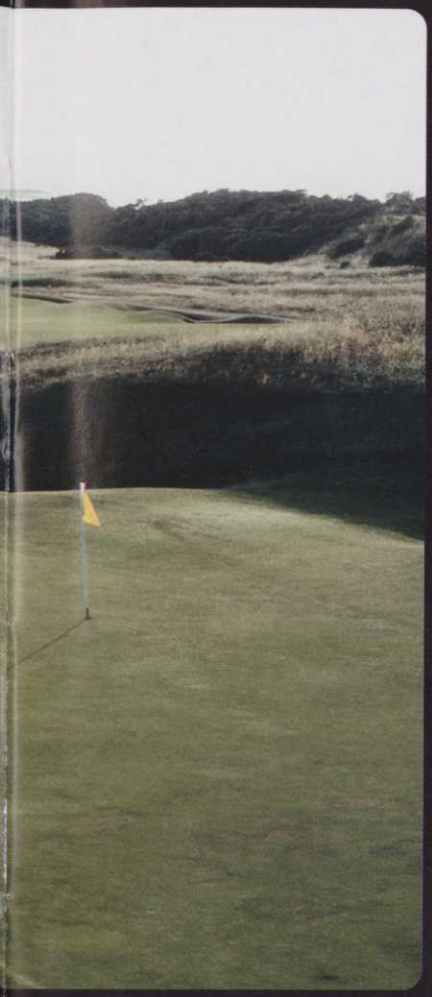


change from normal years is the treatment of the rough, which has not been cut as much as usual. One of the unique elements of Muirfield is the walk offs from the tee, a small strip of cut grass, often over 100 yards long, through rough to enable golfers to walk to the start of the fairway.

"Some of the older members struggle to make the carry, particularly into the wind, or top a shot and it can be tough for them when the rough is left to grow.

"You have to think long term when planning to cut the rough. People said to me three weeks ago that you could hit the ball anywhere in the rough and still get out of it. They won't be saying that now. When you get the rain and the heat how fast it grows so the same people will be saying in a few weeks time that it needs to be cut."

But other than that the course will not change much from its norm, a point illustrated when Colin points to an old aerial photograph pinned to his office wall.

"A picture taken now would be very similar to this one," he said.

Over the last few years he has visited the Open venue and compared it to his own course at the same time of year.

"You do work different management programmes in the lead up to Open time to select the best but you've got to remember we have a different climate to other Open venues.

"Last year we were a lot greener than Lytham which was amazingly dry. When I got back over the border on the Saturday you could see even that the road verges were still green and that we were probably a little behind Lytham," he said, before revealing that they had 29 mil of rain in May and that in the first two weeks of June they have had a staggering 54 mil.

He expects the greens to be more than quick enough for the Championship.

"I can get them to run at 10 feet for no special occasion and I have been asked for 11.5."

He revealed that when Sergio Garcia won the Amateur in '98 they had been cutting morning and night but were asked just to cut in the morning as they were getting too fast.

In addition to all the on-course work, Colin has been placed in charge of all the ancillary work as well.

"Some clubs designate a member to look after these sorts of things but with me being the Course Manager and knowing the course best they decided that I should take on the role of keeping an eye on everything and you do want to protect your course as best you can."

To assist in this they have marked all the sensitive areas which include water pipes and drains and told contractors not to go near those areas."

A genuinely laid back character Colin is looking forward to the week and, with six weeks to go, is happy to boast that he hasn't suffered any sleepless nights worrying about it.

"Yes, you know the eyes of the world are on you and that it's your course and good or bad it's going to come on you in the end so there is pressure but if you are confident in what you are doing on your course you should be fine. It is also reassuring to know that I have such a fine team behind me. They have done a superb job in the preparations for the Championship and I know that will be the same during the week itself," said Colin.

"The weather is the only thing you have no control over but it would be nice to see an Open with the sun blazing, a fiery burnt up course and the wind blowing. That would be my ideal."

He's right but whatever weather is served up during the third week of July you know that Muirfield itself will be the star.

SELECTING

Robert Laycock takes a look at the development of turf and gives some advice as to what to look for when purchasing turf

Turf has been used to create new grassed areas on the golf course for as long as there have been golf courses and it has been sold in rolls for centuries.

