

# Turf War for invasive root Nematodes

A potent weapon is emerging in the fast moving *Turf War*.  
Hilary Knight talks with Colin Fleming

**Throughout the turf based leisure industry a new war is breaking out. And the enemy is the invasive and destructive parasitic root-nematode, which threatens our love of grass based sports.**

Multi-million pound businesses at golf courses, football and rugby stadiums and racecourses have a lot to be concerned about. There is increasing recognition that within a few months, root systems of hallowed turf can be destroyed as the turf becomes thinned, unstable and more importantly unplayable. It's potentially a costly commercial nightmare as pitches and greens have to be re-laid.

Fortunately, there is a new and potent weapon in this recent 'Turf War'. Lead scientists at the Belfast-based Agri-Food and Biosciences Institute (AFBI), are examining the problem and are currently studying new methods to manage nematode outbreaks, advising key sports facilities on how to control potential damage to expensive and vital playing surfaces.

Colin Fleming, Lead Scientist from the Applied Plant Science Division with AFBI outlined the problem.

"It's a fast growing problem for our sports grounds. We estimate that 90% of all new soccer and golf courses with sand based construc-

tions are experiencing significant nematode damage. Plant parasitic nematodes are microscopic round-worms (adults are 0.5-3mm long) with most of the 4100 described species living in the soil, where they feed on plants especially their roots. The heads of plant feeding nematodes contain a hollow spear or stylet with which they pierce root cell walls and ingest the cell contents, causing the plant roots to die.

"Although nematodes have been about for some time, several key changes in modern turf grass construction and maintenance have encouraged their spread and exacerbated the problem creating a

**ABOVE:** microscopic images of the nematodes, clockwise: spiral nematode, stunt nematode and needle nematode



ABOVE: Root knot damage to a bermuda golf green at Raffles Golf Course, Singapore

ABOVE RIGHT: Turf chlorosis and thinning caused by *Pratylenchoides* nematode damage on a sand dressed fairway (treated on left, untreated on right)

LEFT: Another example of green damage

BELOW: Astounding close-up of subanguina galls on roots

distinctive pattern of destruction of grass root systems.

“For golf courses and sports stadiums, the more recent move to sand-based construction to help with drainage and playability, creates a perfect environment for nematodes and so has also increased their levels in the soil base.

“More and more of our well-known sports facilities are beginning to show evidence of root damage. An affected turf typically

autumn at a leading UK (Chepstow) racecourse who have had to cancel the end of their Flat Racing season due to turf instability as a result of nematode damage. This created a potential hazard to the expensive racehorses that could catch a foot on the damaged turf. Since this story came to light we have been contacted by a number of other racecourses in the UK to analyse soil samples to monitor their own courses.”



**“At present our research shows that this is a world wide problem with no simple cure. Once you have plant parasitic nematodes in the soil base, it is almost impossible to eradicate them”**

Colin Fleming

displays reduced vigour, wilts easily in dry conditions, responds slowly to nutrient application, becomes stunted and chlorotic and may eventually die. Ground management staff are becoming more aware of the issue where previously the condition was perhaps mistaken for a fungal infection, or ‘yellow’ or ‘takeall’ patches”

“The problem is certainly being made worse by climate change as milder winters have allowed Nematode levels to increase and hatching numbers of the juvenile worms are both higher and are occurring earlier in the season.”

“The commercial implications of this damage, have been seen this

“At present our research shows that this is a world wide problem with no simple cure. Once you have plant parasitic nematodes in the soil base, it is almost impossible to eradicate them. Research, working with a number of forward thinking turf-based sports facilities worldwide, is identifying best practice methods of managing the problem, restricting the levels of nematodes in the soil and so reducing potential damage. We are then able to offer advice to these sports facilities on the best strategies to manage the problem, backed up by regular soil testing to identify times of high level nematode hatching and grass maintenance.”



“We are also carrying out research into the commercial use of a number of natural compounds which are that are showing huge potential in treating at risk areas during hatching periods, so reducing nematodes to safer levels. Several of these environmentally safe compounds are showing tremendous promise in the ongoing fight against this commercially difficult problem.”

“The turf based leisure industry is looking closely at this new technology as it seeks environmentally sound technologies that are easy to use by grounds staff, reduce levels of nematode numbers, improve turf quality by keeping root development healthy and ultimately save the huge sums of money it would take to replace the sports turf.”

One of the forward thinking leisure facilities taking part in the AFBI research programme is the beautiful and recently constructed Lough Erne Resort in County Fermanagh. This course was constructed in 2006 using a sand based design and after 18 months to two years has shown signs of nematode damage in the greens.

Head Greenskeeper Sean Reilly, explained, “Premium courses have to deliver high playing standards that players have come to expect. If we weren’t so pro-active in tackling the problem playability would deteriorate and problems would develop. Our championship course here at Lough Erne Resort has a sand based construction which allows the course to remain in play throughout the year and this makes business sense. However it does also

place more pressure on the playing surfaces and especially the greens, where the turf can become more stressed and the native nematode problem can become more of an issue if not treated.”

