

**Qualify while you work in
Sports Surface Technology**

Today, the sports industry is one of the fastest growing industries. It is essential that surfaces on which sports are played remain in outstanding condition. Our flexible training programme addresses the business and technical skills required to achieve the high quality sports facilities of tomorrow:

- Our ten, two week short courses are available individually and provide training in specific areas such as "Sports Surface Playability," "Mechanisation for Sports Surfaces" or "Irrigation and Drainage."
- Successfully complete all ten, together with a research project which can be carried out at your own sports venue and you will be awarded an MSc in Sports Surface Technology. You can take up to five years to complete the course.
- Our MSc in Sports Surface Technology is also available as a one-year full-time course. Apply now for entry in October 2002.

Endorsed by The Institute of Groundsmanship and supported by top national and international sporting organisations, this qualification will enhance your future career and salary prospects.

Bursaries available

For further details please contact Kathy Graves, Student Enquiries, Cranfield University, Silsoe, Bedford MK45 4DT.

Tel: 01525 863319 Fax: 01525 863399

Email: StudentEnquiries.silsoe@cranfield.ac.uk
www.silsoe.cranfield.ac.uk

ZallysUK

Eco transporters - for Golf Courses

The Zallys range of electric power units incorporates quality build and state of the art battery technology. Zero emissions, minimal noise and vibration coupled with the simplest controls ensure everyone can use them with ease and safety.

- Versatile and stable
- Ideal for club hire
- Range up to 50km
- comfortable all-weather seat
- Golf bag carrier option
- Wide wheels for low ground pressure



For further information Tel: 01332 824777
or a demonstration email: sales@zallysuk.com

www.zallysuk.com



HAZTEK INTERNATIONAL

Specialist Health and Safety Advisors to the Golf Industry

DON'T BREAK THE LAW

- Advisors in
- Health and Safety Policies
 - Risk Assessments
 - Fire Risk Analysis
 - Safe Working Practices
 - Emergency Procedures
 - Manual Handling

To book your free survey or for further information contact us on:

Telephone - 020 8905 7552 • Facsimile - 020 8930 1015

Email - haztekhse@aol.com • Web - www.safegolf.co.uk

Members of The British Safety Council and RoSPA

DENNIS

Grounds
Maintenance
Equipment for
Professionals



Telephone 01332 824777

for more information on our full range of products or log onto www.dennisuk.com

This month, Rachael Palmer, BIGGA's Membership Services Officer would like to welcome 79 new members to the Association and asks if getting a photo taken for the new membership cards is causing problems.

Renewals: No photo – no problem!

British and International
 Golf Greenkeepers Association

RICHARD BARKER
 Beedles Lake Golf Club

GREENKEEPER
 Membership number XXXXX

Valid until 31 Dec 2002



Are you delaying returning your renewal form as you have still to get your photo taken?

By putting off the return of your form you could risk missing out on all the benefits of membership including receiving your monthly copy of Greenkeeper International, use of the Legal Help Line not to mention access to the members exclusive section of the website. If getting to a photo

booth is really impossible for you then you can send in your old membership card and we can reuse your photograph. Alternatively as long as you provide us with a clear picture of yourself which is approximately passport photo sized there should be no reason why we can't use it.

However if sorting out a photo is still going to take several weeks, return your green renewal to us without one and we will still be able to process your membership so that you can continue to enjoy the benefits of membership. You can then send in your photograph at a later date remembering to write your name and date of birth clearly on the back. Upon receipt of your photo we will despatch your new style plastic membership card.

Remember you only have to supply us with this one photograph and we will reprint the image onto a new card each year.

June's Membership Draw Winner



Just introduce one or more new greenkeeping members to BIGGA and your name will be placed into a draw to win a fantastic BIGGA Clock/calculator/calendar and alarm. Our

congratulations go to June's winner, Ross Wilson, of Parasampia Golf Club.

It's never too late to renew!

If your membership expired in December, January, February or March it's still not too late to renew. Just complete your renewal form and return it to the Membership Services office and we will update your membership with a new expiry date. If you have mislaid your renewal form or would like details on paying by direct debit then call Rachael Palmer on 01347 833800

BIGGA welcomes...

