

# WINTER PLAY ON SUMMER GREENS



Early spring at Peuramaa Golf, Finland. Photo: Agnar Kvalbein.

## Introduction

Golfers discuss the time for temporary or permanent closure of the golf course for the winter, and so do course managers. There are probably no general guidelines because the grass, soil and climatic conditions vary greatly from site to site. Golf courses also experience different pressure from golfers to extend the playing season. Here we will focus on the greens, but we are aware that there are several other good reasons for closing the course. A strong agronomic argument is that the green surroundings (aprons), paths and fairways cannot resist wear under extremely wet winter conditions. Traffic under wet soil conditions can cause long lasting soil compaction, and such conditions are very unfavourable for plant establishment and growth.

**What do we mean by winter conditions?** Winter differs significantly between locations. In the transition zone they associate winter play with dormant Bermuda grass or occasional frost on greens. In coastal climates, winter play occurs during the time when grass growth is limited due to low temperatures, and the limitations for players are therefore set by the wear tolerance of the turf.

In this text we will focus on greens with cool season grass species which normally are exposed to freezing temperatures for several weeks.

## Summary

- No growth – no repair of wear
- Wear during early autumn on frozen green is very harmful for the grass.
- Winter play on deep frozen greens can be OK.
- Decisions have to be made based on local conditions.
- Protect the grass in early spring if the winter has been tough.



Oppegård golf club is closed for golf by a thick layer of snow. Photo: Pål Melbye.

## Nordic winter conditions



*At the borders between climatic zone 1 and 2 ice covers are a common condition .*

Inland Scandinavia and Finland is normally covered with snow for months, and winter play is not really an issue or possible due to Mother Nature. The west coast of Norway and Sweden, Skåne and southern Denmark have a climate that can be compared to Scottish lowland where snow cover lasts only for a week or two. The most unstable and unpredictable conditions regarding winter conditions are probably found in Iceland, a large area around the cities of Oslo, Trondheim, Stockholm and Helsinki and the inland south of Sweden. In these areas, some miles from the sea, the temperature normally fluctuates around the freezing mark during winter, and snow is transformed from slush to ice when the greens are frozen.

## Research and recommendations

Scientific reports<sup>1</sup> related to this subject are rare and the conclusions are hardly transferrable to Nordic conditions.

American turf grass agronomists have addressed this issue. Hartwiger and Moeller (2015) made recommendations that are worth reading and they provided inspiration for the outline of this text.

<sup>1)</sup> At Clemson University in South Carolina, US, a L93 creeping bentgrass putting green was subjected to wear from foot traffic or walk behind mowers in the morning at 7 or 9 o'clock when temperature were at or below 0 C. The early rolling traffic reduced the turf quality in December with 1.1 characters, and significantly more than foot traffic of 75 footsteps. However, in February differences in the measured quality parameters were not detectable, and by the end of March all plots had acceptable turf quality. The authors conclude that damages on creeping bent grass caused by winter traffic are limited to winter and early spring. (Baldwin et al. 2008)



*Shade on a green postpones the melting process considerably. Photo: Agnar Kvalbein.*

## Plants and freezing temperature

When cold temperatures occur during daytime in the autumn, the grass plant cells undergo a comprehensive internal change. The inner membranes become more flexible and there is an accumulation of proteins and carbohydrates inside the cell. This lowers the freezing point of cell fluids to below zero and reduces the size of the ice crystals inside the cells. This can be compared to additives used in ice-cream to make the product soft and smooth, or to anti-freeze.

When the temperature falls below zero during autumn nights, ice crystals will start growing on the leaf surface from the humid air surrounding the canopy. The condensation of vapour and the freezing of water release energy and keep the temperature of the leaf surface at zero degrees for a while as the air temperature

decrease. This means that the green can look frozen, but water inside the plant can still be liquid.

When the temperature continues to fall the internal water in the plant will turn into ice. In plants that are tolerant to freezing temperatures, and have undergone a sufficient acclimation/hardening period, these ice crystals will form between the cells. The razor sharp edges of ice crystals have much less chance of harming the plant when they form between the cells. This happens within the blink of an eye, and suddenly the whole plant is frozen.

Melting ice is a slower and less fascinating process. It takes a lot of energy to transform ice into liquid water again. Solar radiation can provide this energy. Shade on greens postpones the melting process considerably.

## Soil and frost

Temperature declines more rapidly in dry soils than wet soils, because water has a

huge capacity to resist temperature changes compared to mineral particles. The practical consequence on the golf course is that the greens freeze much earlier than the surroundings. (And the golfers show up in the morning because there "was no frost on my garden lawn")

## Preparing greens for winter play

If the course owner allows winter play on summer greens, changes to maintenance should be made. Deep aeration, which many courses carry out as their last maintenance post, should be done while the grass is still growing to obtain a smooth surface before the winter.

The most important task is to increase the autumn dressing rates above what is needed to control the thatch. The sand will protect the grass crowns from physical wear and suffocation in the early spring, but not from fluctuating temperatures.



*Sand protects the grass crowns from physical wear and suffocation in the early spring. Photo: Agnar Kvalbein.*

# When to close the greens?

Several factors make it impossible to give general recommendations

- grass species
- number of golfers
- period of the winter season
- weather prognosis

Annual meadow grass (*Poa annua*) greens continue to grow when the temperature is above zero. This means that it can repair some wear during mild winters, but due to the weak root system *Poa* has low wear tolerance. When spring comes it is relatively easy to repair this grass species by verticutting, which stimulate seed germination, and high input of fertilizer and water. *Poa* greens can be treated differently because the thatch contains a large quantity of seeds that can germinate and develop more rapid than any other green grass species.

