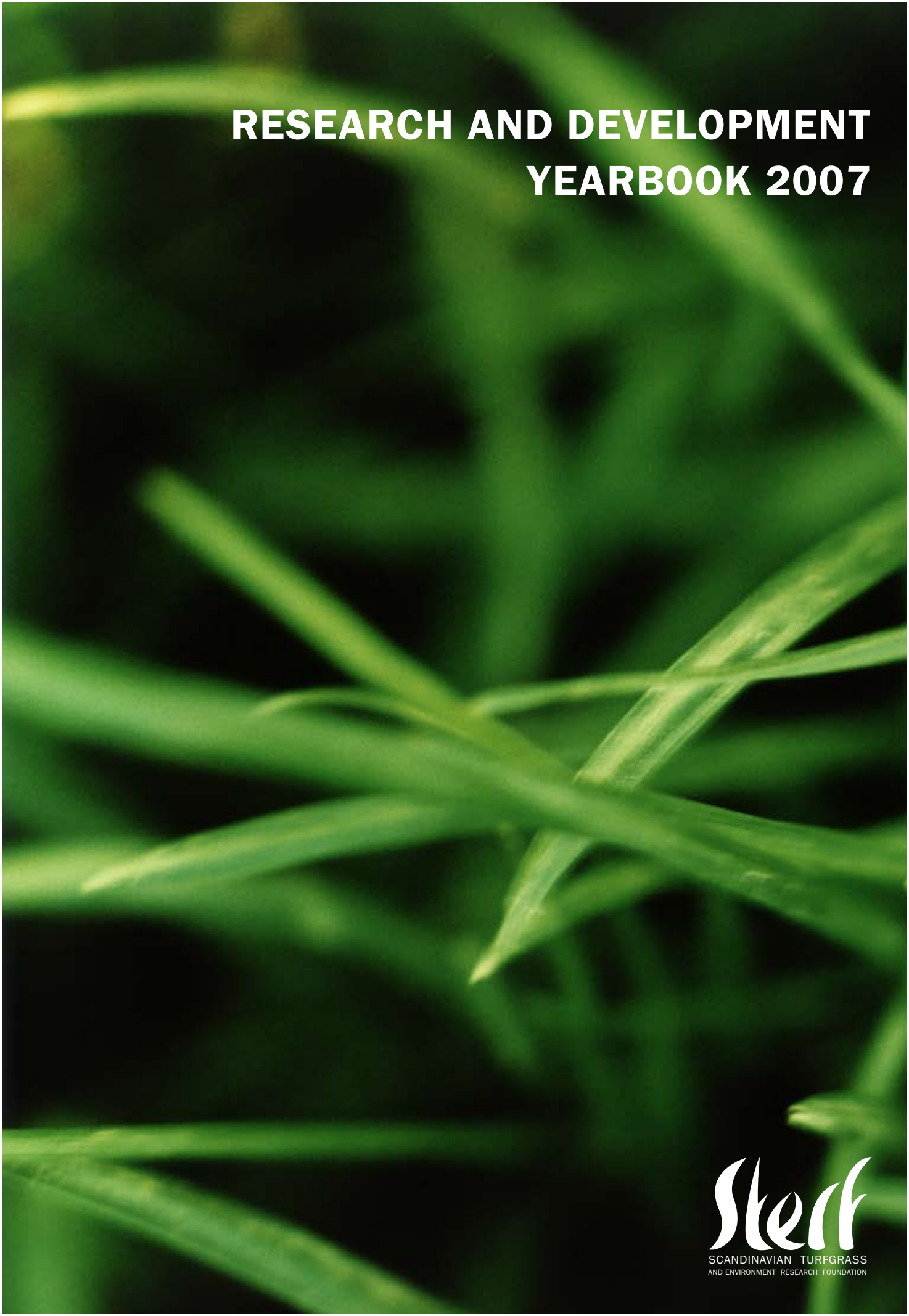


RESEARCH AND DEVELOPMENT YEARBOOK 2007

SCANDINAVIAN TURFGRASS
AND ENVIRONMENT RESEARCH FOUNDATION

IMPORTANT EVENTS IN 2007

MEETING CONCERNING LONG-TERM FUNDING OF NORDIC RESEARCH

On 2-5 August 2007, all Presidents and General Secretaries of the Nordic Golf Federations met with the STERF Board to discuss long-term funding of Nordic research.

The following important commitments were made:

- Research is, and will continue to be, a necessary and strategically important investment for the Nordic golf sector in achieving economically and environmentally sustainable golf facilities of a high standard and in establishing the credibility of golf as an environmentally-friendly sport. Nordic research will be carried out on a Nordic basis through STERF and will be supported by long-term joint funding.

- The STERF research programme, agreed by all the Nordic Golf Federations, will need continuous funding of about k€ 850 per year, based on the goals in the programme. STERF long-term funding from the Golf Federations should be based on the number of playing members in the Golf Federations in each country.

- STERF should play a key role in developing and establishing networks and collaboration with suitable organisations in the rest of Europe, Canada and the USA.

- STERF and the national Golf Federations are jointly responsible for an effective dialogue between researchers and practitioners to identify research priorities in new fields and to ensure that new-found knowledge and experience are translated into practice.

ICELAND – NEW PARTICIPATING GOLF FEDERATION IN STERF

In February 2007, the Icelandic Golf Federation voted to participate in STERF. This means that all the Nordic Golf Federations are now participating in and funding STERF's operations. Important research areas for Iceland include: Breeding and evaluation of turfgrass species and varieties, golf course construction and soil amendments, carbon accounting and energy conservation, nature conservation and cultural preservation.

NEW RESEARCH AREA - CARBON ACCOUNTING AND ENERGY CONSERVATION

There are currently no established carbon accounting methodologies for the operation of golf facilities or for the organisation and running of golf events. In order to meet the expectations of society and conform with the increasingly carbon-orientated policies of government, there is an urgent need to equip the golf sector, for

example golf facility managers, course managers and golf event organisers, with credible methodologies to enable them to undertake accurate carbon accounting.

There is very little existing knowledge relating to the carbon sequestration capacity of golf courses, for example of different types of turfgrasses or other golf course vegetation, or in different climatic regions. A priority area is to devise and implement a carefully targeted piece of research to improve our understanding of the role golf courses play as carbon sinks. This will assist the industry in calculating its carbon footprint, by providing values that can be applied to counter-balance the carbon emissions of golf facilities as they increasingly move into carbon accounting.

To limit the global warming process, European governments and environmental organisations want all sectors of business to begin quantifying the amount of carbon they produce through their activities. Carbon accounting and investigation of energy consumption can also lead to greater efficiency in resource use and long-term cost savings.

SCANDINAVIAN TURFGRASS AND ENVIRONMENT RESEARCH FOUNDATION, STERF

VISION

- STERF is the leading international centre of competence and knowledge in environmental aspects of turfgrass management for golf, delivering 'ready to use research results'.

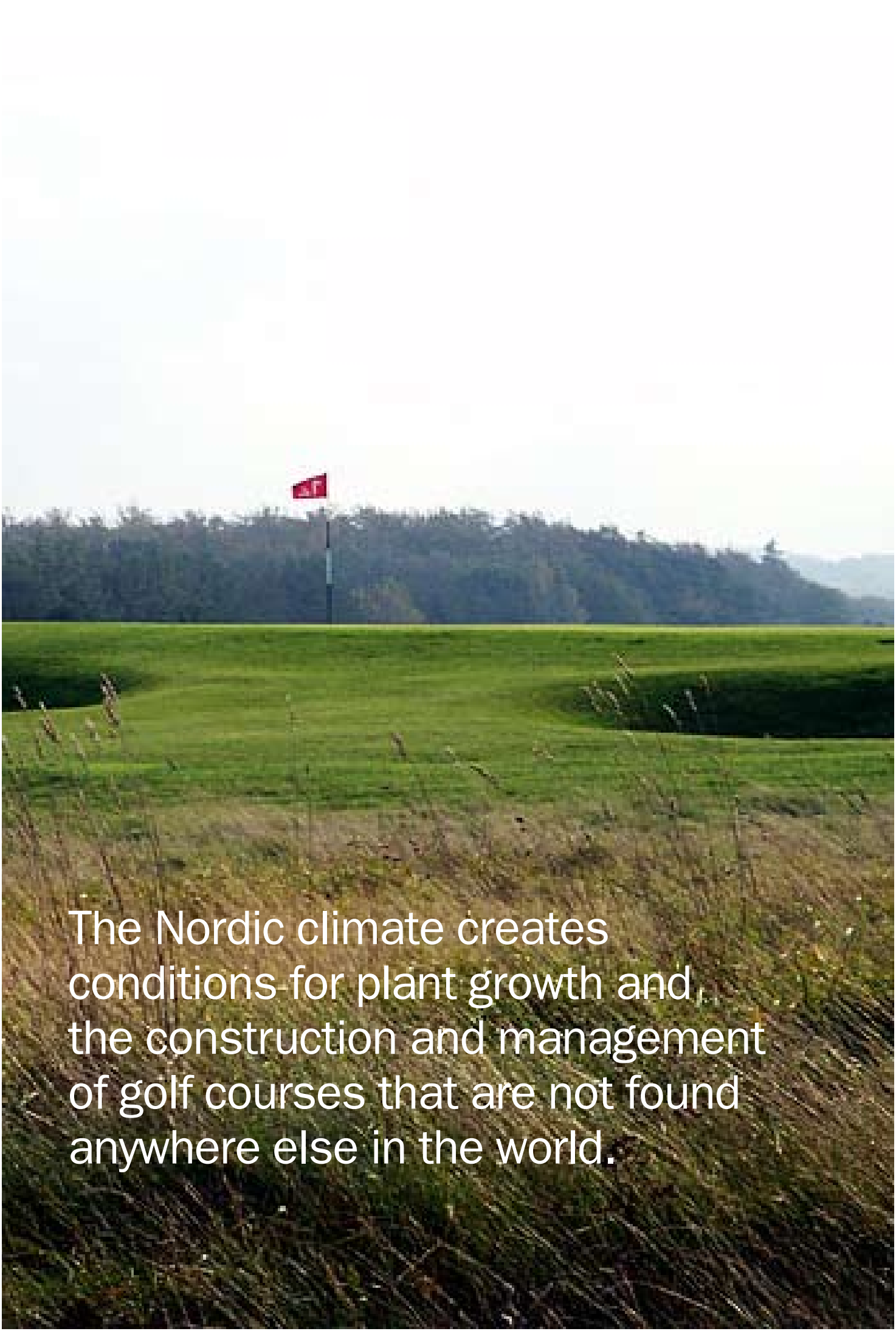
PRINCIPAL STRATEGIES

- **Approach:** Research financed by STERF should be carried out at universities or research institutes (or equivalent) where most of the research capacity is concentrated. STERF has no research capacity in the form of staff or facilities. The work is carried out in project form and is user-driven.