For many years seed was seen as being a more reliable way of making a new turf surface. Late in the 20th century plant breeders began to develop new strains of grasses created specially for turf, which could be truly called turfgrasses. This advance helped in the development of the turf industry as the new cultivated or seeded turf grown from mixtures containing these was demonstrably better than that composed of agricultural or wild grasses, which is all that had been available before.

For many years it was difficult to find turf of reliable quality, but gradually, about 25 years ago, a cultivated turf industry began to develop in the UK. The use of specialist harvesting machinery, developed in North America, made harvesting easier. Later, big rolls made a further improvement to the laying of turf on larger areas. Other specialist forms of turf later became available for sports turf and other landscaping uses.

The problem has always been how to pick the best turf. Every turf company claims to grow excellent turf, so adverts are not very helpful in choosing the best. Objective tests of quality were needed and the Turfgrass Growers Association (TGA) commissioned the production of a quality assessment scheme to make selection easier for customers. The TGA standards provided these tests, with participating growers using the same techniques to assess their turf. This is not to criticise other growers outside the scheme, who often do produce good quality material. However, direct comparisons are difficult if different assessment techniques are being used.

All participating TGA members have exactly the same equipment for assessing their product and all have been trained in its use. In the event that there is a complaint about the quality of turf supplied under the scheme, it is possible for a properly equipped and trained independent person to repeat all the tests and verify whether or not they have been measured correctly.

The TGA standards have brought a discipline to the monitoring of qual-

TURF

ity that was not there before. It is now possible for a grower to compare his records of assessments on this year's crop with those from previous years, and see whether or not his turf has improved. Similarly, by using these parameters, customers can compare the products of different suppliers.

Just because a turf company has supplied good turf one year, it does not follow that it will be identical the next. Turf quality varies from grower to grower but all turfgrowers accept that it also varies from year to year.

There are many reasons for this variation but it is mainly due to the effects of weather conditions during the crop's production and the management it receives while it is growing. Cultivar choice is also very important and the best ones for the grower's conditions should always be used.

The best quality modern turf is grown from top quality turfgrass cultivars and thus should produce a turf area of equivalent quality to one grown from seed. One of the great advantages of turf is that you can inspect its quality and see the grasses it contains, whereas inspecting a bag of seed may tell you which grasses should be in the turf produced from it but not their proportions and not whether weed grasses will be present in the finished sward.

The TGA standards were originally aimed at turf supplied to landscapers, the turf suppliers' largest market, rather than for sports turf users. Nevertheless many of its contents are also relevant to the latter. I find that greenkeepers are not very familiar with the scheme and what it covers so I have provided a brief list of items that greenkeepers should be looking for when buying turf, whether or not it is covered by the TGA scheme.

SELECTING TURF

Just because a turf company has supplied good turf one year, it does not follow that it will be identical the next. Turf quality varies from grower to grower but all turfgrowers accept that it also varies from year to year.

Robert Laycock (right)

Assessments

Any assessments of turf suitability should include the following:

Dimensions
Some sizes and shapes of turf are easier to handle.

Health
Shows the turf is free from pests and diseases.

Soil type
Some soil types are unsuitable for some situations (usually sports turf).

Grasses
It is good to know that good quality seed using top cultivars has been used to sow the turf. Also it is important to know the proportions of the different species of grass that are present in the turf when it leaves the field.

Cutting height
Relatively short turf looks tidier and is easier to bring under control after laying.

Thatch thickness
If this is too thick it has a detrimental effect on turf performance and can slow down establishment time.

Soil thickness
Thickly cut turf tends to be heavier, more difficult to handle and slower to establish after laying.

Netting
The customer can decide whether they want to have netting in their turf.

Strength
Reassures the customer that the turf is strong enough for its purpose.

Weight
The customer can decide whether turf will be easily handled, what type of vehicle will be needed for transport.

The TGA Quality Assessments cover all the above, with objective measurements made of each criterion, but they are not the only way of assessing turf quality. All growers have their own methods, which are more or less formalised within the company. The advantage to the customer of the TGA scheme is that it provides up to date and easily comparable information on the actual turf being offered for sale.

The standards also show details of the field and the farm where the turf was grown so that any problems that may arise can be traced back to source. A certificate is produced which identifies the staff member who assessed the turf and the date on which it was done.

The important things are that the tests are done on the turf the customer actually receives and that they are done shortly before or soon after harvest.

