The nematode *Meloidogyne fallax* in sports turf: symptoms, biosecurity guidance and control

This guide is for those who are responsible for the introduction and maintenance of sports turf in clubs, fields, golf courses etc. or the raw material intended to produce turf in such settings.

The key points are:

- *Meloidogyne fallax* is an EU regulated root-knot nematode, which affects the quality of turf and would be damaging to certain crops if introduced onto agricultural land.

- It has been detected in sports turf at several sites in England.

- Advice is provided to prevent the introduction of the nematode and ensure early detection of its presence.

- Good biosecurity practice is recommended to prevent its spread, and controls are suggested to mitigate damage.

- This is a notifiable pest and findings must be reported to the relevant authority (see last page, Advisory Information section).

Background

*Meloidogyne fallax* is an EU regulated root-knot nematode that invades the roots of plants. It has a wide host range, and can cause considerable damage to potato (*Solanum tuberosum*), oyster plant (*Scorzonera hispanica*) and carrot (*Daucus carota*) and also sports turf. Since it was described in the Netherlands in 1996, the nematode has also been recorded in South Africa, Australia, New Zealand, Chile and several European countries, including Germany, Belgium, France and Switzerland. *Meloidogyne fallax* has not been recorded from natural habitats and so its geographic origin is unknown.
There were unconfirmed records of *M. fallax* in sports turf in south-east England in 2008. In 2013, *M. fallax* was confirmed for the first time in England, infesting a leek (*Allium* sp.) field in Staffordshire. The source of the outbreak in Staffordshire is considered likely to have been green waste from processing vegetables from continental Europe. In 2015, *M. fallax* was also found in sports turf at three locations in north-west England. The nematode was not detected in samples taken from sports turf at over 30 other sites in the UK, but there is a risk that it could be more widespread and/or introduced in the future. This document has therefore been produced to highlight the symptoms of this nematode in sports turf, to provide guidance on minimising the risk of the pest being introduced or spread, and to advise on reducing the impact of the pest.

**Symptoms on grasses**

Root feeding by *M. fallax* and subsequent gall formation can cause stunting, lack of vigour and the yellowing of turf, reducing the quality of pitches, fields and golf courses (see Fig. 1 for a *Meloidogyne* gall). These symptoms can also be caused by another non-native notifiable nematode, *Meloidogyne chitwoodi*, as well as by other species of nematode already present in the UK, including *Meloidogyne minor*, *M. naasi*, *M. kralli* and free-living nematodes such as *Helicotylenchus pseudorobustus*. Typical symptoms produced by *H. pseudorobustus* and *M. minor* are shown in figures 2 and 3.

![Fig 1. Meloidogyne gall on turf roots.](image1.jpg) © Colin Fleming, The Agri-Food and Biosciences Institute, UK

![Fig 2. Damage to fescue turf caused by the spiral nematode *Helicotylenchus pseudorobustus*.](image2.jpg) © Colin Fleming, The Agri-Food and Biosciences Institute, UK

![Fig 3. Yellowing of turf caused by *Meloidogyne minor*.](image3.jpg) © Colin Fleming, The Agri-Food and Biosciences Institute, UK
Greater use of sand-based growing media in the construction of football fields and golf courses is likely to have contributed to the increasing nematode damage in sports turf over recent decades (Fleming et al., 2008). Low light levels in stadia and regular mowing to very low sward heights also increase the susceptibility of sports turf to nematode damage. Additionally, warmer environments in growing media, as a result of undersoil heating, urban heat islands or global climate change, can extend the season for nematode reproduction and allow numbers to grow.

**Biosecurity guidance**

**Preventing introduction and spread**

Possible pathways for the introduction of nematodes into sports turf include the soil / sand / compost used to form the growing media, ready grown-turf, machinery or footwear. Grass seed is unlikely to be infested with *Meloidogyne* species and so is low risk. Some risk reduction measures include ensuring:

- Growing media is nematode free.
- Sand for use on sports turf is stored uncovered and weed free for at least nine months, preferably longer before use. This is likely to kill emerging juveniles. An alternative would be to use kiln dried sand.
- Compost used as part of growing media has been composted at a temperature sufficient to kill nematodes.
- Footwear is cleaned before and after use on sports pitches.
- Any machinery that has soil attached should be thoroughly power washed before it is moved between sites.
- Waste turf, topsoil and/or sub-soil (with the exception of grass cuttings) from sports pitches, especially those where nematode damage is suspected, should not be disposed of on agricultural land.
- Work on infested or potentially infested areas that may result in the transfer of soil is undertaken towards the end of the day, following work on other areas.
- If *M. fallax* is confirmed as being present, waste disposal controls and bio security measures will be required under a statutory plant health notice.

**Sampling**

Regular soil sampling will help to detect any nematode problems at an early stage and is strongly advised when symptoms of nematode damage are seen. To be representative, the samples should ideally cover 500g per ha and should follow a systematic pattern using a soil corer to a depth of around 20 cm. Samples should be taken from around the fringe of damaged areas, and, if possible, from an unaffected area for comparison.
In order to be able to take surface cores, sampling after any period when there has been rain is ideal, though sampling during extremely wet or cold weather is not recommended. As temperatures increase in spring, free-living nematodes become more active; sampling before planting in March/April or in late summer/early autumn is therefore best. However, warm spells over winter are also satisfactory for sampling.

Controls

One means of mitigating the impact of nematodes on turf is to improve the photosynthetic capacity, and therefore the vigour, of the turf. This can be achieved by:

- Using artificial lighting to extend the length of the photosynthetic period.
- Raising the cutting height on mowers to increase the leaf surface area of grass available for receiving light.
- Using biostimulants, such as seaweed extracts and humic acid, which can improve the appearance of infested turf.

The impact can also be directly reduced by targeting the nematodes with nematicides. The garlic based nematicide Eagle Green Care is currently the only authorised nematicide in the UK for amenity and sports turf, and has been shown to be effective in trials. Steam treatment may also be a promising option, with initial results at a football stadium in northern England showing increased root growth and lower Meloidogyne populations.

Advisory Information

If *M. fallax* (or *M. chitwoodi*) has been confirmed to be present following laboratory analysis or there is a strong suspicion that *M. fallax* is present, the finding(s) must be reported to the relevant authority:

For **England and Wales**, contact your local APHA Plant Health and Seeds Inspector or the **PHSI Headquarters**, Sand Hutton, York. Tel: 01904 405138
Email: planthealth.info@apha.gsi.gov.uk

For **Scotland**, contact the Scottish Government’s Horticulture and Marketing Unit:
Email: hort.marketing@gov.scot

For **Northern Ireland**, contact the DAERA Plant Health Inspection Branch:
Tel: 0300 200 7847   Email: planthealth@daera-ni.gov.uk

For additional information on UK Plant Health please see: https://secure.fera.defra.gov.uk/phiw/riskRegister/
https://www.gov.uk/plant-health-controls
http://www.gov.scot/Topics/farmingrural/Agriculture/plant/PlantHealth/PlantDiseases
https://www.daera-ni.gov.uk
Reference


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