- **Capacity:** STERF strengthens research capacity by encouraging and supporting networks and collaborating actively with key organisations in the field of turfgrass management.

- **Application:** STERF delivers research findings that can be utilised in the development of appropriate management practices and recommendations ('ready to use research').

- **Resources:** STERF receives funding from participating golf associations, which can be used to complement existing research funding from other sources.


The Nordic climate creates conditions for plant growth and the construction and management of golf courses that are not found anywhere else in the world.

BACKGROUND

The Nordic Golf Federations have approx. 900,000 members, playing golf on more than 900 courses that cover a total area of more than 55,000 ha. Any societal activity as significant as golf must take responsibility for building knowledge through research and development (R&D). R&D is a prerequisite for golf courses of high quality that also ensure the sustainable use of natural resources. It is therefore important that R&D in sports turf construction and management and in environmental issues continue to develop in the Nordic countries.

R&D is a necessary investment for the construction and maintenance of economically viable golf courses of high standard, and for establishing the credibility of golf as an environmentally-friendly sport. There is a shared Nordic interest and perspective on improving our knowledge of how to manage golf courses. The financial resources allocated for R&D in each country are very limited. The number of scientists actively working within each priority R&D area is also quite limited compared with agricultural and forestry research. The financial resources and efforts of these researchers should be coordinated to optimise R&D within the golf sector. The Scandinavian Turfgrass and Environment Research Foundation (STERF) was set up by the Golf Federations in Norway, Sweden, Finland, Denmark, Iceland and the Nordic Greenkeepers Associations in order to support existing and future R&D efforts.

There are several important reasons why Nordic R&D is necessary. Central Scandinavia, Oslo, Stockholm, Helsinki and Reykjavik lie at the same latitude as the southern tip of Greenland (~60ºN). This gives a unique climate resulting from a combination of factors such as light, temperature and precipitation, both during the playing season and during winter. The Nordic climate creates conditions for plant growth and the construction and management of golf courses that are not found anywhere else in the world.

Carbon accounting and energy conservation will be an important question in the future for the Nordic golf industry, both from an economic and environmental point of view. In order to meet the expectations of society and the increasingly carbon-orientated policies of government, there is an urgent need to equip the golf sector with credible methodologies to undertake accurate carbon accounting. Transport and energy consumption based predominantly on fossil fuels is expensive both for golf clubs and the individual golfer, and may be the most important negative impact of golf on the environment.

The golf sector is affected both by the requirements of public authorities and an increasing environmental awareness among the general public. Environmental legislation in the Nordic countries is often much stricter than in other countries. For example, there are golf courses in both Denmark and Sweden where the use of chemical pesticides is banned or where the fees for irrigation water are prohibitive. In October 2007, the European Parliament presented a political agreement on new pesticide directives, in which golf is directly mentioned with a view to prohibition or severe restriction of pesticide use. Only by continually supporting R&D can we keep ahead of developments and influence new legislation affecting the golf industry.

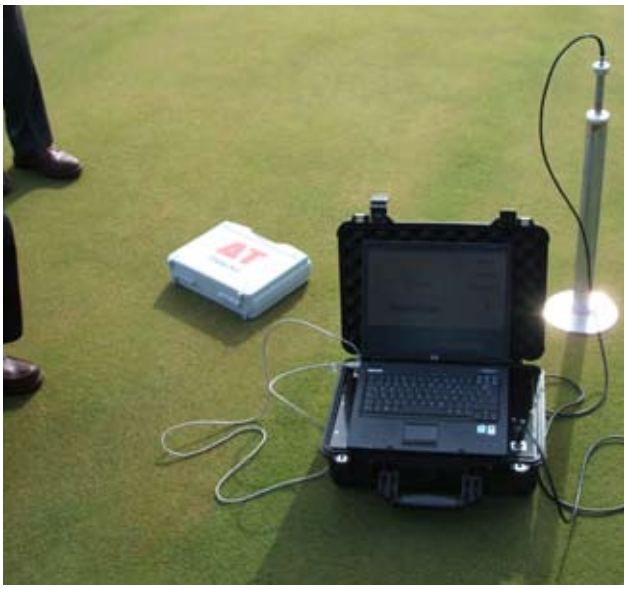
STRATEGIC RESEARCH OBJECTIVES

The Nordic golf sector's vision with respect to golf course quality and the environment is:

- To promote high-quality golf courses, whilst guaranteeing a sustainable use of natural resources and contributing to a healthy environment.

The aim of STERF is to support R&D that can help the golf sector to fulfil this vision. The activities of STERF should lead to improvements in golf course quality, economic gains and environmental benefits. The strategic objectives for STERF-funded R&D activities are that:

- the design, construction, management and administration of golf courses provide optimal conditions for playing quality, degree of utilisation of the course and management inputs
- the design, construction, management and administration of golf courses are economically and environ mentally sustainable, for example with respect to plant nutrient requirements, water use, control of weeds and plant diseases, and energy consumption
- golf courses contribute to preserving and improving the natural and cultural value of the landscape and promote biological diversity.



PRIORITY R&D AREAS

STERF has decided on the following important categories of research for a period of about five years:

- Breeding and evaluation of turfgrass species and varieties
- Winter stress management
- Control of diseases, pests and weeds
- Golf course construction, soil amendments and efficient use of water and plant nutrients
- Carbon accounting and energy conservation
- Nature conservation and cultural preservation

Priority R&D areas will be continuously discussed and re-evaluated by the STERF Board and Research Steering Committee, and new areas may be added in the future.

More information about STERF and about ongoing and finished projects can be found on the STERF website: STERF.golf.se

POTENTIAL FOR VELVET BENTGRASS ON SCANDINAVIAN PUTTING GREENS

Project period: January 2006 – December 2010

Principle investigator / contact person: Tatsiana Espevig, Norwegian Institute for Agricultural and Environmental Research, Bioforsk Øst Landvik, N-4886 Grimstad, Norway. + 47 406 23 778. E-mail: tanja.espevig@bioforsk.no

Co-applicants: Trygve S. Aamlid and Bjørn Molteberg, Norwegian Institute for Agricultural and Environmental Research, Anne Marte Tronsmo, Arne Tronsmo and Linda Hjeljord, Norwegian University of Life Science (UMB). Stacy Bonos, Bingru Huang and James A. Murphy, Rutgers University, USA. Katerina Jordan and Eric Lyons, University of Guelph, Canada. Frank Rossi, Cornell University, USA.

Talks at conferences meetings, seminars, field days, etc (2007):

7 Nov: Presentation of preliminary results at HGU course, Alnarp, Sweden

21 Nov: Presentation of preliminary results at Norwegian Golf Federation Seminar, Oslo

FUNDING (kSEK):						
	2006	**2007**	**2008**	**2009**	**2010**	**TOTAL**
STERF	200	600	560			1360
OTHER SOURCES		750	1000	1000	811	3561
TOTAL	200	1350	1760	1000	811	4921

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

Major concerns for the use of velvet bentgrass (Agrostis canina) in Scandinavia are whether current cultivars have sufficient winter hardiness, and whether it is possible to control the rapid formation of thatch in this species. To meet these challenges, this project is divided into the following three subprojects:

1) Velvet bent (VB) cultivars were tested for winter hardiness in controlled environments at UMB during 2006/2007. Hardened and unhardened plants of the VB cultivars Avalon, Villa, Greenwich and Legendary were compared with creeping bentgrass (Agrostis stolonifera) cv. Penn A-4 (control) and tested for resistance to freezing temperatures, ice encasement and Microdochium nivale. Unhardened VB cultivars were more susceptible to M. nivale than unhardened cv. Penn A-4. Hardened plants of the two species showed similar resistance to M. nivale and tolerance to artificial ice and snow covers, but hardened VB was more tolerant to freezing than creeping bentgrass. During winter

2007/2008 these preliminary data will be supplemented by new results, which also include the VB cultivars Vesper and Venus and the pathogens Typhula ishikariensis and T. incarnata.