If turf in a particular field does not meet the standards it will not be certificated. Because of this, there are times when growers may not be able to supply turf meeting the TGA standards. Growers who do not tell the truth on their declaration of quality will be disciplined by the TGA. So far, to my knowledge, there have been no instances of sub–standard turf being supplied under the scheme, which is a credit to the TGA members and their staff.

Using turf on the golf course

Additional information needs to be supplied by the grower for turf to be used on the critical playing surfaces, especially golf greens, but including any created on a USGA or similar high specification rootzone, because most natural soils are incompatible with new constructions. If a different soil layer is introduced into the profile of the green with the turf, it will take much work to remove it, a process that may take years.

For new greens of this type, the best turf to use is either washed free of soil or grown on a soil or rootzone compatible with that the greenkeeper is going to lay it on. Only a limited number of growers produce turf in these ways and because of the extra work and materials involved it tends to be more expensive than conventional turf.

The grasses the turf contains are also important, especially for use on greens. In an ideal world all the greens on the course would be identical, and this is possible with a new course, at least for a while. However, most old golf greens contain a high annual meadow grass content and turf of this type is not available commercially, so a mismatch is inevitable when new greens are built. Shopping around will provide the type of turf least dissimilar to that on the existing greens. Get samples of turf from different suppliers and make a choice on the grounds of soil and grass content. Make sure any samples you obtain are from the field your turf is going to come from.

Elsewhere on the golf course, away from areas created on rootzone, it is less important that natural soil is avoided, and many believe that better results are obtained if the soil the turf has been grown on and the soil it is laid on are similar.

This means that using local turfgrowers can often provide material grown on a soil type more compatible with the soil on the course. Many of the best local and national growers are members of the TGA, which has members growing turf on all types of soil from clay loam through sandy soils to peaty soil.

The website address of the TGA is www.turfgrass.co.uk
Robert Laycock's website is www.robertlaycock.co.uk

Robert is a founder member of the Register of Independent Professional Turfgrass Agronomists (RIPTA)

Learning

Education & Training for Professional Greenkeepers

As a member of the Greenkeepers Training Committee, BIGGA is actively involved in raising the Standard of Greenkeeper Training. The range and quality of training now available means that there is a training course for every greenkeeper which should improve the quality of greenkeeping and help to produce quality golf courses.

Golf Course Managers should ensure that their staff are trained to the highest standards, beginning by selecting a training provider that meets the criteria laid down by the GTC.
There is a clear link between education, training and economic success and if you think that training is expensive then try ignorance.

Ken Richardson
Education and Training Manager,
British and International Golf Greenkeepers Association

Tel: 01347 833800
Email: education@bigga.co.uk
Website: www.bigga.org.uk

The Greenkeepers Training Committee (GTC) is continually striving to raise the standards of Golf Course Maintenance and Management and they are totally committed to ensuring that the range of qualifications are relevant to the Sportsturf sector and used by Employers for recruitment and by trainees for their own personal development.

The Government endorsed awards range from National/Scottish Vocational Qualifications (N/SVQ's) to the more academic Higher National Certificate (HNC)/National Diploma (ND)/Higher National Diploma (HND) in Golf Course Management and the Degree in Sportsturf Science.

The qualifications are continually under review by the National Training Organisation (NTO) in association with the GTC. The quality of the delivery of these awards by the network of GTC Approved Training Providers is also constantly monitored by the GTC.
For up to date independent advice on qualifications, education and training courses contact the GTC on:-

Tel: 01347 838640
Email: golf@the-gtc.co.uk
Website: www.the-gtc.co.uk

GREENKEEPER TRAINING

ENGLAND

Abingdon And Witney College Warren Farm Campus,Horton-cum-Studley, Oxford OX33 1BY **Contact:** Alan Brown or John Revis **Tel:** 01865 351794 **Fax:** 01865 358931 **Email:** alan.brown@abingdon-witney.ac.uk **Web:** www.abingdon-witney.ac.uk **Information:** *Warren Farm Campus is the base for Abingdon and Witney College's education and training in Greenkeeping, Sportsturf, Amenity horticulture and allied land based courses for the whole of Oxfordshire. Courses include:- NVQ Levels 2 & 3 in Sportsturf, Landscaping and Nursery. We also offer a range of short courses for the Industry including Health & Safety, pesticide training and chainsaw operation. For more information contact either Alan Brown or John Revis on Tel: 01865 351794 or Fax: 01865 358931.*

