



Photo: Karin Juul Hesselsøe

Rolling to prevent, control and reduce microdochium patch

By Karin Juul Hesselsøe (NIBIO), Martin Nilsson (Copenhagen GC), Trond Pettersen, Atle Beisland and Tatsiana Espevig (NIBIO)

Rolling to prevent, control and reduce microdochium patch



Photo 1 (left): Markers usually used on football pitches, was placed into the green to divide it into plots with different rolling treatments. Photo: Martin Nilsson, June 2020. **Photo 2 (right):** Rolling greens with a Smithco greens roller at Copenhagen GK. Photo: Karin Juul Hesselsøe.

It is well known that rolling can reduce dollar spot (fungal disease caused by *Claviceps* spp.). It is less known that it can have a preventative effect on microdochium patch (formerly called fusarium/pink snow mold, caused by the fungus *Microdochium nivale*), but experiments at Copenhagen Golf Club and research at NIBIO Landvik suggests it.

The preliminary results from the first trial year show that rolling reduced microdochium patch on the green in Copenhagen GK, while the results from Landvik showed the same tendency. Both trials will continue in 2021.

Rolling to reduce fungal diseases

Several experiments have shown that regular use of rolling during the growing season can reduce dollar spot (2,3). Because it also has an effect against anthracnose, the University of Oregon tested rolling against microdochium patch on an annual bluegrass green in 2013-15 (4). The greens were rolled five times a week, and it reduced the attacks by 47% the first year and 75% the second year. Despite the reduction in microdochium patch, the conclusion was that rolling alone

was not enough to achieve a satisfactory quality of these annual bluegrass greens.

These results were the background for our experiments. Thus, at Copenhagen GC, the course manager Martin Nilsson tests the effect of rolling on a fescue/bentgrass green. At NIBIO Landvik, rolling and the effect of two fertilizer levels are tested on annual bluegrass greens.

These experiments are part of the international IPM-GOLF 2020-23 project funded by STERF, R&A and collaborators (1). The project is led by NIBIO and started in 2019. The project tests alternative methods against microdochium patch and dollar spot in Denmark, Norway, Germany and England. The experiments at Copenhagen GK are also funded by the Danish Environmental Protection Agency.

The experiment at Copenhagen GC

At Copenhagen GC timing and frequency of rolling were examined. The green was divided into 2 x 12 m plots, marked with blue, red and yellow markers, so the greenkeeper could distinguish where and how often they should do the rolling (Photo 1, left).

There were 3 replicates of the different rolling treatments which were: zero, two and four times per week. In one half of the green, rolling started in June 2020, while the rest of the green was rolled from August. Treatments ended in late November.

Course manager Martin Nilsson did monthly registrations of overall turfgrass quality (scale from 1 to 9, where 1 was the worst and 9 was the best) and % of microdochium patch in 1 m² observation plots from June to November. Total N supply was 0.5 kg per 100 m² in 2020.

Rolling from June did not have a better effect on microdochium patch than if the treatment started in August but rolling had a positive effect on the green quality. Microdochium patch did not occur until December 2020. The results showed that rolling reduced microdochium patch by 57 % (Table 1).



Photo 3: The experimental green at Copenhagen GC on the last assessment date in December 2020. Blue plots were rolled 4 times per week, red - 2 and yellow - 0 (control). Photo: Martin Nilsson.

Difference between rolling 2 and 4 times per week was not significant. However, by the assessment in December, Martin Nilsson noticed that the plots rolled 4 times per week looked less dense and more worn than the plots rolled twice per week. Control plots (no rolling) looked greener and healthier from a distance

in December, but that was due to more moss in these plots (Photo 3).

Martin Nilsson also noticed that plots rolled from August to November looked better than plots rolled from June to November, but there was no statistically significant difference here.

Table 1: Overall turfgrass quality and microdochium patch on average from June to November and from August to November, the difference between the two periods was not significant. The first signs of microdochium patch appeared in December 2020. Figures with different letters are statistically different (** - 0.01 probability level, NS - not statistically different).