“Additionally, on championship courses golf greens, the pressure from players is on to cut the sward as short as possible to increase the speed of the ball when putting, but this in itself is putting more stress on the turf which is allowing the problem to multiply.”

“We first noticed problem patches on our greens about 2 years after they were constructed in 2006 and have been working with AFBI ever since then. We take soils samples every 3 weeks sending these to the AFBI laboratories in Belfast so that they can monitor nematode levels all the time and identify the stage of the nematodes life cycle for treatment. When turf is treated during the hatching period of the cycle, it is most effective in reducing numbers by 90%.”

“AFBI help to advise on how we can best treat the problem here and we are also one of the pilot amenities to test some of the new compounds that AFBI are developing to treat the problem. The natural compounds fit well with our strict environmental policies and natural wetland areas here at the Resort and are safe to use so close to the lakeside. We have had some successes so far with some of these and despite the ongoing problems, our course has stayed in great shape for our players and we know that because we have tackled this head-on, we

**ABOVE:** Sean Reilly, Head Greenskeeper Lough Erne Resort and Dr Colin Fleming, principal scientist AFBI take core samples of turf for laboratory analysis of nematode presence

**RIGHT:** Close-up showing damage

**BELOW:** The darker patches show where turf has thinned as a result of nematode root damage





are winning the battle against this almost invisible enemy.”

Football stadiums are also feeling the pressure to maintain turf, as Championship Club Middlesbrough FC can testify.

Head Groundsman, Tony Bell, has been involved with sand based pitches since 2002, but had never encountered the problem of nematodes until he started to have turf problems during the 2005-2006 busy football season.

“Pitches always thin during the winter season as light levels drop, but by Christmas 2005, the pitch was deteriorating quickly, and the pitch was becoming soft under foot. Stability became a real problem even though initially, there had been no visible signs of problems. There were no yellow patches either in those early stages, but we lost over 80% grass cover by 2006 during a very busy European season.”

“Soil samples were taken and sent to the Agri-Food and Biosciences Institute in Belfast and nematode damage was identified as the problem by Colin Fleming’s team. As a result we took 8 inches off the pitch surface and replaced this with a completely new soil, sand and fibre construction, but by 2007, the nematode infestations were back as before.”

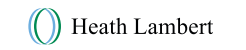
“We have been soil sampling continuously, working with AFBI for analysis of root damage and nematode hatching and following their advice for the management of the pitch. Their advice has been crucial to minimisation of damage and therefore costly repairs to the pitch. We have also been involved in trials of a number of natural compounds currently being developed by AFBI, that are showing some sign of helping to reduce the problem. It is important to concentrate on spraying these compounds to coincide with the major hatching periods of juveniles in spring, summer and

autumn, as it has shown to be difficult to catch the egg masses within the root structures themselves.”

“For the last two years we have been able to control the situation by managing and limiting the damage from nematodes by a programme of sampling to identify life cycle stages and spraying at hatching stages. We have also looked at our cutting regimes in an attempt to reduce stress on the turf, which makes it move vulnerable to nematode attack.”

“During our short maintenance period in the early summer months we also have been removing the top 10-15 millimetres of soil, which helps to get rid of the additional problem of meadow grass and algae that start to invade thinning turf areas as a result of nematode root damage. This has helped to maintain playability and has been a better commercial option than replacing the entire pitch surface every year which is an extremely costly and also lengthy process.”

**“The pitch was deteriorating quickly, becoming soft under foot. We lost over 80% grass cover during a busy season”**  
**Tony Bell, Head Groundsman**  
**Middlesbrough FC**



This article comes to you courtesy of the BIGGA Learning and Development Fund.

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Dr. Colin Fleming can be reached via email address [colin.fleming@afbi.gov.uk](mailto:colin.fleming@afbi.gov.uk) and the website for AFBI is [www.afbi.gov.uk](http://www.afbi.gov.uk)

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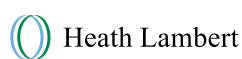


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# Grow wild on the golf course...

## *and put the habitat back*



Linda Laxton offers a guide of what to plant where, when to plant it and the benefits that different species bring

**Not so many years ago, golf courses were being attacked by ecologists as un-natural, profit obsessed, elitist wastes of green space that were endangering our natural habitats and threatening the environment with the use of unnecessary chemicals.**

Since then common sense has tempered that view, aided by greenkeepers' positive attitudes to preserving wildlife and the industry's general move towards sustainability (where possible) and away from the practise of applying products in isolation, regardless of the existing soil make-up. Greenkeepers' love of nature goes without saying and goes with the job, so whether you're looking to simply encourage biodiversity in the rough or go the whole hog with

a grey water filtering system.

If I were planning to bring biodiversity to the golf course I'd start with the rough and semi-rough as they're the biggest possible areas of wildlife habitat, and I'd recommend quite robust plants that will stand golfers tramping around trying to find their balls!

