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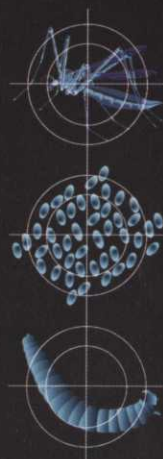


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Elise Jarvenen, Past Chairman of the Finnish Greenkeepers Association, describes life working on golf courses in northern Europe.

● Breaking the ICE

Finland is known as "The Land of The Thousand Lakes" but has less than one hundred golf courses. Not quite all of them overlook lakes; some of them are on river banks or by the sea.

Finland is on the same latitude as Alaska, which means that the winters are severely cold and the ground freezes solidly.

The Finnish summer is light and very beautiful but always far too short. The length of the growing season is about two months shorter in the north than in the south. In the south one can play golf for up to eight months of the year and in

the north for about five. On average the playing season lasts six months and the maintenance season goes on for ten months. But even midwinter does not give the greenkeeper a full holiday, as vigil watch against solid ice forming on the greens has to be kept and all changes in the snow structure must be duly observed.

Although the summer is short, the days are long and light. In the north this means three months of continuous daylight and in the south one and a half months. Just think what this means for the golf course grass! They grow "like crazy" and, accordingly, the teeing grounds and fairways have to be mown three times a week. The cost of maintaining a golf course in Finland is therefore quite high because of the large number of people hired to run the mowers.

Even in the spring the surface can remain soaked for a long period of time before the thaw sets in and the soil dries in earnest. Given the growing conditions we have in Finland the best results

for obtaining high class greens of even quality are achieved by using creeping bent or annual meadow grass.

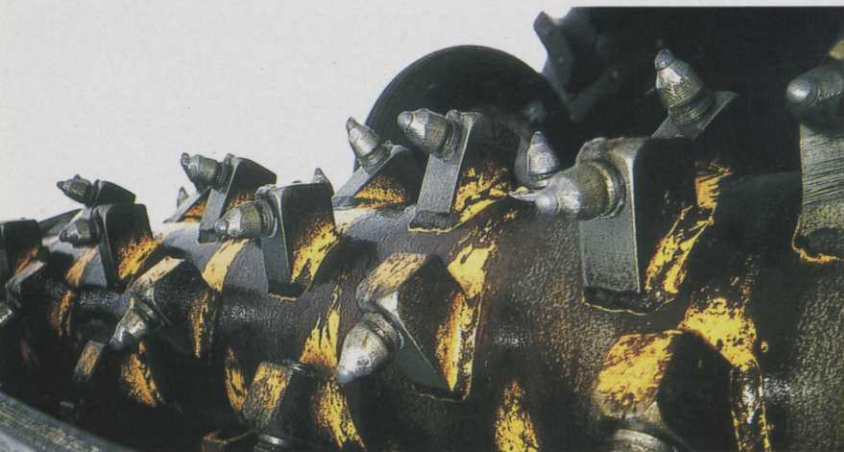
No doubt, we will have to wait for another couple of hundred years of flourishing greenhouse effects before we can expect bermuda grass to survive the Finnish winter. Even so, it is not always easy for the greenkeeper to explain to the most exacting players coming here from courses situated in a more southerly climate that bermuda grass simply does not survive and cannot grow in Finland no matter what you do.

A blend of meadow grass, chewings - and red fescues is used quite extensively for fairways, teeing grounds and rough areas.

Poa supina has also gained popularity for teeing grounds as it grows fast to cover divots and is able to



You won't see many of these in the UK!





withstand our winter climate and a low cutting height extremely well. It is, however, too aggressive to be used on greens because of a far too fast growing rate in the prolonged daylight conditions of the Finnish summer.

How do we maintain the golf course in real winter conditions?

The very idea of maintaining a golf course in the middle of the winter sounds ridiculous but there are jobs that must be undertaken specifically because of the winter. Furthermore, there are tasks that, if completed during the winter season, will reduce work in the summer. This is vital as the summer is short and is the hectic season for both playing and maintenance when courses are packed with players and machinery all at the same time.