Treatment	Overall turfgrass quality (Scale 1-9, where 9 is best)				Mikrodochium patch %
	June	August	October	December	December
No rolling	5.0 a	5.0 b	5.0 b	4.0 b	5.0 b
Rolling 2 times per week	5.0 a	7.0 a	7.0 a	6.5 a	2.0 a
Rolling 4 times per week	5.0 a	7.0 a	7.0 a	6.0 a	2.3 a
Probability level	NS	**	**	**	**

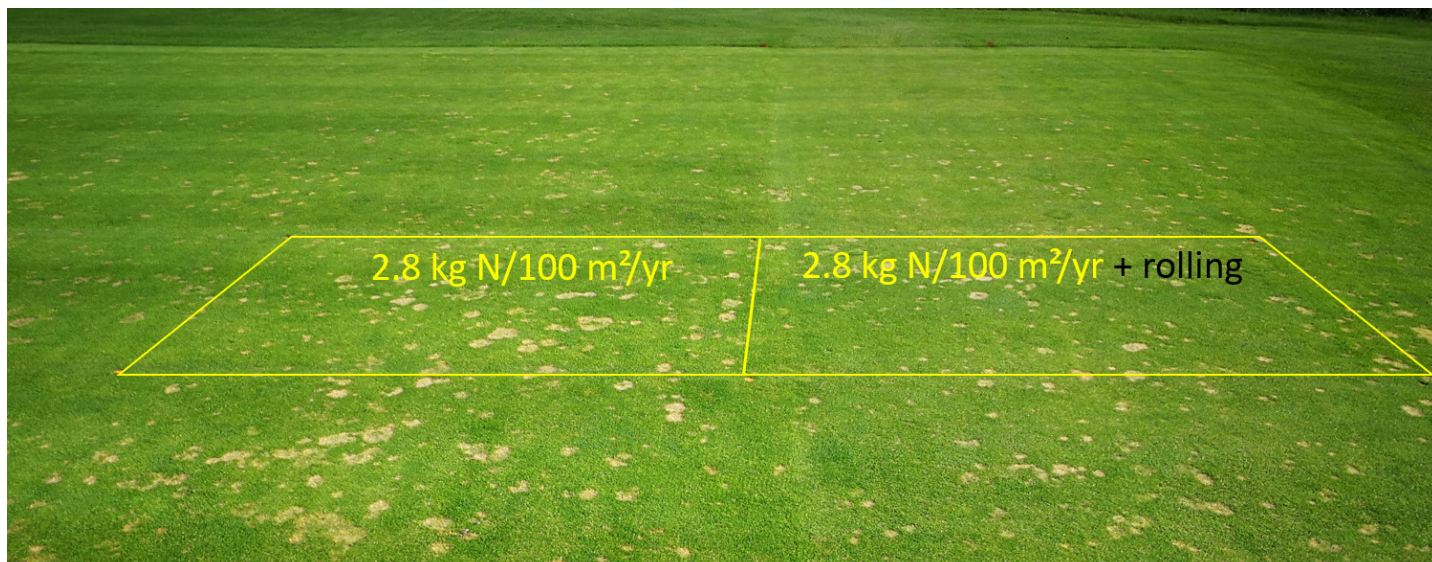


Photo 4. Less microdochium patch on 15th October 2020 on a plot that was rolled twice a week from the end of September compared with untreated control. Photo: Tatsiana Espevig.

The experiment at NIBIO Landvik

The trial at Landvik is part of a larger trial in which various alternative methods against microdochium patch are tested. Here we refer to the results only from fertilizer treatments in combination with rolling. The experiment was performed on two USGA experimental greens with annual bluegrass. A Smithco greens roller was used from the end of September to the end of October 2020. The greens were

established with annual bluegrass in spring 2019 with core material from Borregaard GC, Norway. Annual bluegrass is used in these experiments because this grass species is prone to microdochium patch or anthracnose diseases.

Experimental plots were fertilized with two nitrogen levels from April to October: a total of 2.8 kg N per 100 m² (control) and 2.1 kg N per 100 m². Treatment plots were 1,5 x 2 m in size and assessment plots were 1 x

1,5 m. The experiment was performed with 4 repetitions (2 repetitions on each green). Preliminary results show that the lower N level almost halved microdochium patch, but increased anthracnose 1,5 times (Table 2).