2) Field trials combining two fertilizer levels, two top-dressing levels and four methods for mechanical/biological thatch control started in August 2007, two months after VB cv. Legendary was sown on new USGA greens at Apelsvoll and Landvik, SE Norway. A higher fertilizer level (1.5 kg N/100 m2/yr) resulted in better turf with fewer diseases (mostly caused by Microdochium nivale and Pythiun sp.). Application of 1.0 mm sand every 2 weeks was too much under the lower nitrogen level (0.75 kg N/100 m2/ yr), but at 1.50 kg N/100 m2/yr there was no difference in turf quality between the 0.5 and 1.0 mm top-dressing levels (Photo 2). Effects of grooming and its combinations with verticutting, coring and spiking on turf quality were not significant but will probably become more apparent with increasing turf age. Five applications of the biological product 'Thatch-less' in the grow-in year had no effect on total bacteria or fungi numbers in soil samples taken in November 2007.

3) A field trial comparing wilt-based and field capacity-based irrigation on root zones with and without 2.5% organic matter (OM) was initiated in the USGA green lysimeter facility at Landvik in August 2007. Preliminary data show that turf quality is better and disease levels lower with inclusion of OM in the root zone, but it is too early to report results from the irrigation studies.

EVALUATION OF TURFGRASS VARIETIES FOR USE ON SCANDINAVIAN PUTTING GREENS

Project period: January 2007 – December 2010

Principle investigator / contact person: Bjørn Molteberg, The Norwegian Institute for Agricultural and Environmental Research, Bioforsk Øst Apelsvoll, N-2849 Kapp, Norway. + 47 40 48 27 18. E-mail: bjorn.molteberg@bioforsk.no

Co-applicants: Trygve S. Aamlid, The Norwegian Institute for Agricultural and Environmental Research, Gudni Thorvaldsson, Agricultural University of Iceland, Anders Hammarlund, Östra Ljungby naturbruksgymnasium

Talks at conferences meetings, seminars, field days, etc (2007):

20 Sept: Sandmose Greenkeeper School, Denmark (during visit to Landvik)
24 Sept: Elmia Park & Golf, Jönköping, Sweden.
8 Nov: HGU-kurs, Alnarp (Swedish Golf Federation)
21 Nov: Norwegian Golf Federation: Conference, Oslo, Norway.

FUNDING (kSEK):					
	2007	**2008**	**2009**	**2010**	**TOTAL**
STERF	380	380	380		1520
OTHER SOURCES	88	88	88	88	352
TOTAL	468	468	468	468	1872

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:
Evaluation of turfgrass varieties for use on putting greens started in 2007 as a new project for the period 2007-2010.

Four trials have been established on putting greens constructed according to USGA standards at the experimental locations Östra Ljungby Naturgymnasium, Sweden, Bioforsk Landvik and Bioforsk Apelsvoll, Norway and at a golf course in Keldnaholt, Iceland.

A total of 42 varieties within seven species and subspecies were entered by seed companies into the project. The trials were established according to a split-plot design with the species Festuca rubra, Agrostis canina, Agrostis capillaris, Agrostis stolonifera, Poa trivialis and Lolium perenne on main plots and varieties within species on subplots. Seeding dates for the sites Apelsvoll, Landvik, Keldnaholt and Östra Ljungby were June 26, July 11, August 17 and September 6, respectively.

Mowing three times a week to a minimum of 6 mm in Festuca, Lolium and Poa and 4 mm in Agrostis was carried out at Apelsvoll and Landvik, but not at Keldnaholt and Östra Ljungby by reason of the late seeding and establishment. During the establishment season, the trials at Apelsvoll and Landvik were rated at biweekly intervals for visual merit (overall turf grass quality) and at monthly intervals for other characters. The late-seeded trials at Keldnaholt and Östra Ljungby were only rated for percentage plant cover by the end of the growing season.

Several varieties, not at least within the non-traditional species perennial ryegrass (L. perenne) and rough meadowgrass (P. trivialis), showed promising results in the establishment year.

BREEDING OF WINTER HARDY TURF-GRASS VARIETIES FOR CENTRAL AND NORTHERN SCANDINAVIA

Project period: January 2007 - December 2009

Principle investigator / contact person: Petter Marum, Graminor AS, Bjørke Research Station, 2344 Ilseng, Norway. +4790871749. petter.marum@graminor.

Co-applicants: Bjørn Molteberg, Bioforsk Øst Apelsvoll, 2849 Kapp, Kristin Daugstad, Bioforsk Øst Løken, 2940 Heggenes

FUNDING (kSEK):						
	2006	**2007**	**2008**	**2009**	**Total**	
STERF		50	60	50	160	
Other sources		50	60	50	160	
TOTAL		100	120	100	320	

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

Subproject 1. Improving the leaf texture, uniformity and playing quality of winter hardy creeping bentgrass (Agrostis stolonifera)

Graminor released the creeping bentgrass (Agrostis stolonifera) cultivar Nordlys in 2004. Cv. Nordlys is outstanding in winter hardiness and is characterised by an attractive colour and a higher density than most other cultivars of creeping bentgrass. Its major drawback is a variable leaf texture. The objective of this subproject is to develop new and more uniform varieties of creeping bentgrass based on germplasm of cv. Nordlys.

The trial was established at Bioforsk Øst Løken (61°N, 530 m a.s.l.). Løken is located in the inland of southern Norway, where the climate is continental. About 1000 plants of cv. Nordlys were sown in the greenhouse and transplanted in the field on 25 June 2007 at 50 cm spacing. Density, fineness of leaves and number of inflorescences in the sowing year were recorded in August and September 2007. The majority of observations will be conducted in 2008, after the first winter. During the year of establishment there was a lot of variation in the cv. Nordlys material as regards size, density and fineness of leaves (See photo). There will hopefully be strong selection for winter survival, and synthetic varieties will be established in 2008.

Subproject 2. Preliminary testing of advanced breeding materials (candivars) on an experimental green.

From the earlier breeding programme in Graminor there are 8 candivars of Festuca rubra commutata and 4 candivars of Agrostis capillaris that have not been tested

on putting greens. The objective of this subproject is to clarify which of these advanced breeding materials (candivars) of A. capillaris and F. rubra commutata are worth being evaluated in green trials. Included as standard varieties are the F. rubra commutata cultivar Center and the A. capillaris cultivars Jorvik and Leirin.

The trial has been established at Bioforsk Øst Apelsvoll`s experimental putting green (61°N, 250 m a.s.l.), constructed according to USGA specifications. The trial was seeded on 26 June 2007. The experimental design is split-plot, with species on main plots and candivars on subplots. The first mowing was carried out 14 July. Mowing height was set to a minimum of 6 mm in Festuca and 4 mm in Agrostis. All plots received the same amount of inorganic fertilizer at biweekly intervals, totalling 1.3 kg N/100 m^2.

The ranking of chewings fescue (F. rubra commutata) and colonial bentgrass (A. capillaris) were very similar for most of the candivars in the trial in the year of establishment.

PREDICTION OF TURF GROWTH AS A FUNCTION OF LIGHT AND TEMPERATURE UNDER NORDIC CONDITIONS

Project period: January 2007 – December 2008
Principle investigator / contact person: Karin Blombäck, Swedish University of Agricultural Science, Department of Soil Sciences, P.O. Box 7014, SE-750 07, +46 (0)18 67 10 00, Karin.blomback@mv.slu.se
Co-applicants: Mats Höglind, Bioforsk Vest, Sœrheim, Norway

FUNDING (kSEK):						
	2006	**2007**	**2008**	**2009**	**Total**	
STERF		290				
Other sources						
TOTAL		290				

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

The aim of the project is to find a method to predict the potential growth and winter hardening processes of three turfgrass species as a function of different light and temperature conditions from early spring to late autumn. Good knowledge of the potential growth is the basis for planning a sound sustainable maintenance programme, both regarding turfgrass quality and economic and environmental concerns.

Two simulation models will be used - the SLU model, which is a simple growth model that can be used to create growth curves, and the LINGRA model, which includes hardening/dehardening processes. Potential growth for five locations in the Nordic countries (Umeå, Västerås and Lund in Sweden, Særheim in Norway and Joensuu in Finland) will be modelled. The three different sites in Sweden will cover different light and temperature conditions due to different latitudes. Særheim in Norway has been selected to represent a more maritime climate, while Joensuu in Finland represents a more continental climate. Field data from Fullerö GK, Västerås, were sampled during 2007 and sampling will continue during spring 2008, after which the simulation study will be performed.

The outcome from the project will be a simulation tool to predict the growth of turfgrass. Based on the simulated growth curves, recommendations for fertilisation and other maintenance practices can be fine-tuned according to light and temperature conditions.

DEVELOPMENT, EVALUATION AND IMPLEMENTATION OF PLAYING QUALITY PARAMETERS IN A CONTINUOUS GOLF-COURSE EVALUATION CONCEPT

Project period: January March 2007 – June 2009
Principle investigator / contact person: Anne Mette Dahl Jensen, senior advisor, Centre for Forest, Landscape and Planning – KVL, Rolighedvej 23, DK-1958 Frederiksberg C, +45 3528-1706, E-mail amdj@kvl.dk
Co-applicants: The Danish Golf Union

FUNDING (kSEK):						
	2006	**2007**	**2008**	**2009**	**Total**	
STERF		70				
Other sources		33				
TOTAL		103				

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

Golf players' opinion, definition and understanding of playing quality and how they rank playing quality parameters provide important supporting data for defining playing quality in a broader sense than that used today. Therefore it was deemed important to carry out a user inquiry among players on different levels, with different skills and in different geographical regions.

After discussions with the Scandinavian Golf Unions a draft internet questionnaire on playing quality was drawn up in 2007 with the help of the Danish Golf Union. The questionnaire will be tested on a test panel in Hornbæk golf club in Denmark, after which the final internet-based questionnaire will be decided. The questionnaire will be sent out during summer/autumn 2008 to players in Norway, Sweden, Finland, Iceland and Denmark. In order to get in contact with pro-players, the Golf Federations in the different countries have been asked for assistance. In addition, golf course architects, course consultants and greenkeepers will be asked to define playing quality.