Scottish Region

Rory Campbell, East
 John Hamill, North
 Keith Law, North
 John MacBeth, Ayrshire
 Christopher Scott, West

Northern Region

Peter Anderson, N East
 Steven Anderson, N East
 Wayne Birks, N East
 John Edmond, Northern
 Jason Edmond, Northern
 Jordan Gibson, N East
 Michael Gumeniuk, Northern
 Mark Hastry, N East
 Michael Hodgkin, N West
 Jacob Kay, Northern
 Andrew Laird, N West
 Jason Lee, N West

Ronald Martin, N East
 Reamonn O'Neill, N Wales
 Robert Wiles, Northern
 Barry Wood, N West

Midland Region

Tony Bates, BB&O
 Sean Bilyard, Mid Anglia
 Nathan Bond, BB&O
 Mark Burniston, Mid Anglia
 Michael Farmer, BB&O
 Graham Gardner, BB&O
 Peter Goodwin, BB&O
 Stuart Harding, Mid Anglia
 Daniel James, E of England
 Danny Jones, BB&O
 Gregg O'Brien, Mid Anglia
 Simon Pigott, E of England
 Matthew Read, Mid Anglia
 Andrew Richardson, E of England
 Robert Tomkins, Mid Anglia

Roger Tustain, BB&O
 Matthew Weatherstone, BB&O
 Michael White, E Midland
 Paul White, Mid Anglia

South East Region

Nik Beasley, London
 Paul Best, Kent
 James Burton, E Anglia
 Daniel Cowley, London
 James Dalton, Essex
 Paul Durrant, E Anglia
 Andrew Garland, London
 Aaron Gumery, E Anglia
 Dale Hubbard, Essex
 Patrick Laws, Essex
 Richard Norton, E Anglia
 Stephen Parsons, Essex
 Mick Payne, Surrey
 James Rattenbury, Essex
 Peter Read, E Anglia

Neal Tregasties, Kent
 Peter Willett, E Anglia
 Robert Williams, Essex
 Alex Wilson, Surrey
 James Winner, Essex

S West/S Wales Region

Christopher Bell, S West
 Richard Carter, S West
 Michael Craddock, S Wales
 Paul Ferragut, S West
 Derek Thomson, S West
 Bobby Vining, S West

Northern Ireland

Mark Riddle

International

George Eastwood, Ireland

Finbar O'Mahony, Ireland
 Henrique Holanda, USA
 Jason Podris, USA
 Phillip Connors, Australia

Associate Members

Michael Cox, Surrey
 Brian Boyle, N Ireland

Corporate Members

Darren Clewes, Midland
 Ruth Mann, Northern

Student Members

Michael Abbott, N West
 Pebbles Burns, Essex
 Paul Staples, S Coast

Exclusive Reader Offer for BIGGA Members



BIGGA's Summer Collection

As the days get warmer and nights shorter why not treat yourself to BIGGA's summer range of branded leisurewear, perfect for wearing on the golf course.

Our model is wearing a classic polo shirt by Cutter and Buck in sunflower, which boasts reinforced seams, extra fine twill tape detailing and is generously sized for ease of movement. For extra warmth in the evenings why not team it with a navy blue slipover made of 100% lambs wool. To cope with the unpredictability of the British summer, we also offer a wind and shower proof top from Walrus Golfwear which will take care of your comfort and freedom of movement on the golf course.

All items are available from BIGGA HOUSE by calling Rachael Foster on 01347 833800.

- A** Cutter and Buck BIGGA Logo Classic Polo Shirts Available in sunflower and navy. M, L, XL or XXL available. **£29.95**
- B** Peter Scott BIGGA Logo Slipover (Navy only) Sizes 40" to 46", larger sizes available on request. **£29.95**
- C** Walrus Golfwear Wind/Shower Proof Top Available in tartan only. M, L and XL available. **£15.00**
- D** Slazenger Baseball Caps Available in khaki with a light blue peak. One size fits all. **£12.95**

All prices include postage and packing

How well do you know the people who work for the Association?

In this new series we give you a chance to learn a little more about a member of BIGGA's Headquarters staff



Sami Collins

Name: Samantha (Sami) Collins

Position: Education and Training Administrator

What does your role involve? Organising delegates attendance at Continue to Learn and BTME; Regional Training; Golf Environment Competition; Toro Student of the Year Award; running CPD scheme and Master Greenkeeper Certificate

How long have you worked for the Association? Nine years

Where were you born and brought up? Born in Edinburgh, brought up in Harrogate, with a year living in the USA when I was 17.