Askham Bryan College Askham Bryan,York,North Yorkshire,YO23 3FR **Contact:** Central Admissions **Tel:** 01904 772211 **Fax:** 01904 772288 **Email:** sf@askham-bryan.ac.uk **Web:** www.askham-bryan.ac.uk **Information:** *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.*

Berkshire College Of Agriculture Hall Place, Burchetts Green,Maidenhead,Berkshire,SL6 6QR **Contact:** Laurie Brown **Tel:** 01628 824444 **Fax:** 01628 824695 **Email:** enquiries@bca.ac.uk **Web:** www.bca.ac.uk **Information:** *Full-time programmes - BTEC First and National Diploma and Higher National Diploma. Part-time programmes - NVQ 2 & 3 Amenity Horticulture, Sports Turf (day and block release) and HNC Sports Turf Technology. Short courses - Greenkeeping for golfers, NPTC Chainsaw Competence Certificates, Spray Operators Training Courses.*

Brinsbury College Pulborough ,West Sussex,Sussex,RH20 1DL **Tel:** Tel: 01798 877400 **Fax:** Fax: 01798 875222 **Email:** Student-services@brinsbury.ac.uk **Web:** www.brinsbury.ac.uk **Information:** *FULL-TIME: National Diploma Horticulture (Greenkeeping option), BTEC First Diploma New Entrant Horticulture (Greenkeeping option), First Diploma New Entrant Horticulture (Greenkeeping option). National Certificate Horticulture (Greenkeeping & Sportsground option), PART-TIME: NVQ3 Sports Turf Maintenance (Day release or work based), NVQ2 Amenity Horticulture (Greenkeeping & Sports Turf options), plus varied short courses including Chainsaw, Brushcutter/Strimmer, PA1/PA2A/PA6A/PA9 etc.*

Brooksby Melton College Brooksby,Melton Mowbray,Leicestershire,LE14 2LJ **Contact:** Ann Hurt/Jo Lees **Tel:** 01664 850850 **Fax:** 01664 855355 **Email:** course.enquiries@brooksbymelton.ac.uk **Web:** www.brooksbymelton.ac.uk **Information:** *Situated on the A607 between Leicester and Melton Mowbray. Programmes available include NVQ Level II, III & IV in Greenkeeping. Work based emphasis for all of these programmes. Short courses available in Arboriculture/Chainsaw work, TDLB training and Pesticide application training.*

Cannington College Cannington Bridgwater ,Somerset TA5 2LS **Contact:** Philip Sharples **Tel:** 01278 655084 **Fax:** 01278 655055 **Email:** sharplesp@cannington.ac.uk **Web:** www.cannington.ac.uk **Information:** *Edexcel National Diploma in Horticulture (Sportsturf), Certificate of Higher Education in Golf Course Management, , Foundation Degree in Golf Course Management, Foundation Degree in Turfgrass Science and Technology, NVQ Level II Golf Greenkeeping, NVQ Level III Greenkeeping and Supervisory Management, NVQ Level IV Horticulture (Sportsturf), FEPA Training, Chainsaw Certification, Off-road Vehicle Certification, Greenkeeper Mechanics. Certificate in Irrigation (BTLIA) 1 week course; National Certificate in Golf Greenkeeping (1yr FT). Note: Certificate of Higher Education and Foundation Degrees both available as part time option.*

EAST DURHAM And Houghall Community College Houghall,Durham DH1 3SG **Contact:** Tony Milan **Tel:** 0191 386 1351 **Fax:** 0191 386 0419 **Email:** enquiry@edhcc.ac.u k **Web:** www.edhcc.ac.uk **Information:** *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 maintenance NVQ Level 2 - Day Release. NVQ Level 3/4 Greenkeeping and Sportsturf Maintenance Day Release. Short courses: FEPA Modules, Chainsaw certification, Tree inspection, Horticultural Machinery, Safe Lifting and First Aid.*

Hadlow College Hadlow ,Tonbridge,Kent,TN11 0AL **Contact:** Norman Croasdale **Tel:** 01732 852152 **Fax:** 01732 853207 **Email:** normancroasdale@hadlowcollege.ac.uk **Web:** www.hadlow.ac.uk **Information:** *First Diploma Sports Turf Management, National Diploma in Horticulture (Sports Turf Option). NVQ Level II, III and IV. Part-time Day Release or evenings. NVQ Level II in Groundsmanship evenings. NVQ III Golf Greenkeeping. National Award. Centres at Hadlow and Canterbury .*