It was important for the outcome to be able to discriminate between players that visit different courses during the season and players that only play their home course a couple of times each year as their definition of playing quality must be very different. Therefore additional questions regarding player age, handicap, games per year, number of courses visited etc. have been included.

The aim of this part of the project is to identify specific goals regarding playing quality for golf courses in Scandinavia. In the next stage, strategies for achieving these goals can be created.

EVALUATION OF THE PLANT GROWTH REGULATOR TRINEXAPAC-ETHYL (PRIMO MAXX®) ON NORDIC GOLF COURSES

Project period: May 2007 – May 2009

Principle investigator / contact person: Trygve S. Aamlid, The Norwegian Institute for Agricultural and Environmental Research, Bioforsk Øst Landvik, N-4886 Grimstad, Norway. + 47 90 52 83 78.
E-mail: trygve.aamlid@bioforsk.no

Co-applicants: Oiva Niemelainen, Agricultural Research Centre (MTT), Jokioinen, Finland, Maire Rannikko, HAMK University of Applied Sciences, Lepaa, Finland

Talks and posters at conferences, meetings, seminars, field days etc. in 2007:
27 Aug: Norwegian Golf Federation / Norwegian Greenkeepers Association / Bioforsk F ield Day, Ballerud Golf Club, Oslo, Norway
8 Nov: HGU-course, Swedish Golf Federation, Alnarp, Sweden.

FUNDING (kSEK):						
	2007	**2007**	**2008**	**2009**	**Total**	
STERF	88	88	44		220	
Other sources	237	237			474	
TOTAL	325	325	44		694	

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

The plant growth regulator Primo MAXX® (trinexapac-ethyl) offers prospects for improved turfgrass quality and reduced mowing costs on Scandinavian golf courses. The objective of this project is (1) to produce agronomic documentation for possible registration of Primo MAXX® by the national authorities in the Nordic countries, and (2) to determine optimal application rates and frequencies for Primo MAXX® on golf course fairways and greens under Nordic conditions.

In the first project year 2007, fairway trials (mowing height 12-18 mm) were carried out according to Good Experimental Practice (GEP) standards at Bioforsk Landvik, Norway (58°34'N, 8°52'E) and at the Lepaa Unit of HAMK University, Finland (61°08'N, 24°20'E). Primo MAXX® was applied at monthly intervals at rates of 0.5, 1.0, 1.5, 2.0 and 3.0 L/ha (56.5, 113, 169.5, 226 and 339 g a.i./ha trinexapac-ethyl) in comparison with an unsprayed control treatment. Primo MAXX® had no effect on the general appearance of turfgrass but increased tiller density at Lepaa. At Landvik, Primo MAXX® (>1.0 L/ha) reduced turfgrass

general appearance and density, but resulted in significantly darker green colour. Quality reductions were apparent during periods when the turf was stressed from temperatures >25 ºC, excessive rainfall, or frost at night. Average reductions in clipping yield caused by Primo MAXX® (>1.0 L/ha) were 18% at Lepaa (plant cover mainly Poa pratensis, smooth meadowgrass) and 8% at Landvik (plant cover mainly Festuca rubra, red fescue). Clipping yield reductions due to Primo MAXX® were inconsistent, growth suppression two weeks after application often being followed by a rebound effect during the remaining two weeks until the next application.

In a GEP trial on a putting green (mainly Agrostis stolonifera, creeping bentgrass) at Lepaa, Finland, Primo MAXX® was sprayed at rates 0.2, 0.4, 0.6 or 0.8 L/ha at monthly intervals. On average for rates, Primo MAXX® reduced clipping yields by 16%, but had no effect on turfgrass quality. As in the fairway trials, growth suppression was stronger when assessed two weeks rather than four weeks after application.

In conclusion, results from the first year of this project indicate that guidelines for the use of Primo MAXX® in other European countries are not directly applicable in Scandinavia. The project will continue in 2008 with new trials investigating application of Primo MAXX® at lower rates, but higher frequencies. The effect of Primo MAXX® on winter survival will also be evaluated.

NORDIC TURFGRASS VARIETY GUIDE, 2007

Project period: January – December 2007
Principle investigator / contact person: Trygve S. Aamlid, Norwegian Institute for Agricultural and Environmental Research, Bioforsk Øst Landvik, N-4886 Grimstad, Norway. + 47 90528378. E-mail: trygve.aamlid@bioforsk.no
Co-applicants: Bjørn Molteberg, Norwegian Institute for Agricultural and Environmental Research, Bioforsk Øst Apelsvoll.

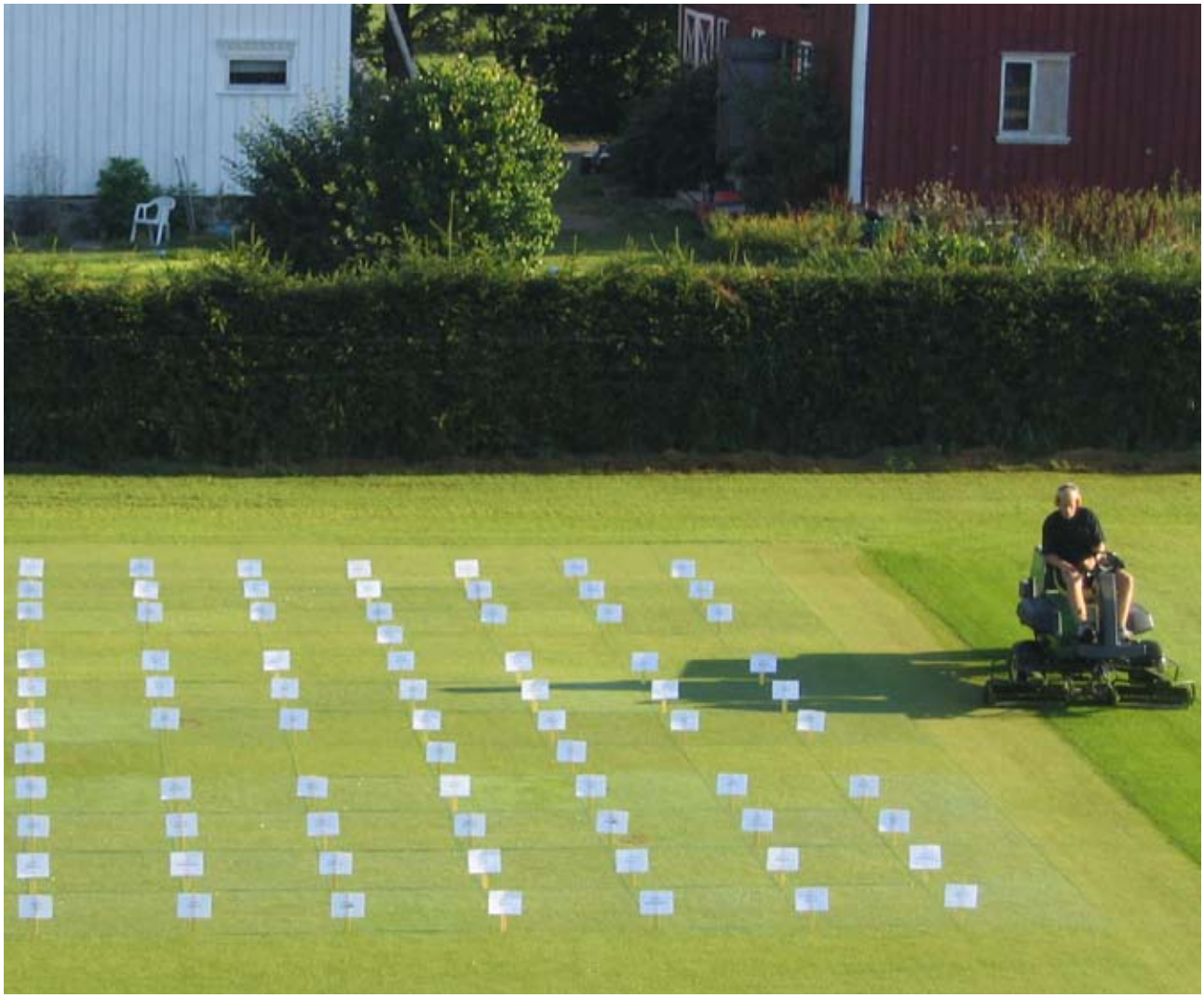
Talks and posters at conferences, meetings, seminars, field days etc. in 2007:
25, 27 Sept: Introduction of variety guide at Elmia Park & Golf, Jönköping, Sweden.
7 Nov: Presentation at HGU greenkeeper course, Alnarp, Sweden
21 Nov: Presentation at Norwegian Golf Federation seminar, Oslo

FUNDING (kSEK):						
	2007	**Total**				
STERF	45	45				
Other sources						
TOTAL	45	45				

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

The total market for turfgrass seed in the five Nordic countries has been estimated at about 6000 tonnes. About 200 cultivars of the approx. 15 grass species and subspecies used for amenity grasslands are available in the Nordic countries. Instead of basing their seed purchases on more or less subjective recommendations from seed companies, many greenkeepers have long been requesting unbiased information on the turfgrass varieties available on the Nordic market. Therefore, in March 2007, STERF established a one-year project with the objective of compiling an independent Nordic turfgrass variety guide in lay language. A printed version, published in Norwegian, was introduced at the Elmia Park & Golf exhibition in September 2007. Since then the guide has been translated into Swedish, and electronic versions are now available on the national Golf Federation websites.