The arrival of winter escapes any

forecasting. No two years are the same. Normally the frost sets in in October-November upon which the soil freezes solid down to a depth of 0.5 - 1.5 metres and will remain so for four to six months. Usually the snow arrives a little later but most winters will see an all-covering and lasting carpet of snow before Christmas. Sometimes the first snow comes early, when the soil is still soft. If this initial snow cover is thick and stays on, the soil might not freeze at all during the winter.

This, however, might result in the emergence of snow mildew and other forms of winter fungi, especially so as the effects of the fungicides we use do not last for such a prolonged period of time. Ideally, the soil should be dry and frozen before the snow comes. A dry and thick layer of snow is good for the wintering of the grass sur-

faces, as this will protect the grass against the cold and prevent the soil from freezing too deep down. In the eastern and northern parts of Finland the snow layer usually builds up to a thickness of 0.7 - 1.5 metres and will cover the land for an average of four months or 120 days. (plus or minus 30 days depending on where you are in Finland).

The problem is that the snow carpet does not stay dry and airy. If the temperature rises above zero the snow gets soaked and wet and even more so if the falling snow changes into sleet or rain. In such an event the water penetrates to the bottom of the snow carpet and when it freezes again the vegetation is suffocated.

In some cases greenkeepers clear the slush from the greens before it can freeze on the grass again. So far

this practice has produced quite good results, but experiences gained are still limited and the drawback is that it requires staff all around the year. Alternatively, wet snow can be dried by ploughing furrows in the snow carpet to lead the unwanted water away from the area. This method works particularly well for the fairways and makes them dry faster and gets them in full playing condition earlier in the spring.

Nearer to the coast the winter weather is more unsettled and there are more problems with icing. The ice layer can regularly attain a thickness from a few centimetres up to more than 10 centimetres. There are recorded cases of greenkeepers being taken by surprise by layers of up to 40 centimetres of crystal clear ice. Ice even collects on the descents and slopes when

• Breaking the ICE



Coping with the elements to produce quality putting surfaces (above)

the ground is frozen and the air is so cold that rain water cannot run but freezes on the spot.

Clear, solid ice is crushed with the aid of large bog rotovators fitted with spikes of hard metal. As the crushed ice is cleared from the course a considerable amount of water is removed from the surface. The clearing process should start about two months after the ice cover appears, but certainly not later than when

the vegetation begins to develop a smell. The greens must never be cleared bare of protection in temperatures which are down to -25°C . And if so, the weather must remain mild for several days ahead.

Top dressing the snow carpet

Top dressing the snow carpet with sand is one of the routine jobs undertaken when winter is about to turn into spring. As the ground is still frozen even heavy tractors will not make damaging tracks, and, as the grass is still fully protected by snow, it doesn't even matter if you use chains on the tyres. In addition to improving the structure of the grass, the dressing will speed up the melting of the snow and the drying of the fairways. The heat of the sun will be absorbed by the dark sand and the snow will practically melt away before your eyes.

Covers, electricity and checking for winter diseases

During the last ten years the use of



covers has become more and more common on golf course greens. They help to protect grass which has been exposed too early in the spring from drying and to promote earlier growing. *Poa annua* greens, in particular, seem to benefit from an accelerated start to their growth when covers have been used. Without them the *poa* trails behind the bentgrass greens by two to three weeks so the use of covers evens out the handicap.

At some golf courses electrical heating has been installed in the ground under the greens. The installation and running costs are very high therefore it is not practical. The problem from the point of view of running a course is that even if the greens are kept clear you cannot play if there is snow on the fairways.

The protection of vegetation is one of the most important maintenance jobs in the autumn whereas the monitoring of winter diseases caused by fungi goes on throughout the winter. The winter diseases based on fungi that cause most damage are called pink snow mold *Fusarium nivale* and grey snow mold *Typhula incarnata*.

