

New STERF project



INDUCED RESISTANCE
to *Microdochium nivale*
(microdochium patch)

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Induced resistance to *Microdochium nivale* (microdochium patch)



Microdochium nivale.

It is widely recognized that the resistance to turfgrass diseases varies among grass species and - varieties. But 'disease resistance' is not always an easy concept, and in some cases, the resistance has to be turned on like you switch on a light button. Such a 'switch' can be the cold acclimation or hardening process which occurs at temperatures in the range 0-8 °C (and even just below 0°C) in late autumn. This acclimation period not only makes the turf more tolerant to low freezing temperatures, but also more resistant to winter diseases.

The objective of the STERF project '*Induced resistance to Microdochium nivale*' is to study a type of resistance that can be 'turned on' by the application of a so-called 'resistance elicitor'.

Many biostimulants on the market claim to make the turf less susceptible to diseases, but their mode of action is rarely as well documented as for 'Civitas' which is studied in the STERF project.

Civitas

Civitas is a mineral oil product (isoparaffin + additives) developed by the chemist, Dr. Michael Fefer of Petro Canada. Influenced by the organic movement in the 1990s, Michael's wife strongly opposed spraying pesticides on the lawn outside their residence in Toronto. This triggered Michel to start exploring if any of the mineral oil products that he used to work with for Petro Canada could have an effect on turfgrass diseases. After several years of mostly private research, he developed Civitas. Michael's effort also sparked the interest of turfgrass pathologist Dr. Tom Hsiang of Guelph University.

Today, Civitas is marketed as an alternative to chemical pesticides in Canada and USA, and Petro Canada is also considering to introduce the product in Europe. This requires that the active ingredient in Civitas is added to the EU-list, which is so expensive that the company is now exploring if the European turf market is big enough to justify the investment. According to Michael, it would be much easier to convince the company's marketing division to start the registration process if it could be proven the Civitas has a market potential not only for turf, but also in the production of grapes (for wine) or other horticultural commodities.



Photo 1. *Agrostis* seedlings growing at various densities and ready to be sprayed with *Civitas* and inoculated with *Microdochium nivale*. Photo: Tatsiana Espevig.

The STERF project

STERF has for a long time had a collaborative agreement with its Canadian counterpart, the Canadian Turfgrass Research Foundation (CTRF), and in this project we are working together with Tom Hsiang and his group. Tom has already documented that *Civitas* may activate 'resistance genes' in creeping bentgrass (*Agrostis stolonifera*). Preliminary results suggest that the response may vary among varieties, and one of the objectives of the Scandinavian/Canadian project is therefore to elucidate the reaction to *Civitas* in the most popular bentgrass varieties on both sides of the Atlantic. As a first step, this was conducted during the winter 2014-15 in a screening trial with 36 different varieties of *Agrostis* (mostly creeping bentgrass, but also some varieties of colonial bentgrass (*A. capillaris*) and velvet bentgrass (*A. canina*)), growing in glass vials in growth chambers (Photos 1 and 2).



Photo 2. Research technician Anne Steensohn adds inoculum of *Microdochium nivale* to glass vials in the laboratory at Landvik. Photo: Tatsiana Espevig.



Photo 3. From the registration trial with various rates and combinations of Civitas One and fungicides at Sydsjælland GC, Denmark, 9 Dec. 2014.
Photo: Trygve S. Aamlid.

Based on the results from this screening, field trials with 10 selected varieties were established at the Norwegian turfgrass research centers Landvik and Apelsvoll in June 2015.

The project also includes registration trials on Sydsjælland GC in Denmark, Österåker GC in Sweden and Lepaa GC in Finland. In these trials, plots sprayed with Civitas at three week intervals in autumn are compared with unsprayed control plots and plots sprayed with fungicides approved for control of turfgrass winter diseases in the respective countries. During the

first winter, especially the trial at Sydsjælland GC produced very promising results, which Civitas having almost the same efficacy against *Microdochium nivale* as the best fungicide. Photo 3 was taken in the registration trial on 9 Dec. 2014, while Photo 4 was taken on the same day in an additional demonstration trial that was initiated by the headgreenkeeper Per Sørensen of Sydsjælland GC. Both photos show that the commercial product Civitas One which, in addition to isoparafin, also contains a green pigment (in North American called ‘Harmonizer’)

which perhaps may have a confounding effect as it tends to mask some of the disease symptoms.