On plots that were rolled, there was less microdochium patch in October (Photo 4 and Table 2) but significant differences between untreated plots and rolled plots disappeared during the autumn.

Table 2. Effect of rolling and N-level on the quality of annual bluegrass greens at Landvik, Norway. Figures with different letters (a and b) are statistically different. Probability level: ** - 0.01, * - 0.05, (*) - 0.1 and NS - not statistically different.

Nitrogen kg/100 m ²	Rolling only october	Turfgrass quality (scale 1-9, 9=best)					Antracnose, %				Mikrodochium patch, %				
		11.aug.	8.sep.	5.okt.	3.nov.	2.mars	11.aug.	8.sep.	5.okt.	AUDPC	11.aug.	8.sep.	5.okt.	3.nov.	2.mars
250 (control)		6.7 a	6.3 a	5.8	4.9	2.9	3.0	6.5	2.6	390	0.4	0.0	4.5 a	10.4	41.3
180		5.8 b	5.1 b	5.1	5.6	3.9	8.3	15.1	6.0	964	0.5	0.0	2.6 b	6.1	25.8
	no	6.5	5.8	5.4	4.9	3.1	4.9	12.5	4.9	725	0.4	0.0	3.8	10.0	34.1
	Rolling	6.0	5.6	5.5	5.6	3.8	6.4	9.1	3.8	629	0.4	0.0	3.3	6.5	32.9
	p N	**	**	(*)	NS	(*)	NS	(*)	(*)	(*)	NS	NS	*	NS	(*)
ANOVA	p Rolling	(*)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	p N* Rolling	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Preliminary recommendation

Rolling seems to reduce microdochium patch on annual bluegrass and fescue/bentgrass greens. Rolling four times a week did not give a better effect than rolling twice, and wear from four times rolling gave reduced green quality in late autumn on the green at Copenhagen GC. Rolling has a positive effect on green quality throughout the summer, but to reduce microdochium patch, it seems that rolling twice a week from August is sufficient for a good control. It is also worth noting that reduced nitrogen fertilisation in the autumn resulted in

less microdochium patch on annual bluegrass greens, as has been shown in previous experiments with autumn fertilization (5).

The experiments will continue in 2021 with observations in the spring of 2021 and 2022, and here it will be interesting to see if the preliminary results are confirmed.

We thank Agnar Kvalbein for professional advice during the work on this article.

References

1. Hesselstø K.J. & T. Espevig. 2020. Integrated management of important turfgrass diseases and insect pests on European golf courses – the IPM project 2020-23 <http://www.sterf.org/>
2. Giordano P.R., T.A. Nikolai, R. Hammer-schmidt & J.M. Jr. Vargas. 2012. Timing and frequency effects of light-weight rolling on dollar spot disease in creeping bentgrass putting greens. *Crop Science* 52:1371-1378.
3. Espevig, T., K. Normann, N. Bosholdt, M. Usoltseva, S. Nilsson, A. Olofsson, J.A. Crouch, K. Entwistle, K. Sundsdal, T. Pettersen, T.S. Aamlid & T. Torp. 2020. Risk assessment, management and control of dollar spot caused by *Clariireedia* species on Scandinavian golf courses (2017-2020). Final report. sterf.org 17 s. http://www.sterf.org/Media/Get/3604/final-report-dollar-spot_final-report_2020
4. Mattox C. M., A. Kowalewski, B. McDonald, J. Lambrinos & J. Pscheidt. 2018. Rolling and biological control products affect *Microdochium* Patch severity on a sand-based annual bluegrass putting green. *Agronomy Journal* 110 (6):2124-2129.
5. Espevig T., T.S. Aamlid, T.O. Pettersen and A. Kvalbein. 2018. Effect of nitrogen in late autumn on microdochium patch on Nordic golf greens. p. 16-17. In S. Brown et al. (ed.) *Different shades of green*. Eur. Turfgrass Soc. Conf., 6th, Manchester, UK. 2-4 July 2018. Eur. Turfgrass Soc. Quinto Vicentino, Italy. <https://nibio.brage.unit.no/nibio-xmlui/bitstream/handle/11250/2660608/6th+ETSC+Manchester+2018-pp16-17.pdf?sequence=2>