



mounted and self-propelled units. Initially, and still on many models today the penetration is achieved simply by weight, but during the '70s a new concept was launched. This consisted of tines mounted on a series of arms that were power-driven by a crankshaft. It was found that it worked on hard compacted soil, which had previously been virtually impenetrable.

#### Hollow tines

These are mainly used where it is necessary to change the soil composition or to help with the removal of thatch. The frequency of treatment has to be carefully monitored as soft playing surfaces can result from excessive use. Mini

tines are available for dealing with thatch and also re-seeding.

The biggest problem when using hollow tines is clearing up the resulting cores, although there are machines available to speed up this operation.

#### Dig deep

When hand digging the earth is lifted before being turned over. This process effectively opens up the soil and was the principle used in the development of the Verti-Drain. The system had some distinct advantages over what had previously been available. Using a heave and lift action meant minimum surface disturbance and it worked down to a maximum depth of 40cm. This

machine continues to play an important role in modern turf management practices.

#### Air Pressure

Getting closer to the true definition of aeration is the use of compressed air. This is best suited to selected problem areas such as wet or dry spots. Air under pressure creates a mini earthquake loosening the soil and opening up fissures and cracks. Small polystyrene beads can be injected into the soil to provide support to aeration and the help the percolation of water, oxygen and fertiliser. The probes can be used at any depth down to 1 metre, although above 250mm there is a possibility of surface damage. This type of unit

is fairly specialised so is usually hired complete with operator. There are, however, some pedestrian models available which may be worth considering if one has this type of persistent problem.

#### Water Pressure

In recent years we have seen the introduction of high-velocity water injection systems. The water droplets travel like minute bullets into the soil and fan out to maximise their affect. The units operate to a depth of 10cm to 15cm and down beyond 51cm if required. They leave virtually no mark on the surface, so play is not interrupted. Chemicals can also be introduced into the root area using this method.



# Making the earth move

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 Charterhouse: 01428 661222  
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### Surface break-up

Especially during long dry spells a hard crust forms beneath the turf and stops the ingress of water, air, fertiliser and top dressing. This can be kept open by regular use of a spiked roller to gently break up the surface.

These are available for use behind a tractor or as a pedestrian model for greens.

### Suck or blow

A system that may be the way forward for many courses uses the existing drainage system to either blow air into the root zone, or suck water and air down from the surface. Developed by a Course Superintendent at Augusta National, this greens management system could have distinct advantages.

One drawback is that not all greens have a suitable drainage system and it also has to be borne in mind that, while it may help with the compaction problem, it is

still necessary to use other equipment to alleviate it.

### Conclusion

The advent of more people taking up golf plus, in many cases the commercial aspect (minimal loss of green fees) has placed increasing pressure on both the playing surfaces and greenkeepers.

For many, compaction is a major problem that will not go away and regular aerating is necessary as part of a turf management programme if it is to be kept in check. In recent years there have been some significant changes (suck or blow) in the approach to the problem which may prove to be the answer for some courses. The quest to find the ultimate answer continues.

In the meantime greenkeepers will find plenty of equipment available that will help them to have some control over the situation and benefit the turf.

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The 1998 Open sees Royal Birkdale Head Greenkeeper, Chris Whittle, becoming the sole member of an exclusive club. He spoke with Scott MacCallum...

# Record breaker



The dream of many young greenkeepers is to be the head man at an Open venue. It is a laudable ambition but one which only a very few will ever realise. There is, after all, only one Open a year, on a very select rota and Head Greenkeepers at Open venues don't tend to move too often.

This year, however, a man creates a new record when he becomes the first man to have prepared two different courses for Open Championships. Chris Whittle was the Head Greenkeeper at Muirfield when Nick Faldo won The Open in 1992 and this year he will be the man at the helm at Royal Birkdale when the world's best descend on Southport.

# Record breaker



Royal Birkdale  
Head Greenkeeper,  
Chris Whittle

In fact, Chris can take it one stage further when you take into account that he was Jimmy MacDonald's Deputy at Royal Lytham in 1979 when Seve Ballesteros won The Open for the first time.