The variety guide is primarily based on the STERF-funded project 'Evaluation of Agrostis and Festuca cultivars for use on golf greens in Scandinavia (2003-2006)' and on official variety testing in the Nordic countries during the past 20 years. The guide gives a detailed description of the varieties that have



been tested during this period and recommends species and varieties for greens, fairways/tees, lawns, football pitches and low-maintenance areas (including roughs). The recommendations are differentiated for the two major climatic zones in the Nordic countries, namely a southern/coastal zone covering Denmark and coastal areas in Southern Sweden and Southern Norway; and a northern/continental zone covering Iceland, Finland, Central and Northern Sweden, Central and Northern Norway and continental areas in Southern Sweden and Southern Norway. A total of 289 varieties are mentioned by name, of which 177 are described in detail in terms of various characteristics, and 105 varieties are recommended for use in at least one type of amenity area in at least one climatic zone. The Nordic Turfgrass Cultivar Guide was compiled by Norwegian turfgrass scientists Bjørn Molteberg and Trygve S. Aamlid and the manuscript was reviewed by research colleagues, teachers and golf course consultants representing the national Golf Federations in Sweden, Finland and Denmark.

OPTIMAL MAINTENANCE FOR HARDENING AND EARLY SPRING GROWTH OF GOLF GREEN TURFGRASS

Project period: 1 January 2005 – 30 June 2010

Principle investigator / contact person: Mats Linde, Department of Soil Science, Swedish University of Agricultural Sciences, Box 7014, 750 07 UPPSALA, Sweden, + 46 (0)18 671273. E-mail: mats.linde@mv.slu.se

Co-applicants: Magnus Barth, Head greenkeeper, Fullerö Golf Club, Karin Blombäck, Swedish University of Agricultural Sciences (SLU), Tom Ericsson, Swedish University of Agricultural Sciences (SLU), Maria Strandberg, Swedish Golf Federation (SGF), Arne Tronsmo, Norwegian University of Life Sciences (UMB)

Talks and posters at conferences, meetings, seminars, field days etc. in 2007:

24 Sept: Elmia Park & Golf, Jönköping, Sweden

FUNDING (kSEK):						
	2005	**2006**	**2007**	**2008**	**2009/2010**	**Total**
STERF			1 000	1 100	1 200	3 300
Other sources			500	500	500	1 500
TOTAL			1 500	1 600	1 700	4 800

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

Winter injury on turf, especially on putting greens, is a major problem on golf courses in Scandinavia. About 70% of Scandinavian golf courses suffer severe winter damage every year. This causes increased maintenance and reconstruction costs, as well as delayed opening of the golf courses as playing conditions on e.g. putting greens are sometimes not acceptable until late May.

The project consists of three parts: 1) construction of the new research greens, 2) studies of how winter hardening and early spring growth depend on management strategies and 3) information and communication.

Construction was finished in late summer 2006 when the two chipping and research greens at Fullerö GK were opened for play and management practices from grass establishment to fertilisation and fungicide treatment were altered according to the research plan. One of the greens is seeded with Festuca rubra (red fescue) and one with Agrostis stolonifera (creeping bentgrass). In addition to the new greens, an existing green with Poa annua (annual meadowgrass) is being used in the project. The research plan includes four different fertilisation regimes: traditional, traditional with late N-supply, demand-driven and demand-driven with late N, with and without fungicide and with and without early spring cover.

From November 2006 to December 2007, plants for fructan analyses were sampled four times. In the spring the damage to turf was recorded on three occasions as percentage damaged surface. Due to practical problems when preparing the plant samples and lack of time for the technical staff, the sampled plants and grass are still waiting for analysis and result calculations. The surface damage assessments showed interesting but very preliminary differences between the species. On the first occasion creeping bent and red fescue gave approximately the same result (5-7% damaged surface), but by the beginning of May the red fescue turf had recovered completely, whereas the creeping bent turf had severe damage.

The results from the trials were reported to R&A Golf Course Committee twice during 2007 and delegates from the R&A Golf Course Committee visited Fullerö GK in late summer to follow up the research and to demonstrate a new instrument, the R&A Turf Thumper, for measuring turf playing properties. The instrument will be systematically tested during summer 2008. In 2007 the research greens were also used for study visits by greenkeepers and SGF agronomists.


"The greens were covered
on 15 November in Boden and
21 November in Timrå."

DEMONSTRATION TRIALS WITH WINTER COVER PROTECTION, A SWEDISH-FINNISH PROJECT

Project period: 1 May 2007 – December 2009

Principle investigator / contact person: Boel Pettersson, Swedish Golf Federation, Idrottens Hus, Kronan A3b, SE-974 42 Luleå, +46 7 556 04 24 E-mail: boel.pettersson@sgf.golf.se and Maire Rannikko, HAMK University of Applied Sciences, Lepaa Unit, Lepaantie 129. FIN-14610 Lepaa, + 358 3 646 5241

Co-applicants: Cover materials and fungicides: Evesco-Tec Oy, HL-Vihannes Oy, Rani-Plast Oy Ab, KSAB Golf Equipment, Lantmännen Park och Mark, Bayer Crop Science Labour costs of trial area management and investigator, cover materials HAMK University of Applied Sciences, Swedish Golf Federation, Agronomist, Lepaa Golf Course, Aulanko Golf Oy, Timrå Golf Course, - Bodens Golf Course

FUNDING (kSEK):						
	2006	2007	2008	2009	Total	
STERF		100	40	40	180	
Other sources		99	62	62	223.	
TOTAL		199	102	102	403	

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

Sweden: The greens were covered on 15 November in Boden and 21 November in Timrå. No fungicide treatment was possible due to weather conditions. The temperature loggers were placed in the soil, at the soil surface and one logger will measure the air temperature. Before covering the greens, the conditions (for example grass density and diseases) of the greens were evaluated. To evaluate the grass survival, plugs of frozen turf were collected, put into a sand/peat mix and placed in room temperature. Alive and dead plants were then identified and documented.

Finland: The trial greens were treated with fungicide and covered on 26 November at Lepaa and 13 December at Aulanko. Thermocron Buttons were placed at -10 cm in the soil and under the covers on one green at Lepaa and Aulanko. Before covering, the conditions of the greens were evaluated.

IMPROVED STRATEGY FOR CONTROL OF MICRODOCHIUM NIVALE ON GOLF COURSES

Project period: January 2006 – December 2008

Principle investigator / contact person: Anne Marte Tronsmo
Norwegian University of Life Sciences, Department of Plant and Environmental Sciences, P.O. Box 5003, NO-1432 ÅS, Norway. C/O Bioforsk Plantehelse, Plantevernbygningen, Høgskolevegen 7,1430 Ås
+47 92605766, E- mail: anne-marte.tronsmo@umb.no
Co-applicants: Ingerd Skow Hofgaard, Bioforsk Plantehelse, Bjørn Molteberg, Bioforsk Apelsvoll

FUNDING (kSEK):						
	2006	**2007**	**2008**	**Total**		
STERF	370	380	350	1 100		
Other sources						
TOTAL	370	380	350	1 100		

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

The most important and widespread disease on golf courses is Microdochium nivale. Attempts to control the disease mainly involve prophylactic spraying with fungicides in autumn. Preventive application of fungicides against snow mould is independent of the actual risk of infection and disease development, and probably often unnecessary. The aim of the project is to understand how M. nivale inoculum survives from spring to autumn, how climatic conditions affect the potential inoculum and how the aggressiveness of strains varies. The project will also clarify whether the fungicides used for control of snow mould in the Nordic countries are effective against M. nivale.

SOURCE OF PRIMARY INOCULUM

Occurrence of M. nivale on grass leaves and stems in spots on greens and foregreens was observed from spring to autumn during two growth seasons. Immediately after snow melt and in late spring, M. nivale was isolated from leaves and stems in most of the spots. The occurrence of M. nivale was reduced during summer, so that in autumn M. nivale was hardly isolated from any of the selected spots. Preliminary results indicate that the fungus does not occur in the same spots in successive years. There may be several explanations for this, and it needs further investigation.

IN VITRO TESTS OF FUNGICIDES

Fungicides used for control of snow mould in Scandinavia were selected and tested in vitro for their efficiency to reduce mycelial growth of M. nivale. The products were: Acanto Prima (cyprodinil, pikoxystrobin), Amistar (azoxystrobin), Amistar Duo (azoxystrobin, propiconazole), Baycor (bitertanol), Bumper (propiconazole), Comet (pyraclostrobin), Proline (protioconazole), Rovral 75WG/Chipco Green 75WG (iprodione), Sportak EW (prochloraz), Stratego 250 EC (propiconazole, trifloxsystrobin), Topsin WG (thiofanatmethyl). A clear reduction in fungal growth was recorded at low concentrations of fungicides. Acanto Prima, Sportak and Stratego were the most efficient compounds, with a clear reduction in mycelial growth recorded even at 0.01% of the concentration recommended for disease control on golf greens.

TEST OF FUNGICIDES IN THE FIELD

The products Acanto Prima, Bumper, Comet and Stratego were tested for their effect in reducing snow mould damage on golf greens. The greens were sprayed with fungicides in late autumn and percentage winter injury was recorded on two occasions in the following spring: immediately after snow melt and after a period of spring regrowth. In the first season Acanto Prima was the most effective of the products tested.

DEVELOPMENT OF METHODS FOR NON-PESTICIDE WEED CONTROL ON GOLF COURSE FAIRWAYS

Project period: February 2008 – December 2009

Principle investigator / contact person: Anne Mette Dahl Jensen, senior advisor, Centre for Forest, Landscape and Planning – KVL, Rolighedvej 23, DK-1958 Frederiksberg C, 3528-1706, E-mail amdj@kvl.dk

FUNDING (kSEK):						
	2006	**2007**	**2008**	**2009**	**Total**	
STERF		65	125	250	440	
Other sources		612	612	612	1 836	
TOTAL		677	737	862	2 276	

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

The fundamental hypothesis in pesticide-free grass management is that the weeds can be controlled indirectly, through a plant nutrition supply strategy that allows the grass to repress the weeds. However weeds can also be reduced directly by mechanical practices such as verticutting and grooming.