Maintenance in the summer

As the ground and air eventually heat up after the winter, all growth and all development in nature set in at a phenomenal speed. The basic rule is that the course and the greens, in particular, have to be in prime condition by midsummer. In other words the course has to be put in shape within one and a half months no matter how extensive the winter damage has been. After midsummer the daylight conditions settle down and the growth of the greens gradually slows down.

Most courses possess their own assorted range of fairly good maintenance equipment even though it represents quite a lot of money. A great concern

here is that the machines work reliably. The short season affords no time off for machine repair and maintenance.

During the peak season mowing often has to begin as early as 3 to 4am on the busier courses and for the rest it is normal to start at 5 o'clock.

During mid-season the courses are kept in tournament shape for as long as possible as the courses are really packed; the average would amount to some 250 (or even a record 300) rounds a day. There are about 7,000 players a month and during a whole season this means 25,000 - 30,000 rounds of golf.

Due to the continental climate in Finland, the temperatures in June and July can reach heatwave figures and rainy days are mainly concentrated in the spring and autumn. Consequently, irrigation becomes the principal task for the greenkeeper in the hot mid-season, even though this summer (1998) produced a record amount of rainfall; up to twice the normal rate and in some places even three times above the average.

Poa annua's start of growth has always proved quite reliable but even so a new cultivation is seeded every year. This saves the greenkeepers from a lot of work in the spring and even though the *Poa* greens are a little late in becoming playable a greenkeeper can rely on *Poa* despite what bentgrass fans think.

To summarise, it would be fair to say that golf courses in Finland are maintained to the same exacting level as they are on the international circuit. The greenkeepers have learned to adjust their course maintenance and techniques according to the growing conditions and the prevailing climate. Among the greenkeepers there is a good spirit of mutual assistance, which helps us solve any problem and colleagues are never left in trouble.

So all in all, irrespective of the rigours of our winter, golf course maintenance in Finland remains an attractive and thoroughly educational occupation.







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1998 Golf Environment Competition winner, Urdrick CC, Sheffield. Photo: Eric Hipworth



In June last year, an R&A survey aimed at identifying research priorities for golf courses was conducted through BIGGA members. Dr Stephen Baker of the STRI now collates the views of the Greenkeeping profession...

...and now for the results

Introduction

In the June 1998 issue of *Greenkeeper International*, a questionnaire was circulated to give greenkeeping staff an opportunity to indicate the principal problems occurring on their courses. This formed part of an R&A strategy to identify research priorities. The results are important because if research on golf course management is to be properly focused, the views of different groups are needed and in particular greenkeeping staff are aware of problems at first hand.

In total 124 completed questionnaires were returned, with 90 from greenkeepers and course managers in England, 23 from Scotland, six from Ireland, four from Wales and one from Sweden.

Questionnaire results

Table 1 gives the overall response for each of the problems identified in the questionnaire. To establish perceived priorities for golf course research, a weightings system was applied to the questionnaire results. Five marks were awarded for each response of a severe problem, three for a moderate problem, one for a minor problem and no

points for any factor not considered to be a problem. Cumulative scores are given in Table 1, with the five most important problems relating to annual meadow-grass, traffic management/winter wear, earthworms, rabbits and golf trolleys.

Clearly the perception of problems may also be influenced by other factors most notably the weather. Thus for instance irrigation requirements may have featured more prominently had the summer of 1998 not been so wet. In addition factors such as heather management may be an issue only on a limited number of courses with specific habitats.

No major differences in patterns of response could be seen on a regional basis but there were indications that perceived problems varied between course types. Only the categories of parkland, heathland, links and converted agricultural land had more than ten cases so analysis was restricted to these course types, but the most conspicuous variations in the reporting of severe problems were as follows:

(a) Annual meadow grass control - a response of 28% and 24% with severe problems on converted agri-

cultural and parkland respectively compared with only an 8% response on heathland courses.

(b) Earthworms and casting control - for converted agricultural land 41% of responses indicated severe problems compared to 18% on links courses and only 8% on heathland areas.

(c) Irrigation management - the greatest problems were reported on links courses (27% indicated severe problems) compared to only 4% on converted agricultural land.