"I must confess that I hadn't really given it a thought. I've been too busy to think about things like that," said Chris, whose full CV includes Formby, when he was an apprentice under Jimmy MacDonald; then following Jimmy to Royal Lytham, where he also worked on both Ryder and Curtis Cups; St Annes Old Links which was his first headship; Muirfield and now Royal Birkdale.

He admits that it could only have been Birkdale, where he has been for three and a half years, that lured him away from Muirfield.

"I loved Muirfield and think of it as a very special place but Birkdale has always been my favourite golf course, bar none. I used to caddie here as a youngster and this was the course on which I always wanted to work. Being Head Greenkeeper here is my dream job," said Chris.

That said, he was so content at Muirfield that he agonised for three months before finally sending in his Birkdale application, and admits that when he visited the course he almost had second thoughts.

"The greens were a problem, the irrigation system was defunct, there

was dry patch on the fairways and remedying the tree problem was probably the biggest task of the lot. But I felt that if I hadn't taken the job I'd always have wondered... so you have to go for it then, don't you?" he said, before adding, "But I'm glad I did."

Birkdale's difficulties had been exposed in the most public and cruelest of fashions when Ian Baker-Finch won the 1991 Open on greens which were universally vilified, forcing then Head Greenkeeper, Tom O'Brien, to endure an experience no-one would wish on their worst enemy.

A combination of long standing degeneration which caused the greens to be slow and soft, compounded by an error on a grimmer height setting, which killed the annual meadow grass, meant that the '91 Open will always be remembered for its bad greens.

"I walked on a few of them in '91 and they tended to look worse than they were. They were far from perfect but it was very much a visual thing," recalled Chris, whose own Open at Muirfield was, by coincidence, the following year.

"It's not fair what happened to Tom O'Brien and I don't think I would have coped with the situation as well as he did," he added.

The severity of the situation, and inherent admission that Birkdale

had been sitting on a long term problem, was apparent when the decision was taken to rebuild totally the greens under the guidance of the STRI.

Chris arrived at the club after the new greens had already been laid, some of them twice, and quickly realised that it was not the end of the problems.

"It was clear that the grass was only living in the top layer because what was below was very sandy. It was pretty much thatch in a lot of places and we had to encourage the roots to go down, which meant diluting and removing some of the rich top layers.

"Some greens were 100% poa while the best were 90% poa, 10% bent and we wanted to change to bent-fescue greens. We hollow tined regularly and topped dressed but this in itself caused problems because there was no rooting and the turf was plucking. In the first year I think we put 200 tonnes of top dressing on and most of the greens had been hollow tined at two inch centres at least 12 or 13 times.

"The members were very good and let me close the greens from September to Easter a couple of years ago. It did help that The Open was coming as we all knew it had to be right by then," said Chris (44), who returned to Royal



Lytham two years ago to help his old boss during Open week.

"At least now we have a mixed sward of bent, a little fescue and poa. It's just a matter of tipping the balance in favour of bent-fescue. That's going to take a long time."

As well as the extensive work Chris and his team have carried out they have had to cope with the inevitable grindings of the rumour mill which suggested that the R&A might just replace Birkdale in 1998 as the Open venue.

"Some of the rumours were just ridiculous. What I can say is that no-one once came to me and said if this doesn't succeed you'll lose The Open. That pressure was never put on us," said Chris.

While it was the greens which commanded the most attention at Birkdale it was the trees which caused the greatest headaches.

"The white poplars were virtually choking the golf course. There were even tree roots underneath the new greens which we had to dig out. The roots were round drains and sprinklers. On the new 16th green a root had even gone underneath a bunker, up through the bunker face and underneath the green."

In addition to the practical dif-

ficulties of getting the roots out of the ground the project had to be sold to the membership. Fortunately that didn't prove to be as difficult as they feared.

"The course was actually changing from a links to an inland course so we did a presentation to the members about what we were going to do and why. We expected to be bombarded by questions but those we got were very sensible and very few.

"A lot of trees were small suckers, spreading off other trees and over the last three years we have cleared trees ranging in height from 40 feet down to about 30 inches over an area totalling at least 60,000 square yards."

It was this clearance work which led to the club's entry in BIGGA's Golf Environment Award, in association with Amazone and Rhone Poulenc being the Regional winner.

"We got a lot of help from the Sefton Life Project with regard to advice and practical help," explained Chris.