The aim of the project is to develop new and improved strategies for pesticide-free mechanical management of grass on fairways that respect the environment while still meeting golf players' demand for a high fairway quality. The goal is for these management strategies to control weeds without the use of herbicides and in addition to improve playing quality due to more grass on the fairways.

In order to represent the different management principles, experiments including fertilizer regimes, verticutting (time, frequency and quality) and grooming (time, frequency and intensity) will be carried out in different combinations on several golf courses, in order to evaluate the effects under different conditions. The experiments will also be carried out on several fairways and the parameters recorded will primarily be weed and grass occurrence.

In addition, detailed studies of the different weed species and their response to the different management practices will be included. These detailed studies will primarily be carried out in greenhouses or on special research sites at the University.

EFFECTS OF ORGANIC AMENDMENTS AND SURFACTANTS ON HYDROPHOBICITY AND FUNGICIDE LEACHING FROM AGEING GOLF GREENS

Project period: January 2006 – December 2007
Principle investigator / contact person: Trygve S. Aamlid, The Norwegian Institute for Agricultural and Environmental Research, Bioforsk Øst Landvik, N-4886 Grimstad, Norway. + 47 90 52 83 78. E-mail: trygve.aamlid@bioforsk.no
Co-applicants: Nicholas Jarvis and Mats Larsbo, Swedish University of Agricultural Sciences
Arne Tronsmo, The Norwegian University of Life Sciences
Talks at conferences, meetings, seminars, field days, etc. (2007):
31 March: Swedish Golf Federation Consultant Spring Meeting, Elisefarm, Sweden.
8 Aug: Eight International Symposium on Adjuvants for Agriculture, Columbus, Ohio, USA (Oral and poster presentations)
26 Sept: Elmia Park & Golf, Jönköping, Sweden.
8 Nov: HGU-course, Swedish Golf Federation, Alnarp, Sweden.

FUNDING (kSEK):						
	2006	**2007**	**Total**			
STERF	400	300	700			

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

Creeping bentgrass (Agrostis stolonifera) and annual meadowgrass (Poa annua) putting greens are difficult to manage without fungicides. Earlier research showed that two commonly used fungicides, iprodione and azoxystrobin, are liable to leach when used on sand-based root zones. This may be due at least in part to the development of hydrophobic spots, causing water to percolate in fingers instead of uniformly through the root zone.

The objective of this project was to study the effect of organic amendment and surfactant on turfgrass quality, hydrophobicity and fungicide leaching. An experiment was conducted from May 2006 till May 2007 on a three-year-old green seeded to creeping bentgrass cv. Penn A-4 in the field lysimeter facility at Bioforsk Landvik, Norway. The experimental plan included two root zone compositions (straight sand (SS) vs. the same sand amended with 2.3 % (w/w) garden compost (Green Mix (GM)); two surfactant treatments (no surfactant vs. Primer 604, 19 L ha^{-1} applied at monthly intervals from May to September 2006); and two fungicides (Rovral 750 (iprodione 1.5 kg a.i. ha^{-1}) vs. Amistar Duo (azoxystrobin + propiconazole, 600 + 375 g a.i. ha^{-1}) sprayed in June, July and October 2006) in factorial combination. Turfgrass

quality and disease occurrence, infiltration of water vs. ethanol, water droplet penetration time and spatial variability in soil water content were determined at regular intervals. Fungicides in leaching water were analysed 2 to 3 weeks after each application and in spring 2007.

Application of Primer 604 reduced dry spots and improved turfgrass quality during summer, especially on SS plots. The improvement was associated with increased water infiltration rates and a reduction in the spatial variability in soil water content at 4-10 cm depth, suggesting that hydrophobicity extended deeper in the profile than the 14-19 mm thatch/mat layer. However, Primer 604 also increased snow mould (Microdochioum nivale and Typhula spp.) in spring 2007, probably because of a significant increase in the mean soil water content in the thatch/mat layer. Leaching of fungicides from GM root zones was always negligible, but regular use of Primer 604 reduced the total leaching of iprodione, azoxystrobin, and propiconazole from SS root zones by 60, 63, and 80%, respectively. In conclusion, Primer 604 offers many benefits on SS root zones, but there is also a need for surfactants that retain less water in the thatch/mat layer.

AGEING OF A SAND-BASED ROOT ZONE

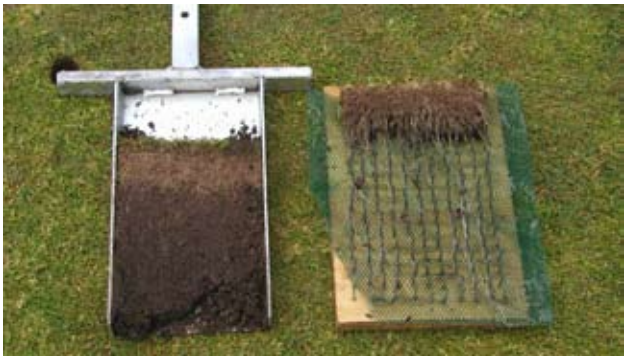
Project period: January 2007 – December 2008

Principle investigator / contact person: Karin Blombäck, Swedish University of Agricultural Science, Department of Soil Sciences, P.O. Box 7014, SE-750 07, +46 (0)18 67 10 00, Karin.blomback@mv.slu.se

FUNDING (kSEK):						
	2007	**Total**				
STERF	137	137				
Other sources						
TOTAL	137	137				

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

Successful construction of a golf green cannot be fully judged until some years after construction. Many problems first appear when the turf and the soil have been exposed to the stresses caused by players, maintenance and weather. It is therefore important to evaluate the development of different green constructions over a period of time. This project aims to investigate changes in different chemical, physical and biological soil parameters in a research green built in 1999 at Fullerö GK outside Västerås in central Sweden. It was built according to USGA recommendations and was subjected to six different treatments: three levels of organic matter content (2, 3 and 4% by weight) and two different types of organic amendment (fen peat and composted chicken manure mixed with sphagnum peat). Soil physical parameters (water holding capacity, porosity and bulk density) and chemical parameters (P-AL, K-AL, organic C and total N) were determined in the year of construction and soil biological activity was tested during the three first years. In 2004, before a reconstruction of the green, the same parameters were determined to enable a comparison and a development over time. In 2008 the samples will be analysed and the results will be evaluated.



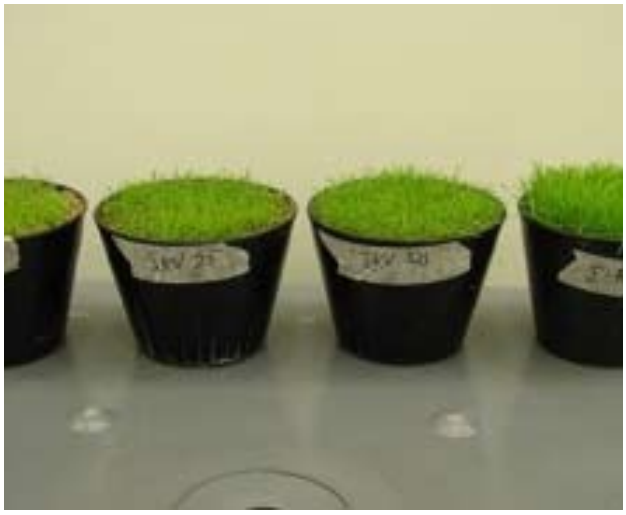
FERTILIZER STRATEGIES FOR GOLF TURF: IMPLICATIONS FOR PHYSIOLOGY-DRIVEN FERTILISATION

Project period: January 2007 – June 2008

Principle investigator / contact person: Karin Blombäck, Swedish University of Agricultural Science, Department of Soil Sciences, P.O. Box 7014, SE-750 07, +46 (0)18 67 10 00, Karin.blomback@mv.slu.se

Co-applicants: Tom Ericsson, Swedish University of Agricultural Science, Department of Urban and Rural Development, Trygve Aamlid, Bioforsk, Landvik, Norway

FUNDING (kSEK):						
	2006	**2007**	**2008**	**2009**	**Total**	
STERF		91	386	462	939	
Other sources		133				
TOTAL		224				



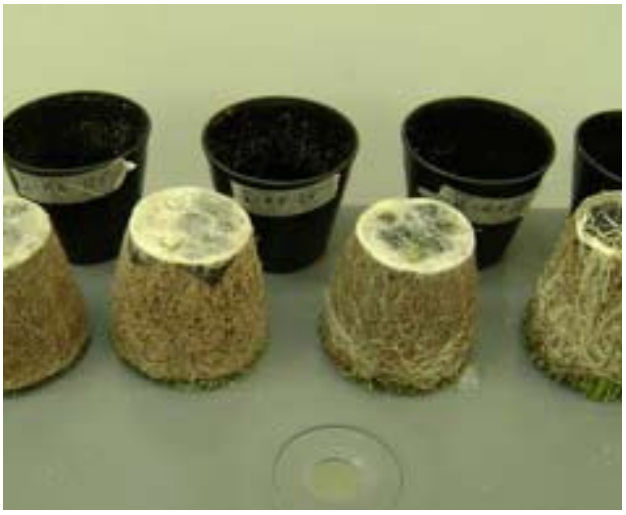


Photo 2. Root development in creeping bentgrass ('Nordlys') in response to nitrogen availability. From left to right, 12.5, 25, 50 and 200 mg N l-1

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

Most fertilisation strategies today are based on trial and error because of lack of information concerning the basic physiological relationship between nitrogen status and growth. The maximum growth capacity of the most commonly used turfgrass species and their ability to tolerate low levels of nitrogen supply when grown under steady state nutrient conditions are currently unknown. The objective of this study is to determine the linear relationship between plant N-status and growth for creeping bentgrass (Agrostis stolonifera L., cv. Nordlys and Independence), velvet bentgrass (Agrostis canina L., cv. Legendary), colonial bentgrass (Agrostis capillaris, cv. Barking), slender creeping red fescue (Festuca rubra litoralis, cv. Cezanne), chewing fescue (Festuca rubra commutata, cv. Center) and annual meadowgrass (Poa annua L.). Furthermore, the effects of plant N-status on biomass allocation, playing quality and fructan storage will be evaluated. The study is being performed in two steps. In the first step performed during winter 2007, a pot experiment was carried out under controlled climatic conditions to determine the basic linear relationship between plant nitrogen status and growth. In the second step, the findings from the laboratory study will be validated at the Bioforsk turf research site at Landvik, Norway, during 2008 - 2010. The results will be used to improve the precision of current recommendations for demand-driven fertilisation.