(d) Level of resources - greatest problems were reported on converted agricultural land (21% indicated severe problems) compared to a zero response for links courses.

(e) Rabbit control - problems greatest on links and heathland courses (46% and 45% respectively indicated severe problems) compared with a 17% response for parkland courses.

(f) Traffic management/winter wear - greatest problems on parkland courses (37% indicated severe problems) compared to a zero response on links courses.

(g) Wear by golf trolleys - greatest on parkland courses (33% severe problem) compared to a 10% and 8% respectively for links and heath-

...and now for the results

A number of additional areas for possible research were also suggested and these are given in Table 2. In some cases they overlapped with items included on the main section of the questionnaire. Issues such as the composition on the Green Committee and the mind of the golfer were specifically excluded,

although several people listed these as important factors in golf course management!

Research needs

The R&A is already funding major research projects at the STRI on earthworm control and green construction and work on heather

management is just starting. In addition the USGA is funding a project at Bingley to examine particle migration and moisture profiles in greens as influenced by the rootzone, intermediate and drainage layers. Under the STRI's own resources we have been examining drainage and moisture retention of

different rootzone materials. Furthermore the STRI's grass cultivar testing programme, that culminates in Turfgrass Seed, continually supplies new information on the performance of grasses for the golf course including indications of disease susceptibility. All this research is invaluable for providing

Table 1

Problem area	Severe	Moderate	Minor	No problem	Total score
Annual meadow grass: Control and management	30	48	29	9	323
Traffic management/winter wear	28	44	21	16	293
Earthworm and casting control	31	33	32	14	286
Rabbit control	30	33	26	31	275
Wear by golf trolleys	24	42	21	23	267
Fusarium control	22	38	28	22	252
Dry patch/superficial fairy rings	17	36	44	13	237
Levels of resources for golf course management	15	30	38	22	203
Micro-organism supplements and feeds	14	28	29	36	183
Tree management	10	35	28	32	183
Irrigation management and water supply problems	15	22	35	37	176
Bunker sand selection and refurbishment	7	38	25	36	174
Disease forecasting	7	32	35	28	166
Soft spikes and footwear selection	12	19	33	44	150
Fairy ring control	9	23	32	42	146
Thatch fungi	8	24	34	43	146
Anthraxnose control	12	18	29	46	143
Wildlife management	8	20	39	38	139
Mechanical treatments for greens	4	21	32	50	115
Grass selection for greens	4	18	40	45	114
Use of seaweed products	5	16	37	48	110
Effect of rollers on triple mower and ride-on units on green speed	3	19	37	42	109
Black layer control	2	18	35	47	99
Perennial ryegrass control on greens	5	15	20	67	90
Autumn/winter feeding	1	19	24	59	86
Grass selection for tees	1	14	37	52	84
Mowing height for golf greens	2	14	30	58	82
Yorkshire fog control	4	7	28	69	69
Heather management	2	7	7	79	38

Overall response for the severity of different management problems on golf courses (perceived severity was calculated on basis that: Severe problem = 5 points, Moderate problem = 3 points, Minor problem = 1 point and No problem = 0 points)

information on the performance of different products and materials and improves our understanding of mechanisms influencing the quality of golf courses. Our aim is always to publish the most important findings, both in scientific journals and in more popular magazines such as Greenkeeper International, so that

the results can be incorporated into future management decisions by greenkeeping staff.

The questionnaire has provided useful additional information on priorities for research funding and our thanks go to all the greenkeepers who took time to complete the questionnaire.