Removing the roots proved to be a complicated business.

"We tried grubbing them out, pulling them out, cutting to ground level, stump grinding, but eventually found that the best way was to cut to ground level.

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# Record breaker

## Machinery Inventory

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Kubota ST30 tractor  
Kubota L4200 tractor c/w front loader  
1.5 tonne trailer  
2.5 tonne trailer  
3 tonne trailer  
4 tonne trailer  
Land Rover  
2 Cushmans C/W TD 1500 topdresser, Slitter and Core harvester  
Multi-Core MC15  
Hardi 4001 sprayer  
1.5 metre vertidrain  
Charterhouse Vertiseeder  
40" rotovator  
Amazone Groundkeeper rough mower  
Lloyds semi rough gang mowers  
Ransomes Mounted Hydraulic gang mowers  
Jacobsen 3810 fairway mower  
Jacobsen Triking  
Jacobsen Mk V greens triplex  
2 Jacobsen Mk1V greens triplex  
Toro GM3 triplex  
5 Ransomes Certes  
5 Lloyds Paladins  
6 Flymo  
2 strimmers  
2 Reciprocators  
Ryan Turf Cutter

stump treat, to prevent regrowth, and then wait until the summer when some suckers came up and then spray those off. When we got a unit cost worked out we put the work out to a contractor."

A lot of the tees have been discovered to be full of roots and Chris is already planning to rebuild many of them.

As we spoke the final touches to the revamped watering system were being carried out with 63 well points hopefully ending a situation when a dependence on the mains supply resulted in Chris scaling everything down by 40%.

To the question "At what stage did you feel you had everything under control?" Chris laughed.

"I don't think I have yet. Ask me after The Open. I only felt I was beginning to get to grips with it this spring but I'm still not happy because the greens are not of the quality that I'm used to having...but I will get there."

Being in the unique situation of having been in charge of two of the best golf courses in the world Chris is able to compare Muirfield and Birkdale.

"Birkdale is laid out between the hills while Muirfield just rolls over the ground generally. They are different but both great golf courses. In maintenance terms, Muirfield had very little rainfall and when I was there there wasn't an irrigation system as such so most of the summer was spent pulling hose pipes



round. It was predominately fescue and the greens were no problem at all. The big bonus was that it wasn't overplayed, especially in the non growing season so you got maximum benefit from your work. Really it was so easy you could leave it alone and it could look after itself. Whereas Birkdale doesn't look after itself. It goes the opposite way and it is a very busy golf course."

The Open itself will see Chris

utilising some of the club's artisan golfers as well some students.

"My brother, Geoff, who's now Head Greenkeeper at St Annes Old Links is coming over for the week and the other local Head Greenkeepers have offered their services. I'm also delighted that the BIGGA Open Support Team will be here because you just couldn't manage without them."

It will undoubtedly be an exciting week, played out over a wonderful golf course where each hole is as superb as the one before and the one which follows but you can fully appreciate Chris when he says he hopes for a low key week.

"I will just be happy to have a quiet Open where all the headlines are made by golf rather than the golf course. If no-one makes a comment about Birkdale all week, then, that'll be fine by me."

"I won't relax until I see the course go through a tournament successfully and it will wipe out the memory of the last Open which damaged Birkdale's reputation."



The Royal Birkdale team

# Only one company has been selected to supply the irrigation requirements for St Andrews, venue of the millennium Open

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**Dr Stephen Baker, Head of Soils and Sports Surface Science, STRI, Bingley assesses the value of laboratory testing of golf green rootzones...**

# Reasons for research

In recent years there has been considerable debate about the value of laboratory testing for the selection of materials for golf green construction. Much of the information that has been presented has been anecdotal and perhaps sometimes based on extreme cases. In addition, there is little evidence that detailed measurements have been carried out so that conclusions can be based on meaningful data. The objective of this article is to present the results of two major studies at the STRI where we addressed the issue of comparing laboratory and field measurements to see whether laboratory analysis can be used to predict subsequent performance in the field.

## STRI field trial

Results of the first study were presented at the International Turfgrass Society Conference in Australia. This study had two parts, firstly the construction of a series of experimental plots at the STRI covering an area of 34m x 13m and secondly a laboratory programme in which the effects of different moisture levels and compaction procedures were examined.