Where did you work before you joined BIGGA? I can't remember it was so long ago! (a computer company).

What are your hobbies? Going to concerts, the movies, travelling and reading trashy novels.

What is your favourite food? Mexican. It's spicy and you get tequila

What is your favourite film? Can I have a top five in no particular order? 1. Some Kind of Wonderful; 2. All the President's Men; 3. JFK; 4. Almost Famous; 5. High Fidelity.

What was the last book you read? I don't know the title, but it was trashy!

Who is your all time hero? John Lennon

What was the best event you've ever attended? Journey (my favourite band) at Red Rock Amphitheater, Colorado (my favourite venue)

What is your claim to fame? (None not acceptable) Was good friends with Hugo Speer (the Lunchbox from The Full Monty) at college

Take control of your irrigation system.



TORO Commercial and Irrigation Products distributed by Lely (UK) Limited
St Neots, Cambridgeshire PE19 1QH. Tel: 01480 226800 Email: toro.info@lely.co.uk www.toro.com

Just add Toro's simple, affordable, compatible control system.

Converting or upgrading your existing system to a PC-based operation couldn't be easier than with Toro's simple, but highly effective, Gemini and Trident central-control systems.

Flexible, compatible and easy to use, with a user-friendly interface, these systems are packed with the features you need to save time, money and water.

Controlling existing two- and three-wire systems, they will monitor your water usage, detect faults and provide simple diagnostics and online help.

Gemini and Trident Control Systems set the standard in the industry. So for water when and where you want it, let Toro put you in control. For more information, call 01480 226800.



Brush off your dew for a better cut without clumps of debris!



18' width with 3 floating sections for contours



The Multi-Brush instantly transforms into a 6' wide zig-zag brush for greens



Paul Eddlestone of Fishwick Hall Golf Club has been using the new Multi-Brush for a month now and says: "Being situated besides the River Ribble, we tend to get heavy dew in the mornings so its mid afternoon before we could get a good quality cut on the fairways.

Now we brush all the fairways and rough each morning. It only

takes us an hour and a half to two hours and then we can start mowing 10 minutes later. I've been doing it for a month now and I can honesty say I don't think we've left any clumps of clippings anywhere on the course".

GreenTek

INNOVATIVE TURF CARE MACHINERY
DESIGNED TO SAVE YOUR TIME!

0113 267 6000





Scott MacCallum visited Greetham Valley and met Adrian Porter, who together with his team, makes an army of ants look slovenly

THE CLUB WHICH NEVER SLEEPS

There can be few greenkeeping teams which operates quite as efficiently as Adrian Porter's at Greetham Valley Golf Club, near Oakham, in England's smallest county, Rutland.

A bold statement one might think, and I am more than happy to be proved wrong, but when you consider that Adi's team of nine manage two 18 hole courses, a par-3 course, a driving range, a bowling green, help at the club's newly built 4x4 course, oh and, operate a contracting division which manages fine turf for anything from other golf clubs, state-ly homes to private dwellings as well as maintaining local bowling greens and football pitches you might get my drift.

"We are a young team and there is a real go-getting atmosphere around the place. There is as much work out there for them if they want it and if they work the hours they'll get good money," said Adi.

The average hours the guys put in in the summer is around 50-55 a week and Adi himself doesn't leave until the jobs are done and regularly works 6.30am to 6.30pm.

It is an up and at 'em approach which is epitomised by a club which only celebrated its 10th birthday in April. To mark the occasion they held a competition for members, friends and supporters over both the Lake and Valley courses which acted as more than just a thank you to every-one who had helped make the club

successful but a true marker as to just how far Greetham Valley has come over the past decade.

Amid all the tributes to the Hinch family, without whose vision and drive the complex would still be a sheep and arable farm, was a very public and heartfelt thanks to Adi and his team for making dreams a reality.

"They are great that way. I am always invited to competitions which the club holds and they never fail to credit the staff for the work they do while the members often go up to staff while out on the course and

complimenting them on the condition of the course," said Adi.

Adi joined the club from Crocketts Manor G&CC, in Henley-in-Arden, in 1995 after the Hinch family led by Frank but with superb support from his wife, Hazel, son Robert and his wife, Dee, decided that the introduction of a professional Course Manager was vital if the club was to fulfil its potential.