The pot experiment was successfully finished in December 2007. Results on aboveground biomass production are available (Fig. 1), whereas root biomass and plant N-status will be analysed in January 2008. The research green in Landvik was established during autumn 2007. Based on the analysis of grass biomass production in relation to plant N-status, fertilisation strategies for the field experiment will be available in the end of February 2008.

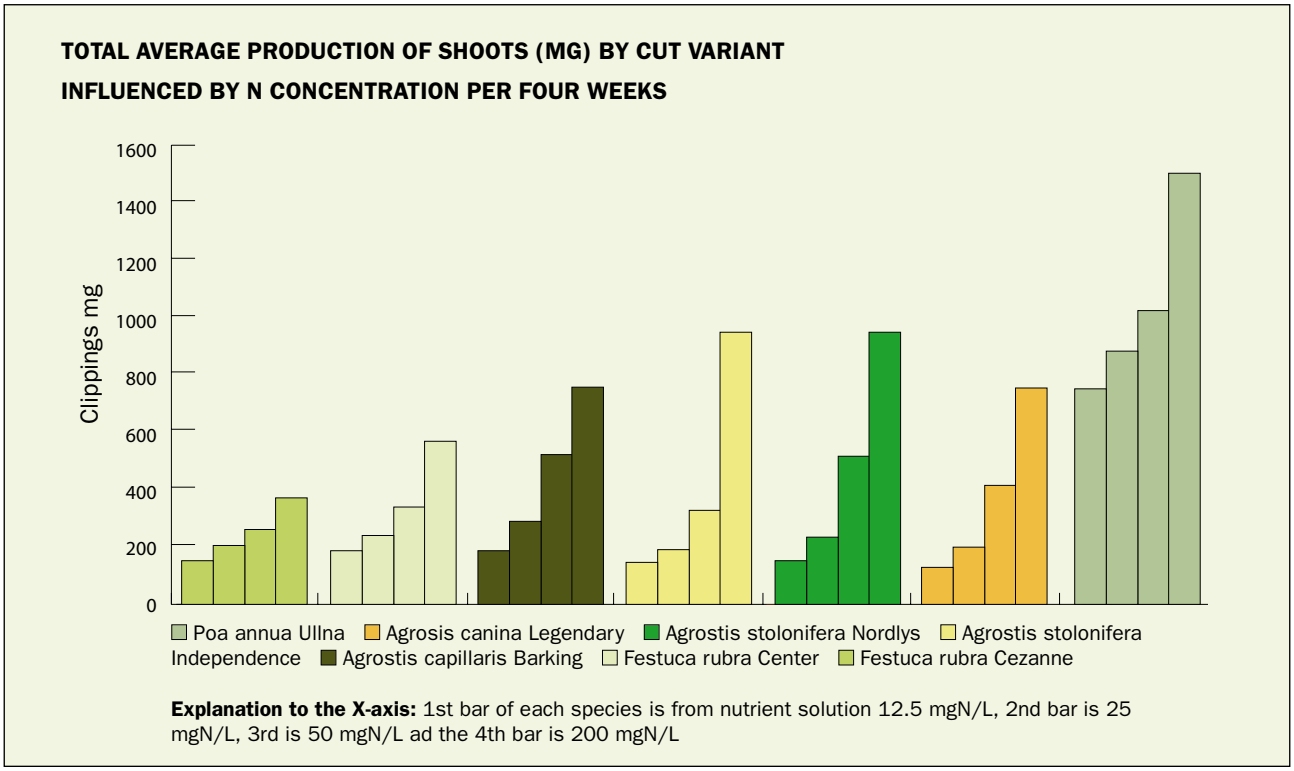


Figure 1 Aboveground biomass production in relation to fertilisation strategy.

TURFGRASS DEMONSTRATION TRIAL IN DALARNA

Project period: January 2006 –December 2008

Principle investigator / contact person: Erik Svärd, Swedish Golf Federation, P. O. Box 84, SE-182 11 Danderyd, Sweden, +46 8 622 15 00, E-mail erik.svard@sgf.golf.se

Co-applicants: Bengt Pettersen DGDF, Mikael Lagestam Samuelsdals GK

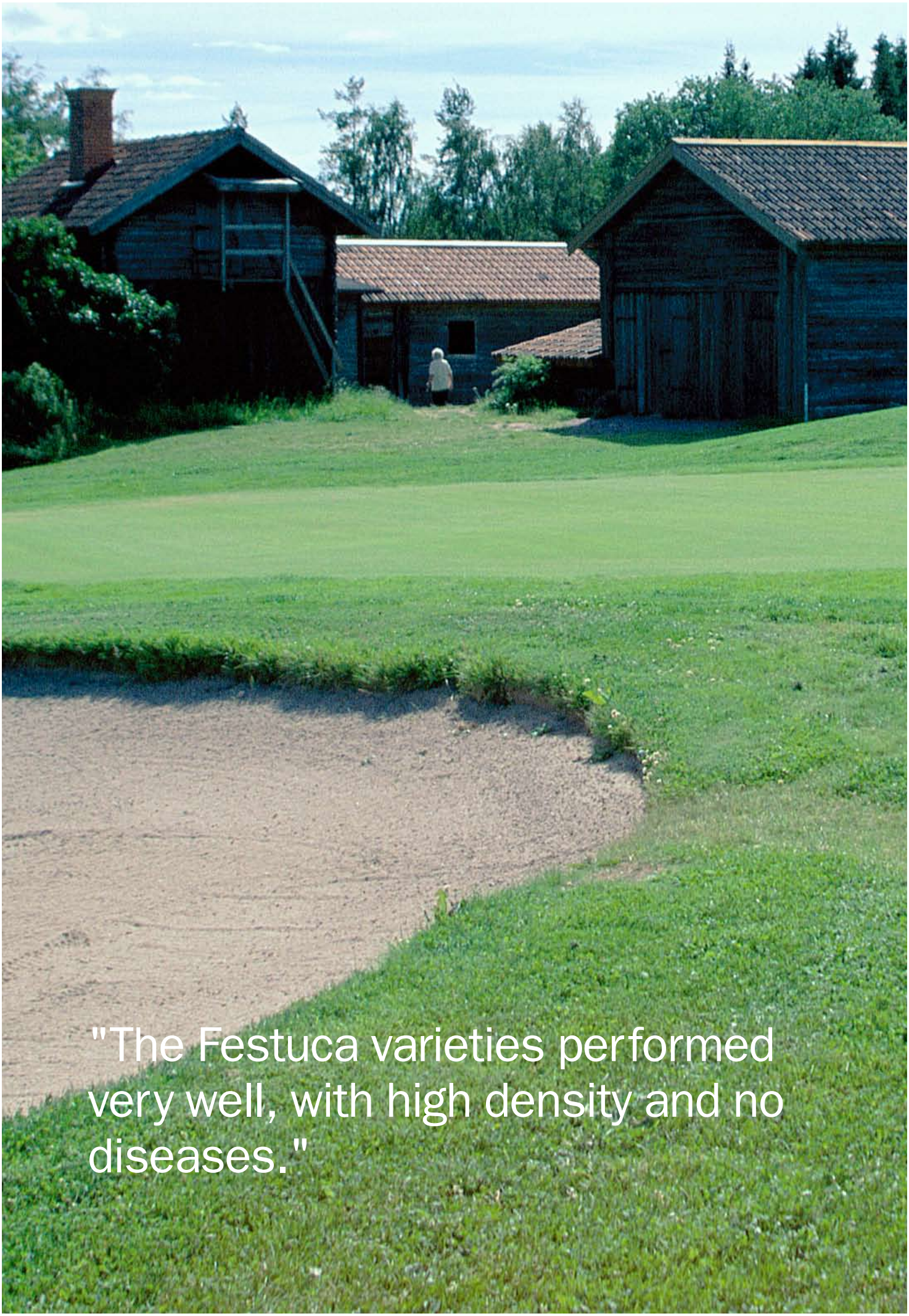
Talks at conferences, meetings, seminars, field days, etc. Results have been presented at local seminars for superintendents.