### **Parkland/Inland Courses.**

For parkland and most inland courses Knapweeds, Oxeye Daisies, Hedge Woundwort, Rosebay Willowherb, Dandelions and Buttercups will all do the job, with Foxgloves, English Bluebells, Primroses and Red Campions for shady areas. All you need to do is just clear small spaces and put them in any time from October to March. They don't

need any looking after, they will seed themselves and attract between them; Bumble Bees (Foxglove), Elephant Hawk Moths (Rosebay Willowherb) the Rosy Rustic Moth (Hedge Woundwort) and the Plain Y Moth. The larvae of the Campion Moth that lives in the Red Campion's seed heads is a valuable food source for Blue Tits and Knapweed provides nectar for bees and butterflies, while Greenfinches eat the seed. As primroses are pollinated at night they provide food for a variety of moths.

### **Links Courses.**

Links courses will also happily play host to Harebells, Red and White Clover, Stonecrop, Marram Grass, Sea Couch Grass, Dune



MAIN ABOVE: A reedbed  
INSET: A bee on a knapweed  
ABOVE: Red campion

## WILD FLOWER CALENDAR

### January/February

– Coltsfoot

### March/April

– Dog Violets, Primroses, Red Campion

### May/June

– Dandelions, Buttercups, Daisies

### July/Aug

– Knapweed, Oxeye Daisies, Clovers, Vetches, Birds foot Trefoil

### September/October

– Hedge Woundwort, Lesser Burdock, Angelica

### November/December

– Guelder Rose, Wild Clematis, Wild Privet, Woody Nightshade.



ABOVE: A cricket lands in the rough.  
BELOW: Sea campion.  
BOTTOM: Harebell



Fescue, Vipers Bugloss, Slender Birdsfoot and Trefoil, loved by the *Bombus subterraneus*, endangered and almost extinct bumble bee. Sheep's bit, Scabious and Sea Campion will also do well. For the three butterfly species that migrate to these shores from the Mediterranean, the Tortoiseshell, the Peacock and the Painted Lady, these plants provide the first nectar break after their long journey.

### Heathland Courses

The wild flowers mentioned for general inland golf courses will survive on Heathland courses but due to the acidity of the soil there are others that will do better. Sheep's Sorrel which is the larval food plant of the Small Copper Butterfly, Harebells, Thyme and Tormentil, Gorse and Heather, which has its own special maintenance programme and is adored by bees. Meadow Pippets, Grouse and various Fritillary Butterflies love these plants.

### Lakes, Ponds, Streams and Water Hazards.

If golfers are likely to be wading in to collect stray golf balls I would keep away from plants like Water lilies that could get damaged. This situation needs spiky plants that are planted, around the edge of the water. Marginals including Reeds, Irises, Ragged Robin, Purple Loosestrife, Marsh Marigolds and Bulrushes, once established will encourage dragonflies, newts, water voles, frogs and toads, and can be planted from October to March. Water Soldiers float in summer and

then sink to the bottom of the pond and live in the mud over winter. They should be 'golfer' proof but need to be planted in the spring when the water has heated up.

### Grey Water Filtering

Many of our water loving marginal plants will recycle grey water from the clubhouse caused by washing-up, washing machines and showers, which you can safely re-use for irrigation.

Grey water needs to pass through plants of three different densities so you either need a long narrow pond (like a brook) or three smaller connecting ponds. Build settlement beds of re-cycled materials – crushed glass will last 10 years – and plant into it. Section one, or your first pond should contain reeds which have a good root mat and act as a physical filter. Section two should have Yellow Flag Irises, Marsh Marigolds and Bulrushes, while the third and last section needs sedges and floating plants for oxygenation.

The Lesser or Greater Pond Sedge will effectively pull anything that's left, detergent for example, out of the water and you will be able to safely re-use it for irrigation."

Golf courses are 'managed', but then so are the 'wild' heath lands of the North Yorkshire Moors and every back garden in the land. That doesn't stop them becoming important havens of biodiversity and by providing the right food source you can attract even the most endangered species and help secure their survival. As Linda Laxton says "Golf courses offer an ideal opportunity to put the habitat back."



### about the author

Linda Laxton is the owner and MD of British Wild Flower Plants, 31 Main Road, Burlingham, Norfolk NR13 4TA.  
www.wildflowers.co.uk  
Email: office@wildflowers.co.uk  
Tel: 01603 716615

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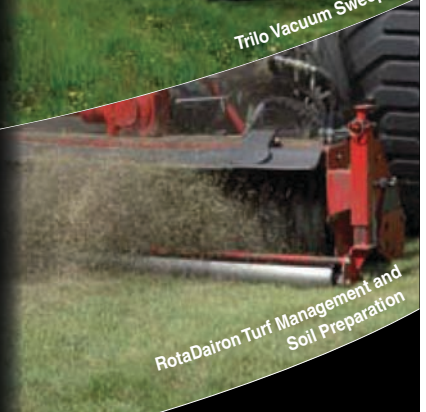
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*Harrogate fix*, says Scott MacCallum

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delegates in huge numbers while, with money short and budgets tight, companies have shown their faith in Harrogate by continuing to exhibit in solid numbers.

It says much for BIGGA's flagship event that such statements can be made, and in 2011, like every year since it first took place in 1988, it is a win-win for visitors and exhibitors alike.