Table 2

List of additional items that were considered to warrant research

- Benefits of a closed season in January and February
- Bird damage
- Chafer beetles
- Clubhouse surrounds
- Disease problems of newly established greens
- Drainage problems on fairways, bunkers, rough
- Effectiveness of fungicides
- Environmentally friendly alternatives to chemical control
- Fertility of newly constructed greens
- Fever fly
- Grass clipping disposal
- Growth retardants
- Health and Safety
- Integrated pest management
- Long term effects of wetting agents
- Maintenance of USGA greens
- National Survey of fungal disease problems
- Overseeding
- Quality of irrigation water and effects on turf quality
- Storage of irrigation water
- Thatch removal
- Tree Planting
- Use of peat and organic materials in rootzones and top dressing

Dr Stephen Baker is Head of Soils and Sports Surface Science at the Sports Turf Research Institute based at Bingley, West Yorkshire



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Bernhard & Co Ltd. has traded for almost 25 years as the export arm of Atterton and Ellis Ltd. In December 1997 Bernhard's (BCo) bought Atterton's and the newly expanded company has now become BIGGA's latest Golden Key supporter. Scott MacCallum spoke with Managing Director Stephen Bernhard...

Life at the sharp end



Atterton's grinders, play a pivotal role in supporting an increasing number of greenkeepers in their efforts to produce superb playing conditions - ensuring that the cutting units he uses are razor sharp at all times.

Ask any group of golfers what a greenkeeper does and you won't lose money by betting that cutting grass will appear in the first couple of answers.

Of course we all know there's more to it than that, but grass cutting, rather like a policeman on the beat, is the visible bit and grass quality is the basis upon which they are judged. Produce a nice striped fairway or help an old lady across the road and "Boy you're doing a good job."

Stephen Bernhard, Managing Director of Bernhard & Co, aware of this, knows that producing the best possible cut, with the sharpest possible blades, results in benefits far greater than the merely aesthetic.

A horticulturist from the landscape industry, Stephen makes sure his company is run by people who know about growing grass and who appreciate information greenkeepers feed back to them after using mowers sharpened by Bernhard's machines.

"We believe the horticultural influ-

ence should always be paramount in our thinking," explained Stephen.

To highlight an example, he recounted how, years ago, Breckenridge Golf Club, in Colorado, had asked him to visit a year or so after buying a set of Express Dual and Anglemaster grinders, to discuss why snow mould diseases had been significantly reduced. Having being voted "best looking greens in the Rockies" their Superintendent said much of this was down to using the grinders, coupled with changes in his maintenance routines.

Sharpening was rescheduled to the autumn, when the grass was stressed by frequent play, drought and high temperatures. Rescheduling meant that mowers cutting during the last months of the season would be super sharp. This significantly reduced the damage to the grass blade tips thus reducing the susceptibility to fungal attack. The crew noticed lower demand for nitrogen and instead they encouraged root growth and plant development.

The grass seemed to be stronger and healthier through winter and as the Spring season began, they used the same mowers, sharpened in autumn, to mow through worm casts and accumulated winter debris. Only

then, after all rough work was completed, they re-sharpened the mowers, ensuring the turf would be mown cleanly to be at its best when the golfers came back to play - and to judge the conditions.

"By analysing this sort of experience, we constantly learn about implications of sharpening and programmes which could reduce costs," explained Stephen, who talks with great zeal about the grass research in which he and his team

are involved with a number of US turf research institutes and universities.

"We have developed a superb Cost Analysis Programme which evaluates the potential savings a course can enjoy by modifying its approach to sharpening. There are huge savings to be made from improved environmental practices and from understanding the practical implications in both agronomic and mechanical terms." Sharing this information with many organisations, colleges and mechanic associations has made Stephen a popular speaker at seminars and workshops all over the world.

Bernhard and Co arrived in the sharpening business because of what Stephen learned when in the family landscape company in the 70s. His father, Jeffrey, began his business in the early 1940's in the Midlands and he opened the first ever Garden Centre in the UK.

Stephen studied at Pershore Institute and then traveled extensively, working for landscapers in England, Holland, Germany France and in the USA, adding to his knowledge.

Returning to the family firm, he initially headed up the design side of the business and later took over the grass maintenance division.

"To reduce mower problems we embarked upon several tests that demonstrated how different techniques of sharpening could significantly improve the mower's performance and reduce our costs."

The company then invested in sharpening equipment and soon became involved with Atterton and Ellis, who had made the first cylinder



"We believe the horticultural influence should always be paramount in our thinking," explained Stephen.

