be established with pure Kentucky bluegrass (*Poa pratensis*), red fescue (*Festuca rubra*) and colonial bentgrass (*Agrostis capillaris*) as well as a mixture of the three species. Control plots will be mown manually two to three times a week with a standard triplex cylinder mower. Both robotic and manual mowers will be set at a cutting height of 15 mm, and emphasis will be placed on regular backlapping/grinding of the cylinder mowers as well as replacement of the knives on the robotic mowers to achieve the best mowing quality.

In sub-project 1, there will also be an experiment on a semi-rough established with Kentucky bluegrass (*Poa pratensis*), red fescue (*Festuca rubra*) and ryegrass (*Lolium perenne*) at a 35 mm cutting height. Here, the control plots will be mown once or twice a week with a manual rotary mower.

Sub-project 2 aims to study if the transition to robotic mowers has implications for the demand for fertilizer on fairways. We want to test the hypothesis that mowing with robotic mowers several times a day provides better recycling of plant nutrients (e.g. less loss of ammonia gas?) than regular mowing twice



Photo 2: Husqvarna 550 automower in the ROBOGOLF project. At each charging station, a logger is installed to measure the energy consumption. Photo: Anne F. Borchert.



Photo 3: Drone photo from NIBIO Landvik showing the experimental area with fairway to the right and semi-rough to the left. In the front the automown area, in the middle the manual mown area and further behind repetitions. Photo: Karin J. Hesselsoe.

a week. To measure this, small plots with different fertilizer levels will be laid out within both robotic and manually mown plots.

Sub-project 3 is a field trial started on five Nordic golf courses in the spring of 2020. Here an automower is installed on a semi-rough and a fairway on each course. The experiment will compare turf quality, weeds and diseases on robotic and manually mown areas. In collaboration with the researchers from NIBIO Landvik, the greenkeepers on the five courses will assess turf quality, weeds and diseases in the experimental areas during the growing season. In addition, the energy consumption of both robotic mowers and ordinary mowers will be measured and

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CO<sub>2</sub> emissions calculated. The time used for manual mowing will also be registered. A survey among members, green fee players and greenkeepers on the five golf courses will also be conducted. They will be asked how satisfied they are with the robotic mowers and with the playing quality. Golf courses included in the project are: Bærheim (Norway), Ikaalisten (Finland), Ness (Iceland), Grenå (Denmark) and Jönköping (Sweden).

In the end of August a field-day was arranged at Bærheim GC to introduce the ROBO-Golf project and to watch the automowers at the fairway and semi-rough (Photo 4). Due to Covid-19 restrictions it was only a local arrangement for Norwegian greenkeepers.

Over the next three years, we will gain much more knowledge about the mowing robots both from these experiments and from the greenkeepers' experiences and registrations on the golf courses in the ROBO-GOLF project.



Photo 4: Head greenkeeper Atle R. Hansen shows and tells about registrations on the fairway in the ROBO-GOLF project at Bærheim Golfpark. Photo: Karin J. Hesselstøe.

Reference:

Pichio, M., Volterrani, M., Grossi, N., Fontanelli, M. 2019. Autonomous mower saves energy and improves quality of lawns. Lecture at the European Turfgrass Conference, Padova, Italy, May 27-28, 2019.



**ITRC** 14<sup>TH</sup> INTERNATIONAL  
**2021** TURFGRASS RESEARCH  
CONFERENCE





# INTERNATIONAL TURFGRASS SOCIETY

Exchanging Turfgrass Knowledge Worldwide

The International Turfgrass Society (**ITS**) is a not-for-profit scientific organization that encourages research and education in turfgrass science.

**ITS** was established in 1969 and promotes communication among international turfgrass researchers by organizing international conferences on turfgrass research and all phases of turfgrass production and use.

International Turfgrass Research Conferences (**ITRC**) are held at 4-year intervals and the next **ITRC** will be held in Copenhagen, Denmark in July 2021.

**ITS** membership is a 4-year subscription (2018-2021) and includes the following benefits:

- copy of the **ITS** Research Journal from the next **ITRC**
- discounts for **ITRC** registration
- back issues of the **ITRC** Proceedings and Journal articles.
- access to the Members Only section of the **ITS** website
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