"For the first three years they tried to run it by themselves with some farming friends but before I came they had begun to lose members to neighbouring clubs," explained Adi.

"It didn't look like a golf course. Every fairway was cut from tee to green with no definition. They knew something wasn't quite right and Robert - who is now the Club's Managing Director - was getting ear-ache whenever he went into the clubhouse."

An advert soon went into Greenkeeper International and Adi was appointed.

"It was a bigger development, closer to my home, and as soon as I walked round the course I knew it was a job I wanted. I felt I could really make a name for myself at Greetham Valley."

At that stage they had just finished the construction of the nine holes to turn it into a 27 hole complex, plus the par-3 course, and were at the stage where they were still seeding greens and turfing areas.

There was no mention in specific



Adrian Porter: Head Greenkeeper at Greetham Valley Golf Club

THE CLUB WHICH NEVER SLEEPS



Machinery Inventory

- 1 Jacobsen Mk IV
- 1 Jacobsen Mk V
- 2 Toro Sidewinders
- 1 Toro 580D
- 5 Toro 1000
- 3 Toro Workmen
- 1 Ransomes 30S
- 1 Articulator 425D
- 2 Kubota ST30
- 1 T.Y.M Tractor
- 1 New Holland 65T
- 1 Antonio Carraro
- 1 Toro Sand Pro
- 1 Greens Iron
- 1 Groundsman Aerator
- 1 Verti Drain 1.45m
- 1 Verti Drain 2.5m
- 1 Sisis Fairway Slitter
- 1 Risboro Turf Slitter
- 1 Sisis Auto Rotorake
- 1 Sisis Tru Level Brush
- 1 Gambetti Sprayer 600 lt
- 1 Wilmot Sprayer 1000 lt
- 1 Sanderson Loader
- 2 Toro Topdressers
- 1 Amazone Groundkeeper
- 2 Vicon Spreaders
- 1 Kilworth Burryvator
- (stoneburrier)
- 1 Kubota 3 Tonne Mini Digger
- 1 Man Lorry
- 2 Ifor Williams Trailers
- 1 Kawasaki Mule

terms of what Greatham Valley would eventually become but Adi was given an inkling at his interview.

"Even then they said they didn't like to sit back and always wanted to make changes and improvements."

From that moment Adi has enjoyed a superb relationship with the Hinch family, who have always accommodated his requests for new machinery and additional staff.

After Adi's arrival Greatham Valley ran as a 27 hole complex for around two years before the decision was made to add a further nine holes and create two distinct 18 hole courses.

"We bought more land adjacent to

the existing course which gave us room for another four holes but we had to find additional space for the other five holes. This involved moving the par-3 course across the road," he explained.

"We seeded the greens on the new par-3 course while the old one was still open and got them in play before building the new five holes. There was no disruption to the members and there was always a course for them to play while the work was going on."

That's not to say the entire job went seamlessly as turning 27 holes into two 18s can be a logistical nightmare.

"All the holes had changed and it was absolute bedlam for a while. It was also confusing for my staff as well as the members because what was the 3rd on the Valley course became the 3rd on the Lakes. Even now I'll tell someone to go and cut the 27th green when I really mean the 17th," he revealed, while adding that it also meant all the course literature and stroke indexes had to be amended to cope.

The story behind who designed the new holes is also one worth telling.

The initial 18 holes were designed by Dave Wishart, of the STRI, who'd been brought in at the start to assist the Hinch family in the transition from farm to golf but the remainder of the holes have been designed by Ben Stephens.



You know... Ben Stephens. Surely you must have heard of Ben Stephens.

Well don't go thumbing through the Institute of Golf Course Architects' Directory for Ben's name because you won't find it.

Ben was a junior member at Greatham Valley and a single figure golfer, who is now studying to be an architect - not the golf sort - at university.

"He sat down one day and off his own bat drew an extension to the original 18 holes. He showed it to Frank, who thought it was fantastic and we all sat down together, did a few modifications and went with it," said Adi.

"Ben combines his drawing skills as an architect with his golf knowledge and works from that. He can look at a piece of land, design a hole, draw it within a very short space of time, then go to his computer and draw it properly. As an example our 13th hole on the Lakes course was a bland par-5 but we got Ben in and he redesigned the hole with a meandering ditch and some banking on the left and it looks fantastic.