FUNDING (kSEK):						
	2006	**2007**	**2008**	**Total**		
STERF	40	40	-			
Other sources	40	40	-			
TOTAL	80	80		160		

PROJECT SUMMARY AND STATUS BY 1 JANUARY 2008:

The project is set up in Dalarna with the aim to improve knowledge of turfgrass among members of greens committees and golf course staff in the region. Greens consisting of different Agrostis and Festuca species are used to demonstrate winter hardiness and disease and wear tolerance. The velvet bentgrass (Agrostis canina) varieties still had some snow mould patches from previous spring but no new winter diseases occurred after this winter. The velvet bentgrass suffered from the snow mould damage during the whole of last season. The creeping bentgrass (Agrostis stolonifera) performed better than the velvet bentgrass, with less disease and better recovery capacity. The Festuca varieties performed very well, with high density and no diseases.

The test plots were mowed two to three times a week during the whole season and they were top-dressed every other week in the spring and then every week in the summer. The total amount of nitrogen applied was 0.96 kg/100 m2.


"The Festuca varieties performed very well, with high density and no diseases."

FINISHED PROJECTS

The projects listed below were funded by STERF during the period 2001 to 2007. More information about the projects can be found on STERF website STERF.golf.se

Nitrogen utilisation efficiency in different golf green constructions. Karin Blombäck, Swedish University of Agricultural Sciences (2001-2004).
Effects of demand-driven fertilisation on growth, appearance and nitrogen use efficiency of turfgrass. Tom Ericsson, Swedish University of Agricultural Sciences (2003-2004).
Leaching of fungicides from golf greens: Quantification and risk assessment. Nicholas Jarvis, Swedish University of Agricultural Sciences. (2004-2005).
Evaluation of Agrostis and Festuca varieties for use on Scandinavian golf greens. Trygve S. Aamlid, The Norwegian Institute for Agricultural and Environmental Research (2004- 2007).
Benefits and environmental risks of fungicide use on Scandinavian golf greens. Trygve S. Aamlid, The Norwegian Institute for Agricultural and Environmental Research (2004-2005).
The role of golf course management in the support of wetland-associated organisms in greater metropolitan Stockholm. Johan Colding, The Beijer Institute of Ecological Economics, Royal Swedish Academy of Science (2006-2007).
Evaluation of biodiversity and nature conservation on golf courses in Scandinavia. Bente Mortensen, GreenProject (2006-2007).


CALLI-
OPE
BAR
DOT
PENN
G6
GREEN
WICH

ECONOMIC OVERVIEW

INCOME STATEMENTS		
	07-01-01, 07-12-31	**06-01-01, 0612-31**
Revenue		
Net revenue	4 704 286	3 174 479
	4 704 286	**3 174 479**
Expenses	-17 736	-1 030
	4 686 550	**3 173 404**
Income from financial items		
Interest	82 321	41 533
Surplus	**4 768 871**	**3 214 937**
BALANCE SHEETS		
	07-12-31	**06-12-31**
Assets		
Cash and bank balances	1 204 724	3 334 101
Other receivables	**2 016 728**	0
Total assets	**3 221 452**	**3 334 101**
Labilities and equity		
Equity		
Restricted reserves	247 545	243 429
Non restricted reserves	2 435 793	2 548 938
Total equity	**2 683 338**	**2 792 367**
Current liabilities		
Other current labilities	538 114	541 734
Total current liabilities	**538 114**	**541 734**
Total liabilities and equity	**3 221 452**	**3 334 101**

COLLATED LIST OF PUBLICATIONS

Aamlid, T.S. 2003. Kraftig satsing på golfgras i Planteforsk. Gressforum 2003 (3)2, 24-25.

Aamlid, T.S. 2003. Prøving av kvein- og rødsvingelsorter på golfgreen. Park & anlegg 2(4): 14-16.

Aamlid, T.S. 2004. Nye forsøksgreener på Landvik. Park & anlegg 3 (7): 14-17.

Aamlid, T.S., B. Molteberg, M.E. Engelsjord & K.O. Larsen 2003. Evaluation of Agrostis and Festuca varieties for use on Scandinavian golf greens. Results from the sowing year 2003. Report to the Scandinavian Turfgrass Research Foundation. 19 pp.

Aamlid, T.S. & B. Molteberg 2004a. Evaluation of Agrostis and Festuca varieties for use on Scandinavian golf greens. Results from the sowing year 2003 and first green year 2004. Report to the Scandinavian Turfgrass Research Foundation. 24 pp.

Aamlid, T.S. & B. Molteberg 2004b. Utprøving av grasarter og –sorter på golfgreener. Resultater fra green-forsøka på Landvik og Apelsvoll i såingsåret 2003. Gressforum 1/2004: 18-21.

Aamlid, T.S., B. Molteberg & A. Tronsmo 2004. Norske grassorter på norske golfbaner. Gressforum 2/2004: 20-23.

Aamlid, T.S. & B. Molteberg 2005. Klare forskjeller i overvintring og tidspunkt for vekststart på Planteforsks forsøksgreener. Gressforum 2/2005: 18-21.

Aamlid, T.S., B. Molteberg, F. Enger, Å. Susort, Å. & A.A. Steensohn 2005a. Evaluation of Agrostis and Festuca varieties for use on Scandinavian golf greens. International Turfgrass Society Research Journal 10: 52-53.

Aamlid, T.S., B. Molteberg, A.A. Steensohn, Å. Susort & F. Enger 2005b. Evaluation of Agrostis and Festuca varieties for use on Scandinavian golf greens. Results from the sowing year 2003 and the first two green years 2004 and 2005. Report to the Scandinavian Turfgrass Research Foundation. 21 pp.

Aamlid, T.S. 2006. Vilka svampmedel är effektivast och samtidig mest miljovänliga ? Greenbladet 23(5), 58-59.

Aamlid, T.S. 2006. Seks råd for bedre vinteroverlevelse: Råd til norske golfklubber før vinteren. NGF nyhetsbrev, Nov. 2006.

Aamlid, T.S., M. Larsbo & N. Jarvis 2007. Effects of a surfactant on turfgrass quaility, hydrophobicity and fungicide leaching from a USGA green established with and without organic matter to the sand-based rootzone. In: Adjuvants on our World. Eighth International Symposium on Adjuvants for Agrochemicals. Abstracts. p. 24.

Ericsson, T. 2005. Inverkan av behovsanpassad gödsling på golfgräs tillväxt, utseende, och kväveutnyttjande. Report to the Scandinavian Turfgrass and Environment Research Foundation - STERF.golf.se

Ericsson, T. 2006. Behovsanpassad gödsling. Greenbladet 23 (2): 74-76.

Hedlund, A., 2002. Vart tar kvävet vägen. Greenbladet 19 (4):

Hedlund, A. & M. Strandberg. 2005. Gräsets tillväxt och kvävegödsling i Skandinavien. Greenbladet 22 (2), 30-31.

Hedlund, A., K. Blombäck & M. Strandberg. 2003. Nitrogen use in a golf green during one season in the Mälar region in Sweden. 1st International Conference. Turfgrass management & Science for Sport Fields. Athens, Greece, 2-7 June 2003.

Hedlund, A., K. Blombäck & M. Strandberg. 2005. Nitrogen flows and use efficiency in a golf green during three seasons in central Sweden. International Turfgrass Society Annexe - Technical Papers 10: 11-12.

Larsbo, M., N. Jarvis & T.S. Aamlid 2007. Organisk material och vätmiddel minskar utlakning. Greenbladet (Sverige) 27 (5): 40-42.

Linde, M. & Strandberg, M. 2006. Tre av fyra drabbas av skador. Greenbladet 23 (4): 37-38.

Molteberg, B. & T.S. Aamlid 2005. Utprøving av grasarter og –sorter på golfgreener. Greenbladet 22 (2): 24-28.

Molteberg, B. & T.S. Aamlid. 2006. Grasarter og sorter til golfgreener. Bioforsk Tema 1 (25): 1-5.

Molteberg, B. & T.S. Aamlid. 2007. Nordisk sortsguide for gras til grøntanlegg, 2007. Anbefalte sorter til green, fairway/tee, plen, fotballbane og ekstensiv grasbakke basert på forsøksresultater 1985-2006. Bioforsk Fokus 2 (18): 125 pp.

Molteberg, B., T.S. Aamlid, G. Thorvaldsson, A. Hammarlund, F. Enger, T. Espevig, Å. Susort & D. Nord. 2007. Evaluation of turfgrass varieties for use on Scandinavian putting greens. Results from the sowing year 2007. Bioforsk Report 2 (159): 26 pp.

Pettersson. B. 2007. Vintertäckning – möjlighet till bättre greenkvalitet tidigare på säsongen.Greenbladet 24 (4): 74-75.

Strömqvist, J. & N.J. Jarvis. 2005. Sorption, degradation and leaching of the fungicide Iprodione in a golf green under Scandinavian conditions: measurements, modelling and risk assessment. Pest Management Science 61: 1168-1178.

IF YOU HAVE ANY QUESTIONS ABOUT STERF OR THE PROJECTS SUMMARISED IN THIS REPORT, PLEASE CONTACT:

Maria Strandberg, STERF Director
E-mail: maria.strandberg@sgf.golf.se
Telephone: + 46 8 622 15 27, + 46 70 620 17 87

Bruno Hedlund, STERF Board, Chair
E-mail: bruno.hedlund@sgf.golf.se
Telephone: + 46 31 335 56 34, + 46 704 20 56 34

GRAFISK FORM: MADELAINE HENEBY, DAVID KÄLLMAN

SCANDINAVIAN TURFGRASS
AND ENVIRONMENT RESEARCH FOUNDATION

ADRESS BOX 84, 182 11 DANDERYD **BESÖKSADRESS** KEVINGESTRAND 20 **TELEFON** 08-622 15 00 **FAX** 08-755 84 39 **E-POST** INFO@SGF.GOLF.SE **INTERNET** WWW.GOLF.SE