Hartpury College Hartpury House,Gloucester,Gloucestershire,GL19 3BE **Contact:** Lucy Cable **Tel:** 01452 702132 **Fax:** 01452 700629 **Email:** enquire@hartpury.ac.uk **Web:** www.hartpury.ac.uk **Information:** *Courses available: First Diploma Horticulture, National Certificate Horticulture, National Diploma Landscaping, National Award in Amenity Landscape Horticulture, also in Greenkeeping and Groundsmanship, First Diploma Greenkeeping, Certificate in Greenkeeping, National Diploma Greenkeeping, National Diploma Golf Studies, Modern Apprenticeships, Route 2 Work, NVQs available in Amenity Horticulture, Commercial Horticulture, Amenity/Turf, Amenity/ Sportsturf, Decorative Horticulture, plus RHS General Examination, City & Guilds Certificate in Gardening, TDLB Assessor Awards and a full programme of amateur, leisure and day release courses.*

Merrist Wood College Worplesdon,Guildford,Surrey,GU3 3PE **Contact:** David Rhodes **Tel:** 01483 884003 **Fax:** 01483 884001 **Email:** info@merristwood.ac.uk **Web:** www.merristwood.ac.uk **Information:** *Part-time courses: NVQ Level 2 Sportsturf college day release and workplace visits/assessments, Level 2 Edexcel first Diploma college day release for those without qualified workplace accessories, NVQ Level 3 Sportsturf college day release and workplace visits/assessments, Level 3 Edexcel National Award college day release for those without qualified workplace assessors, Edexcel HNC Turfgrass Science and Management college day release over 2 years plus various short courses throughout the year. To be introduced in the near future - Edexcel HND Turfgrass Science and Management college day release. Please contact us for up-to-date listings, qualifications and advice. Career Evenings held monthly at the college.*

Myerscough College Bilsborrow,Preston,Lancashire,PR3 0RY **Contact:** Colin Stanfield **Tel:** 01995 642222/642305 **Fax:** 01995 642333 **Email:** mailbox@myerscough.ac.uk **Web:** www.myerscough.ac.uk **Information:** *Full time courses; BSc (Hon's) Turfgrass Science, HND Turf Science and Golf Course Management: Foundation Degree Sportsturf Science, ND Turf Science & Sportsground Maintenance: NC Groundsmanship and Greenkeeping: First Diploma; Turf Science: NVQ Level 2, 3 & 4 Greenkeeping Management delivered both in the work place and over the internet using the colleges 'Mollnet System'. Part-time courses NVQ Level 2 & 3 Greenkeeping and Sports Turf Maintenance (Day/block release or Fast track work-based training qualification). All higher education courses can be accessed on a part time basis.: HNC Turf Science: FEPA Short courses.*

NESCOT - North East Surrey College Of Technology Reigate Road,Ewell, Epsom,Surrey,KT17 3DS **Contact:** Mr C Smith **Tel:** 020 8394 3220 **Email:** info@nescot.ac.uk **Web:** www.nescot.ac.uk **Information:** *NVQ Levels I, II and III in Amenity Horticulture (Greenkeeping options). Pesticides Application - Certificate of Competence. Part time Day Release. Duration: Two years to Level II. FEPA Spraying Courses. Also available - RHS General and Advanced Certificates in Horticulture.*

Oaklands College Oaklands Campus,Hatfield Road, St Albans,Hertfordshire,AL4 0JA **Contact:** Ian Merrick **Tel:** 01727 737000 **Fax:** 01727 737752 **Email:** ian.merrick@oaklands.ac.uk **Web:** www.oaklands.ac.uk **Information:** *Full time courses: National Certificate in Greenkeeping and Sports Turf Management. Part-time courses: leading to NVQ Level 2 & 3 Greenkeeping, Modern Apprenticeships. Evening Courses: leading to NVQ Level 4. Short Courses: Pesticide, Chainsaw.*