"I sit down with him when he's done his initial drawings and discuss





it from a maintenance or health and safety perspective and he takes these on board and comes back the next day with the revised drawings."

Ben, who also happens to have hearing and speech difficulties, studies the work of the great architects like Robert Trent Jones and Alistair McKenzie, and has already designed another nine hole pitch and putt course Manton, on Rutland Water for another client.

"To achieve what he has done is amazing, it really is, particularly with his disability, and I admire him so much for it. I also admire the fact that someone was prepared to take a chance on him."

It is indeed an example of the unusual way things are done, and done successfully, at Greetham Valley.

Another is the entrepreneurial spirit in which the club seeks out other work to augment the budget.

"Frank and Robert's idea was that I would go around local bowling clubs telling them who I was and what we could do for their bowling green. Frank was a keen bowler and felt that the quality of greens could be a lot higher," explained Adi.

"So one day Robert and I made

appointments with a series of local clubs, explained the services we could do for them together with a price list and since then we have looked after between six and eight on a regular basis and they have seen great improvement in the quality of their surfaces."

That service then grew beyond purely bowling greens to anyone who wishes to construct or maintain a fine turf area. A few years ago they even built and looked after the indoor turf green that was laid for a Jimmy Tarbuck, golf inspired, quiz show.

"We don't do landscaping but anything to do with fine turf and we've worked at stately homes and built a sunken lawn to greens quality. We also do a great many football pitches and contract work for other golf clubs," he explained, before adding that he'd already done a job that morning before my arrival.

To make it all possible they ensure that they have the machinery to do the task and double up on some so that they can still do work on their own patch when a piece of kit is on the road.

"We've got a seven and a half tonne flatbed lorry, all logged up, to trans-

port the kit around and have two verti drains as well as more than one top dresser.

"The money we make offsets my expenses and makes my figures look good at the end of the day," said Adi, who explained that the work was done under the name of another company, Greetham Valley Turf Care.

Now you would think that with so much going on, and with a staff of only nine, labour saving methods would be employed on the two courses, and par-3 course, to make it all possible. But you'd be wrong.

Greens are always hand mown - a total walking distance for the 45 holes of 22 miles - and are cut six days a week while they do not have the luxury of a fully automated irrigation system.

"We use travelling irrigators on the fairways. Since I've been here we've put in irrigation points at the sides of fairways but we didn't bother with pop-ups because we were continually tweaking fairways and they would be in the wrong place.

"It is very labour intensive and we spend a lot of time with hose pipes in the summer especially as with only four inches of topsoil over limestone,

which is very free draining, the fairways and even the rough dries out quickly," said Adi, adding that he has to cope with the high alkalinity of the course.

So what next for Greetham Valley?

Well, other than the recently opened 4x4 course, there are plans afoot to build a 35 room hotel on site to provide more facilities for visiting company and society guests while Adi is hopefully of attracting a mini professional tour event which he hopes would be televised.

"The Hinch's know of my desire to attract a televised event to the course and are happy to pay the fee for that to happen and the course is pretty close to being ready for such an event," he said, adding that it would probably be on a composite course to stretch over 7,000 yards.

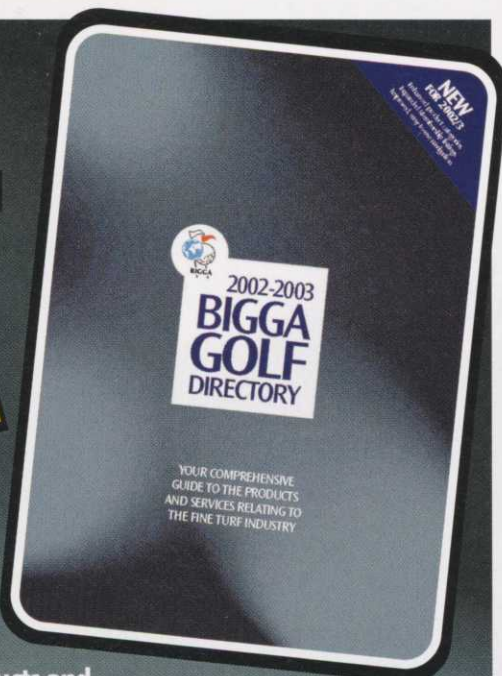
Speaking to Adi, you get the impression of a young man who is well in control of the fast moving, dynamic job which he now holds.