If we consider first the field trial, this consisted of a suspended water

table construction of 250mm of rootzone material, 50mm of coarse sand blinding layer and a 150mm deep drainage carpet of 5-10mm gravel. It included 16 different rootzone materials in 2m by 2m plots each of which was repeated four times.

The rootzones were formed from blends of a sandy loam soil with four different sands in four mixing ratios i.e. 1:1, 1:2, 1:4 and 0:1 (soil:sand by volume). In other words mixing ratio ranged from 1 part soil to 1 part sand mixes to pure sand rootzones. The sands had contrasting grain size characteristics and they included three uniform sands (medium-fine, medium and medium-coarse) and one sand with a wide spread of particles which was therefore susceptible to interpacking. The experimental plots were sown with a fescue-bent seeds mixture in June 1988.

Subsequent management was typical of that for a good quality golf green and wear started in July 1989 using one of the STRI's differential slip wear machines. A vast number of properties of the turf were measured such as changes in grass species composition, ball roll characteristics and the stopping distance of golf balls fired with controlled conditions of velocity, angle and backspin. However, the most important characteristics as far as this study was concerned were water infiltration rates, soil porosity, air-filled pore space and water retention. Infiltration rates were assessed each spring by hammering concentric rings of 300mm and 500mm diameter into the plots and measuring how quickly water entered the turf surface. Porosity and water retention characteristics were assessed at the end of the trial in 1992 from undisturbed cores

taken at depths of 10-90mm and 100-180mm.

Samples of the different rootzone materials were submitted to the STRI's Soil Physics laboratory after blending. In the laboratory we examined the effects of two levels of compaction and four moisture contents at the time of compaction. The test procedure was very similar to that used in the USGA test methods except that the two levels of packing energy (18.9 and 47.3kJ per m<sup>2</sup>) were either side of the compaction energy used in the USGA test (30.3kJ per m<sup>2</sup>).

Compaction energy and moisture content at the time of compaction inevitably have some effect on the values obtained but the most important factor in the current debate is how well measurements in the laboratory compared with corresponding assessments on the turf plots.

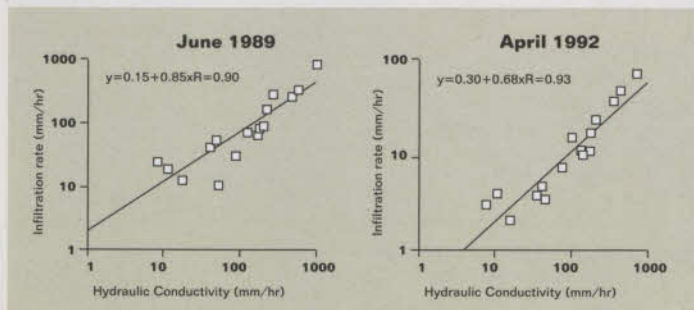
Drainage rates into the field plots inevitably decreased with time because of a build-up of compaction, root blockage of the pore space and accumulation of organic fines but as Fig 1 shows there is a strong relationship between hydraulic conductivity measured in the laboratory and drainage performance in the field. Under United Kingdom conditions it is very rare for rainfall to exceed 15mm per hour and using equation for the data in April 1992 (four years after construction) a drainage rate in the laboratory of 148mm per hour would be required to ensure infiltration rates exceeding the 15mm per hour mark. This value agrees almost exactly with the lower limit of 150mm per hour given in the USGA recommendations for putting green construction.

Relationships between air-filled pore space and capillary porosity (water filled pore space) measured in the laboratory and field are shown in Fig 2. Again the relationships were strong, in other words the laboratory data are very useful for predicting which rootzone mixes are liable to be water retentive and which rootzone materials are likely to be droughty in nature therefore requiring more watering.