The STERF project will go on until 2017 and it is too early to draw any conclusions. As already mentioned it is also uncertain if Civitas will ever make it to the European market. However, the principle of induced resistance may also apply to many other products, and it is therefore important for STERF to be at the forefront in this research.

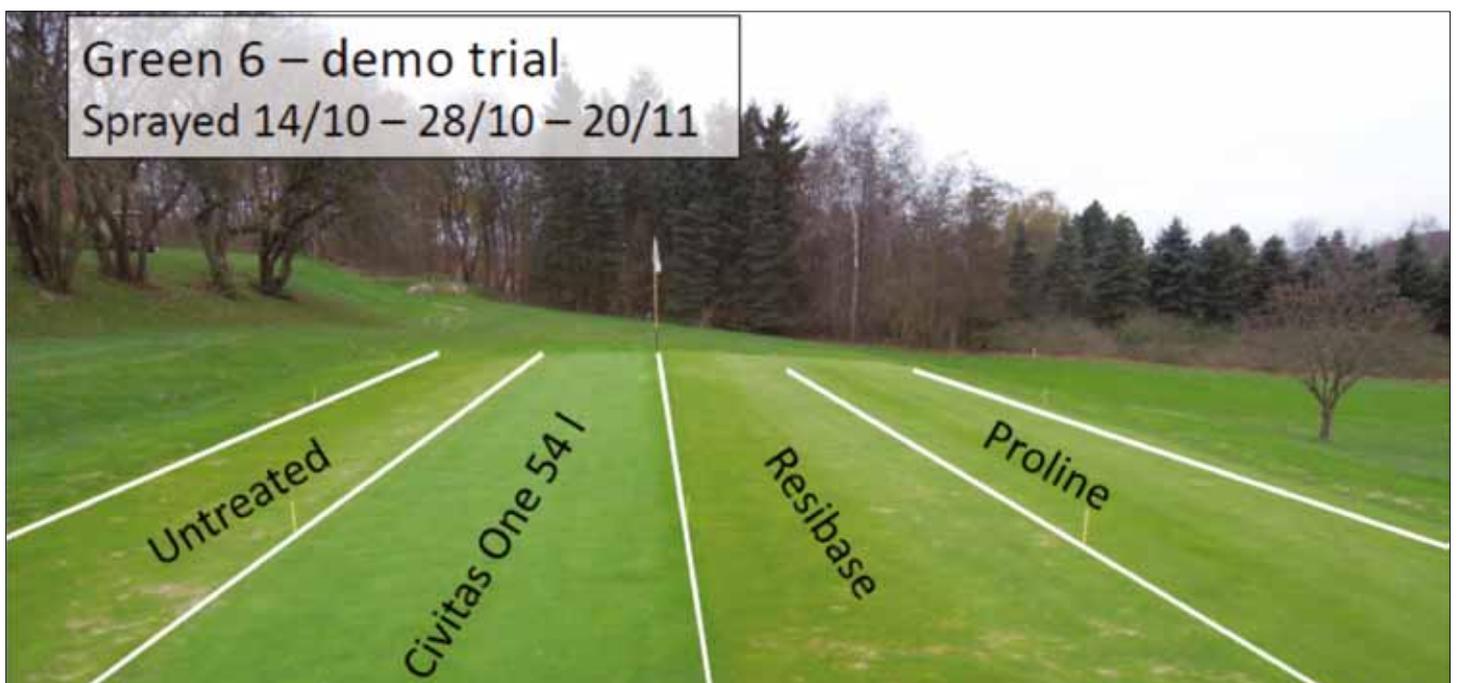


Photo 4. Demonstration of Civitas One, the fungicide Proline (prothioconazole) og the potassium phosphite Resibase at Sydsjælland GC, 9 Dec. 2014.
Photo: Klaus Paaske.