"I couldn't imagine doing what I am doing now when I started. I knew Greetham Valley would go to 27 holes and that would be a big step for me but even now, being in charge at such a big complex, I still can't believe how quickly it has happened."

CALL US NOW TO BOOK FOR 2002/3

The 2002/3 BIGGA Golf Directory

Last ORDERS



The BIGGA Golf Directory is the most comprehensive annual guide to the products and services within the turfcare industry. What better way to promote your products and services than by having a company listing all year within the BIGGA Golf Directory.

Get 4 category entries for just **£150**

Published annually, the Directory is a stand-alone publication which provides the industry's buyers with an unrivalled database of contacts from which to make their buying decisions. Easy to use, with over 125 individual product categories, the Directory is proving to be a major resource for buyers as they search for industry contacts. **Can you afford NOT to be included?**

Entry into the 2002/3 edition starts from just £150 for 4 category listings, with your contact details automatically included in our searchable Online Directory, absolutely FREE of charge! To find out more about the various advertising opportunities available to you and your company, call Cheryl Broomhead on 01347 833800 or send an email to cheryl@bigga.co.uk

DESCRIPTION	CATEGORY LISTINGS	FREE WEB LISTING	ONLY
Minimum entry	INCLUDES 4	✓	£150
Quarter page ad	INCLUDES 3	✓	£350
Quarter page DPS	INCLUDES 5	✓	£605
Half page ad	INCLUDES 5	✓	£595
Half page DPS	INCLUDES 10	✓	£1,085
Full page	INCLUDES 10	✓	£995
Full page DPS	INCLUDES 15	✓	£1,650

Send an email Cheryl Broomhead at

cheryl@bigga.co.uk

Call Cheryl at BIGGA HOUSE on

01347 833800

Aventis Environmental Science



Mycorrhizal structures associated with turf roots

Intelligent disease control

Amazingly, some species of fungus are good for your turf.

Mycorrhizal fungi develop a mutually beneficial relationship with turf roots for effective nutrient exchange, and increased resistance to drought, insect pests and disease.

You'll be pleased to hear then, that Rovral Green leaves these 'friendly' fungi completely unharmed.

But Rovral Green is as effective as ever at controlling the harmful species like Fusarium, Red Thread and Dollar Spot.

Rovral Green - it thinks for itself.

Harmless to beneficial fungi - still effective against disease



Associate Member

Aventis Environmental Science
Fyfield Road • Ongar • Essex CM5 0HW • Telephone 01277 301115 • Fax 01277 301119

ROVRAL GREEN contains iprodione. ALWAYS READ THE LABEL : USE PESTICIDES SAFELY. (MAPP 09938)

ROVRAL is a registered trademark of Aventis. © Aventis 2001

When diseases develop on turfgrasses, it is almost invariably fungi that are the cause of the problem. Under the right conditions, the symptoms of disease can develop and spread rapidly and in some cases, cause extensive and lasting damage. But when conditions are not conducive for disease development, what happens to the fungi? Dr Kate Entwistle, from the Turf Disease Centre investigates ...

FINDING FUNGI

In the vast majority of cases, the fungi that are responsible for turfgrass diseases are permanently present on the sward or in the rootzone. The most obvious exception to this is in newly constructed areas where the microbial populations will naturally be very low. However, these areas will not remain free of microbial presence (or sterile) for very long and within a short period of time, both beneficial and pathogenic microbes will begin to colonise them. Once present, these microbial populations will fluctuate over time increasing and decreasing in response to the local conditions. But as far as the pathogens are concerned, once they have become established in an area, they are likely to remain. So why is disease not an everyday occurrence?