## Golf greens with sand dominated rootzones

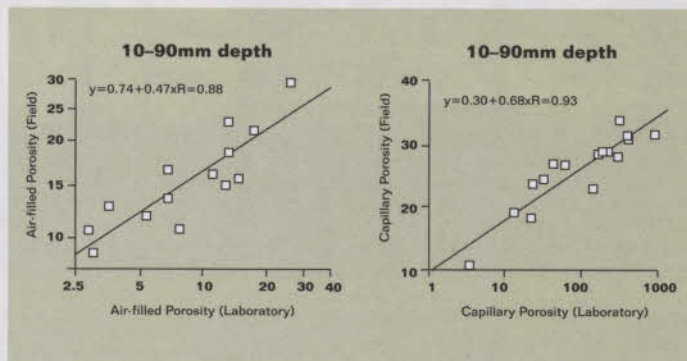
The trial on the STRI experimental plots had the advantage that all the rootzones had exactly the same management and exactly the same amount of wear. The second project examined relationships between laboratory measurements on real golf greens, generally 5-15 years old, which formed part of a survey of sand dominated golf greens financed by the R&A. Again physical properties of the greens were measured using double ring infiltrometers and undisturbed cores.

**Figure 1:** Relationships between laboratory hydraulic conductivity measurements and field values of infiltration rate measured at the beginning and end of the trial





**Figure 2:** Relationships between laboratory measurements of air-filled pore space and water retention at 40cm tension and corresponding measurements made on undisturbed cores taken from a depth of 10-90mm in the field plots



This time the rootzone material for the laboratory study had to be collected from the established turf using large samples taken by a golf hole cutter.

In this study there were again significant relationships between laboratory and field measurements but compared to the earlier study the relationships were weaker for all parameters except total pore space. The stronger relationship for total porosity probably reflects the greater range of values that occurred in the golf green survey.

**Studies elsewhere**

The findings of relatively good relationships between laboratory and field measurements under the closely controlled conditions on field trials (where management and wear are standardised) but weaker relationships for real greens has also been found in a number of studies in the United States. This perhaps leads to the conclusion that laboratory measurements can be very valuable in assessing the potential performance of a rootzone for a golf green but variations in management have the capacity to affect performance in the field.

For example a well formulated rootzone mix with the potential to produce a free draining, high quality putting surface may give lower than expected drainage performance because of abuse during construction (eg working in wet conditions), a lack of aeration work or subsequent use of a much finer top dressing.

There are also undoubtedly cases where a rootzone has been tested and approved in a soil testing laboratory but poor quality control has meant that the material delivered to the site bears little resemblance to the material examined in the laboratory.

**The quality of laboratory test results**

The second main issue that is relevant is the standardisation of test methods and the reproducibility of results from laboratories. Some of alleged variability in test results may have resulted from the fact that soil properties can quite legitimately be measured using different test procedures. In reality this does not matter as long as results are interpreted taking account of the test method that was used, but it

does mean that people must be wary of comparing results from different laboratories. In addition it does provide ammunition for anyone wishing to criticise the whole concept of testing. In this respect the standardisation of methods for the testing of the physical properties of rootzones by the USGA must be welcomed. In the same manner the CEN standardisation procedure taking place within Europe, for which I head the task group on golf, may ultimately help with respect to chemical test methods and other test procedures.

Problems of reproducibility of test results are being addressed through the USGA's Laboratory Proficiency scheme of which the STRI have been members from the outset. Samples are sent to the participating laboratories on a quarterly basis and statistical analysis of the test results provides a mechanism to

identify the reliability of the laboratory and to identify if any errors are occurring. Use of a laboratory participating in this scheme is an important step to ensure reliable test results.

**Final thoughts**

In conclusion, an experienced scientist or agronomist may well have a pretty good idea of the potential performance of a rootzone material just by visual inspection but laboratory test results can be very useful in assessing the physical properties of more marginal materials. Furthermore many developers of new golf greens simply do not have the experience to compare the merits of different rootzones and therefore test results, and their interpretation by a suitably qualified agronomist, is an essential part of ensuring that a good quality product is obtained.

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# GREENKEEPER

The Greenkeepers Training Committee (GTC) are continually reviewing the approved status of colleges offering greenkeeper training courses. This guide shows colleges offering courses to craft, supervisory and management levels, but it must be stated that until the GTC review is completed only the green coded colleges are approved to train greenkeepers beyond craft level. The introduction of vocational

qualifications into industries, has caused the colleges to re-think their training policies and the GTC will be issuing guidelines for the golf greenkeeping industry as to which colleges employers and their staff should be supporting. Anyone with a query regarding greenkeeper training should contact the Greenkeeper Training Committee at Aldwark Manor, Aldwark, Aine, York YO61 1UF. Tel: 01347 838640.