On the other end of the scale is red fescue (*Festuca rubra*). It stops growing in the autumn but the strong thatch can be resistant to winter wear. The regrowth capacity in the spring is very poor. Surviving plants do not respond well to enhanced fertilizer rates and red fescue seedlings develop slowly. The bent grass greens

(*Agrostis stolonifera* or *A. capillaris*) are usually something in between. They stop growing when it is cold and need a couple of weeks with soil temperatures above 8° C to start growing.

There are large differences between courses. The local golf club, where some senior members like to play under cold conditions, is very different from the courses that attract lots of greenfee players. Due to winter stresses the turf is normally most vulnerable by the end of the winter and should be protected from wear if the winter has been tough. For instance, ice encasement for a period can reduce the carbohydrate level in the plants to a critical level and ice cold melting water and full sunlight in the spring can be very stressful for plant cells.

Plants that are growing are generally more vulnerable to freezing temperatures than acclimated/hardened plants and growing plants can easily be dried out by wind and sun when the ground is frozen.

Golf course managers and green committees should consider all these matters when deciding when to close the greens.



*It is hard to close a demonstration green in a park. Photo: Agnar Kvalbein.*



*This photo shows how pressure can damage a green during autumn. Photo: Agnar Kvalbein.*

## Some scenarios

Some use the word “dormancy” to describe grass plants that are not growing. We use the term “acclimated” to describe the plant status when it is not growing and has prepared itself to resist winter stresses.

### Frost in the autumn

Before the grass plants are fully acclimated they are easily damaged by traffic. Even foot traffic can be lethal during this phase. It is likely that the mechanical strain itself causes intercellular ice crystal formation of cell water that has not yet frozen.

***Avoid any traffic on frozen greens in the autumn.***

### Frozen soil in autumn and winter

A green that is completely frozen and has experienced a sufficient period of acclimation can resist wear very well if the grass crowns are protected with some dressing material. However, the extremely hard green surface makes it less fun to play and the low air temperature limits the number of potential players.



## Written by

**Agnar Kvalbein**  
Agnar.Kvalbein@nibio.no

**Wendy Waalen**  
Wendy.Waalen@nibio.no

NIBIO Turfgrass Research Group,  
Norwegian Institute of Bioeconomy  
Research

*Footprint from early autumn frost.  
Photo: Agnar Kvalbein.*

## Thawed green surface on frozen soil

Everyone has experienced situations where the sun can melt the green surface but the soil continues to be frozen. The combination of wind and sun dries the surface and this is stressful for the grass, as the roots are not able to take up water from the frozen soil. Normally the plants will not start growing under these extremely dry conditions but the plants may de-acclimate if the temperature is high. If that happens, the plant becomes less resistant to all winter stresses. Lasting sun, wind and temperatures below zero can dehydrate and kill plants even without wear.

Mild, moist air, mist and rain can also thaw the green. Condensation on the cold green surface transport energy into the green and increases the water content on the green surface. The top soil layer may become waterlogged and very soft if ice further down blocks drainage.

Wear will harm the plants under these conditions. More importantly, the putting surface will be damaged if the green freezes again, making it not worth playing. Damaged areas will also be open to the invasion of annual meadow grass.

***Close the greens under these conditions.***

## De-acclimated plants

If the grass plants are weak after the winter, due to long lasting darkness under snow, snow mold attack, ice encasement etc., they will benefit very much from a few weeks without play and mowing. They need to build up some energy via photosynthesis before they can produce new tillers and roots. It is difficult to keep the golfers at bay during this time of the year. As a minimum, the cutting height should be raised. It may also be possible to replace mowing with rolling for a few weeks.

## References

**Baldwin, C. M.**, H. Liu, L. B. McCarty, H. Lou, J. E. Toler, S.H. Long (2008) 'L-93' Winter Foot and Equipment Traffic Impacts on a 'L93' Creeping Bentgrass Putting Green. HortScience 43(3): 922-926

**White, C.B** (1984): Playing Par with Jack Frost USGA Green Section Record Sept/Oct.

**Hartwiger, C.**, A Moeller (2015): Winter Play – When to Go and When to Say No. Green Section Record Vol 53(1)

# STERF

STERF (Scandinavian Turfgrass and Environment Research Foundation) is the Nordic golf federations' joint research body. STERF supplies new knowledge that is essential for modern golf course management, knowledge that is of practical benefit and ready for use, for example directly on golf courses or in dialogue with the authorities and the public and in a credible environmental protection work. STERF is currently regarded as one of Europe's most important centres for research on the construction and upkeep of golf courses. STERF has decided to prioritise R&D within the following thematic platforms: Integrated pest management, Multifunctional golf facilities, Sustainable water management and Winter stress management. **More information can be found at [www.sterf.org](http://www.sterf.org)**

# CTRF

CANADIAN TURFGRASS RESEARCH FOUNDATION  
LA FONDATION CANADIENNE DE RECHERCHE EN GAZON

The CTRF is a registered charity with a mandate to raise monies and sponsor research projects that advance the environmental and economic benefits applicable to turfgrass. The CTRF is funded by contributions received from two national and six regional organizations involved in the golf and sports turf sectors. Over one million dollars has been invested in turf research in Canada by CTRF. The Foundation currently has 10 active research projects. Participating organizations include Golf Canada, the Canadian Golf Superintendents Association, the Western Canada Turfgrass Association, the Alberta Turfgrass Research Foundation, the Saskatchewan Turfgrass Association, the Ontario Turfgrass Research Foundation, the Quebec Turfgrass Research Foundation and the Atlantic Turfgrass Research Foundation. **More information can be found at [www.turfresearchcanada.ca/](http://www.turfresearchcanada.ca/)**