To answer this fully we need to take a closer look at the agents of disease; the fungi. The mere presence of a fungus that has the propensity to cause disease on turfgrasses, doesn't necessarily mean that disease will develop, nor indeed that it is the cause of any symptoms expressed! Although the fungi are an extremely diverse group of organisms, they share similar characteristics and life cycles. However, there will always be exceptions that may vary widely from the general

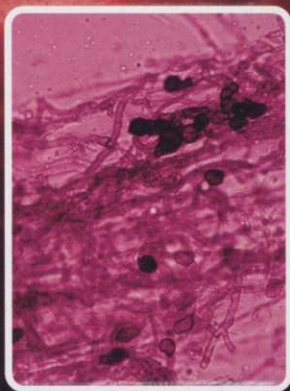
model, but on the whole, the fungal life cycle can be described as shown in Figure 1. By appreciating and working through the fungal life cycle, we can understand why disease is not an everyday occurrence, even if the fungi that cause the disease are always present.

Let's choose the spore as an arbitrary starting point for the fungal life cycle. The spore is the reproductive unit of the fungus (resulting from sexual or asexual reproduction) and it is extremely important for accurate fungal identification. Spores are liberated in vast numbers and dispersed locally or disseminated over large distances to enable the fungus to find a new host.

Spores may be present on the leaf surface, in the rootzone and in the air above the turf area but for any fungus to have a chance of causing disease, these spores must 'land' on a susceptible plant. Spores are, however, moved about at random and the vast majority will be deposited on areas or plants that they are not able to colonise. Thus, inoculation (or the arrival of a fungus on to an area) does not necessarily mean that disease will develop. Only a relatively low number of the released spores will end up on a suitable turfgrass host.

Inoculation of susceptible turf with a potential pathogen will still not result in disease if the fungus can't enter the plant. Firstly, the fungal spore must germinate to produce a germ tube and ultimately, mycelium that can be considered as the 'body' of the fungus. If the environmental conditions are not right for the fungal spore to germinate, or the conditions change soon after germination, the spore will not germinate or the germ tube will die. In either case, disease will not occur. If the spore does germinate, the germ tube will start to grow across the plant tissues trying to gain access to the plant.

In order to penetrate the plants defences, the fungus will either take advantage of natural openings (eg stomata) or wounds (eg caused by mowing), or it will directly penetrate the plant by force. Once the fungus has infected the plant and gained access to its internal cells, you might imagine that disease development will be inevitable. Not so. In plants that are able to recognise the initial presence of the fungus, the fungus may be restricted to only one or two cells. In these cases, the resistance shown by the plant means that the recognisable symptoms of disease will never develop. The effort made by



This month's front cover shows mycelium and appressoria of *Colletotrichum graminicola* (the fungus that causes anthracnose basal rot of *Poa annua*)

This slide shows the magnified spores of *Microdochium nivale*, the fungus that causes Fusarium patch disease

FINDING FUNGI

recognisable symptoms of disease will never develop. The effort made by the fungi to get this far has come to nothing. However, this situation does not always occur. In many cases, the fungus can progress further in to the plant causing damage to the plant tissues as it removes nutrients from them. This part of the life cycle can be regarded as disease development and symptom expression. The extent and severity of the disease is directly related to the relative susceptibility

of the host plant and the virulence of the pathogen. Once the fungus has colonised the plant tissues and removed the available nutrients, the fungus will need to move on to find a new host to colonise. In the majority of cases, it does this by producing spores which are disseminated either in the water film on the surface of the sward or within the rootzone, or alternatively through the air.

Parts of the fungal mycelium may also be disseminated across the turf

to allow colonisation of new areas of the same sward. And so we return to the start of the life cycle. But there is one additional part of the life cycle that is of importance to many fungi and that is the development of structures that will allow the fungus to survive adverse conditions. When they are not able to cause disease, some fungi can live on dead and decaying organic material and will do so for as long as is necessary until the conditions are right for them to actively cause disease. Other fungi cannot and they rely on some alternative method of survival. The means by which fungi do this are diverse and include the production of specialised spores or accumulations of mycelium, but ultimately these structures may allow fungi to survive in a dormant state for many years or decades until they become active again.

So what do we now know about the fungi that cause disease? Firstly that they are extremely diverse in their modes of action, their life cycles and their ability to attack plants. Secondly, their mere presence in a sward does not necessarily mean that disease will occur. Thirdly and arguably of most importance, there are many stages during the lead-up to symptom expression, during which disease development will fail. Therefore, disease must be regarded as the ultimate expression of a series of events in the development of the pathogen and its effect on the turf-grass plant. This 'relationship' between the fungus and the plant is significantly affected by the local environmental conditions and they directly control the severity of any

Figure 1: Generalised infection cycle of the fungi