## NORTH



**ASKHAM BRYAN COLLEGE** Askham Bryan, York YO2 3PR. Contact: The Registry Tel: 01904 772211. National Certificate in Horticulture, National Diploma in Horticulture (Turf Option), Higher National Diploma in Horticulture (Golf Management Option) all available full or part time. Block release courses: NVQ Level 2 Greenkeeping, NVQ Level 3 Greenkeeping and Sportsturf Maintenance, NVQ Level 4 Amenity Horticulture. Short courses: FEPA spraying, chainsaw and brushcutter courses.



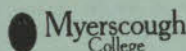
**REASEHEATH COLLEGE** Nantwich, Cheshire CW5 6DF. Tel: 01270 625131 Fax: 01270 625665. Full time: BTEC First Diploma Horticulture (Sportsturf Option) - 1 year. BTEC National Diploma Horticulture (Sportsturf Option) - 2 years. BTEC Higher National Diploma Golf Course Management - 3 years. Part time: HNC Golf Course Management - Distance Learning. NVQ Level 1 Greenkeeping - Day Release. NVQ Level 2 Greenkeeping - Day/Block Release. NVQ Level 3 Greenkeeping - Day/Block Release. C&G Phase IV Greenkeeping - Block Release. IoG National Intermediate Diploma in Turf Culture - Day Release. IoG National Diploma - Day Release. Short Courses: FEPA Chemical Safety; Safe Lifting; Chainsaws; Off-Road Vehicle Driving; First Aid. NVQ Level 4.



**SHIPLEY COLLEGE** Exhibition Road, Saltaire, Shipley, West Yorkshire BD18 3JW. Tel: 01274 757222. Full time courses: BTEC First Diploma Horticulture (Environment and Landscaping), BTEC National Diploma Horticulture, BTEC National Diploma Environmental Horticulture. Part time: Greenkeeping NVQ 2, Amenity Horticulture NVQ 2/3, Horticulture Skills Test, Pesticide Spraying, Royal Horticulture Society Certificate, City & Guilds Gardening Certificate.



**HOUGHALL COLLEGE** Durham College of Agriculture and Horticulture, Houghall, Durham DH1 3SQ. Contact Tony Milan. Tel: 0191 386 1351. Full time courses: National Certificate in Horticulture/Greenkeeping and Groundsmanship - 1 year; National Diploma in Horticulture Turf Option - 2/3 years. Part time courses: Greenkeeping and Sportsturf Management Level 2 - Day release; NVQ Level 3 Amenity Horticulture - Afternoon-Evening. Short Courses: Health & Safety Legislation; Turfcare; Machinery & Mechanisation. All courses contribute towards NVQ Levels 1 and 2.



**MYERSCOUGH COLLEGE** Bilbottle, PRESTON, Lancashire PR3 0RY. Contact: Course Enquiries Tel: 01995 640740 Fax: 01995 640842 Email mailbox@myerscough.ac.uk WWW <http://www.myerscough.ac.uk>. Full time courses: BSc (Hons) Turfgrass Science - 4 years; HND Turf Science and Golf Course Management - 3 Years; ND Turf Science and Sportsground Management - 3 years; National Certificate Groundsmanship and Greenkeeping - 1 year. Part time courses: NVQ Level 2 and 3 Greenkeeping and Sportsturf Maintenance (plus Fast track option); Higher National Diploma Turf Science and Golf Course Management; Certificate and Diploma in Turf Irrigation; FEPA short courses.

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**MOULTON COLLEGE**, Moulton, Northampton, NN3 7RR Tel 01604 491131 Fax 01604 491127. Full time: BTEC First Diploma in Horticulture - 1 year. BTEC National Diploma in Horticulture - 2 years. National Certificate in Horticulture - 1 year. Part time: NVQ2 Amenity Horticulture with Sports Turf Care. NVQ3 Sports Turf Maintenance. Both NVQs - 1 day per week over 2 years Short Courses: FEPA - 2 days. Chainsaw Operators Certificate - 1 week



**RODBASTON COLLEGE** Rodbaston, Penkridge, Stafford ST19 5PH. Contact Nigel Foskett. Tel: 01785 712209. Courses offered: NVQ Level 1,2,3 and 4 by Day Release. FEPA and chainsaw training.



**BROOMFIELD COLLEGE** Morley, Ilkeston, Derby DE7 6DN. Contact Admissions Officer. Tel: 01332 831345. NVQ Level I and Level II Amenity Horticulture (Greenkeeping) Block Release course. Two years duration presented in 12 one-week blocks following guidelines of GTC Training Manual. NVQ Level III gained by 9x 3-day blocks or day release or APL service. Also available TDLB, Pesticides, Chainsaw and First Aid Training.



**BROOKSBY COLLEGE** Brooksby, Melton Mowbray, Leics LE14 2LJ situated on the A607 between Leicester and Melton Mowbray Contact Ann Hurt / Jo Lees Tel: 01664 434291. Day release NVQ Level 2/3 Greenkeeping, includes GTC training manual (2 years). Short courses available in arboriculture/chainsaw work, FEPA spraying and machinery maintenance.



**WARWICKSHIRE COLLEGE**, Moreton Morrell, Warwick CV35 9BL. Contact Brian Cook. Tel: 01926 318268. Greenkeeping courses - NVQ levels 2 and 3 (day release), NVQ levels 2 and 3 underpinning knowledge only (block release), NVQ level 4 (block release), IoG National Intermediate Diploma (evening class), 2-year ND in Horticulture with turf culture option. We also offer short courses in FEPA, Chainsaw, First Aid etc to cater for individual and company training needs: Call us to discuss your requirements.



**HADLOW COLLEGE** Hadlow, Tonbridge, Kent TN11 0AL. Contact Tony Leach Tel: 01732 850551. NVQ Level II and Level III Part-time Day Release with two periods of Block Release or evenings. Level II in Groundsmanship evenings. NVQ Level III Golf Greenkeeping. BTEC First Diploma Sports Turf Management, National Diploma in Horticulture (Sports Turf option). Centres at Hadlow, Canterbury, Maidstone and Nottingham.



**NESCOT** North East Surrey College of Technology, Reigate Road, Ewell, Epsom, Surrey KT17 3DS. Contact Dr S Shaw. Tel: 0181 394 3220/3049. NVQ Levels I, II and III in Amenity Horticulture (Greenkeeping options) Training and assessment for the Greenkeepers Training Manual. Part time, Day Release. Duration: Two years to Level II. FEPA Spraying Courses.



**PLUMPTON COLLEGE** Lewes, East Sussex BN7 3AE. Contact David Blackmur. Tel: 01273 890454. Full time courses: National Diploma in Amenity Horticulture (options in Landscape and Sportsturf); National Certificate in Amenity Horticulture; First Diploma; A11 BTEC. Part time courses: NVQ Level II Amenity Horticulture in Arboriculture, Interior Landscaping, Hard Landscaping and Greenkeeping, Sportsturf and Sportsground Management; Decorative Horticulture, NVQ Level III Amenity Horticulture; Phase IV Business Management.



**OTLEY COLLEGE** Otley College, Otley, Ipswich, Suffolk IP6 9EY. Contact Course Enquiries. Tel: 01473 785543. ESF Bursaries may be available for full-time courses: National Certificate in Horticulture, option in Sports Turf Technology. Part time NVQ 2 Golf Greenkeeping and NVQ 2 Groundsmanship, NVQ 3 Sports Turf Management. IoG Intermediate and Final Diplomas (Evenings). NVQ Horticultural Mechanics. FEPA Courses PA1, PA2, PA6. Otley College \* Developing individuals \* Achieving more.



**BRINSBURY COLLEGE** North Heath, Pulborough, West Sussex RH20 1DL. Contact Keith Harrison. Tel 01798 877400. Full time courses. (Subject to approval) HNC sportsturf sciences management. BTEC 1st Diploma Horticulture with Greenkeeping option. National Diploma Landscape Studies, Sportsturf and Greenkeeping option. Part time: NVQ II Greenkeeping. Day release. Both full time and part time students. Greenkeeping manual. (National Technical Certificate) with Inst. of Groundsmanship manual may be delivered as an evening course. NVQ Level III Sportsturf Maintenance. National Practical Certificate NID, NDT (IOG)

## MIDLANDS

## SOUTH EAST