Plumpton College Lewes East Sussex,BN7 3AE **Contact:** David Blackmur **Tel:** 01273 892044 **Fax:** 01273 890071 **Email:** enquiries@plumpton.ac.uk **Web:** www.plumpton.ac.uk **Information:** *National Diploma in Amenity Horticulture (options in Amenity/Garden Design and Sportsturf); National Certificate in Amenity Horticulture and National Award; First Diploma in Horticulture. Part-time courses: NVQ Level 1, Level 2 in Landscaping and Sportsturf, Nursery, NVQ Level 3 , NVQ Level 4. Also available are RHS General and Advanced and IOG National Technical and Int. National Diploma. Short courses are also available for FEPA spraying and chainsaw courses.*

Reaseheath College Nantwich Cheshire,CW5 6DF **Contact:** Brian Jones **Tel:** 01270 613236 **Fax:** 01270 625665 **Email:** brianj@reaseheath.ac.uk **Web:** www.reaseheath.ac.uk **Information:** *Full time First Diploma Horticulture (Sportsturf Option) - 1 year. National Diploma Horticulture (Sportsturf Option) - 2 years. BTEC Higher National Diploma Golf Course Management - 3 years. Part time: HNC Golf Course Management with Open Learning option, NVQ Levels 1-4 Greenkeeping with Fast Track options. IOG courses available. Short courses: FEPA, Chemical Safety; Safe Lifting; Chainsaws, Off-Road Vehicle Driving; First Aid.*

Training providers guide
Available courses guide

This guide is not exhaustive and a full list of GTC approved training providers can be obtained from the GTC. The Greenkeepers Training Committee (GTC) are continually reviewing the approved status of training providers offering greenkeeper training courses. Anyone with a query regarding greenkeeper training should contact the Greenkeeper Training Committee at Aldwark Manor, Aldwark, Alne, York YO61 1UF, Tel: 01347 838640 or visit their website at http://www.the-gtc.co.uk

ENGLAND

Sparsholt College Hampshire Sparsholt,Winchester,Hampshire,SO21 2NF **Contact:** Ray Broughton **Tel:** 01962 776441 **Fax:** 01962 776587 **Email:** rbroughton@sparsholt.ac.uk **Web:** www.sparsholt.ac.uk **Information:** *NVQ Level 2 Greenkeeping Practice, NVQ Level 3 Greenkeeping Supervision, City & Guilds Phase IV Management Studies, National Diplomas in Golf Course Management and Golf Studies,National Certificate in Greenkeeping and Sportsturf Management. GTC: Greenkeeping Certificate, GTC: Certificate in Golf Course Supervision, FEPA: Short courses, Chainsaws. Phase IV and NVQ Level 2 are offered on block release and day release. Full residential facilities available. Sparsholt College provides education and training in the land-based industries.*

The College Of West Anglia Milton Campus ,**Contact:** Bob Young **Tel:** 01223 860701 **Email:** Student Support at King's Lynn on 01553 761144 Ext 271 **Information:** *The College of West Anglia offers a full range of courses for Greenkeepers including; NVQ Level 2 Sportsturf (Greenkeeping and Groundsmanship), NVQ Level 3 Sports Turf Maintenance. GTC Craft Certificate, GTC Certificate in Golf Course Supervision, TDLB Assessors awards. FEPA, Chain Saws, MO1. Other Courses: National and First Diploma in Horticulture and Garden Design.*

Warwickshire College Royal Leamington Spa & Moreton Morrell,Moreton Morrell, Warwick,Warwickshire,CV35 9BL **Contact:** Brian Cook **Tel:** 01926 318268 **Fax:** 01926 318300 **Email:** enquiries@warkscol.ac.uk **Web:** www.warkscol.ac.uk **Information:** *Greenkeeping Courses: HNC Sports Turf & Golf Course Management (Day Release 2 year Programme also distance learning option); NVQ Level 2 & 3 Day Release and Workbased Option (we come to you); two year ND in Horticulture with Turf Option;BTLIA Certificate in Turf Irrigation. Short Courses: Introduce your Committee to Turf Culture; Computing for the Greenkeeper - various times throughout the year - ring for details. FEPA; Spraying Certification, Chainsaw Certification; TDLB; First Aid. Also RHS General and Diploma, PA1, PA2A and PA6.*

Writtle College Chelmsford Essex,CM1 3RR **Contact:** David Campbell **Tel:** 01245 424200 **Fax:** 01245 420456 **Web:** www.writtle.ac.uk **Information:** *SPORTSTURF PROGRAMMES NVQ Level 2 - Sportsturf: NVQ Level 3 - Sportsturf Maintenance. NVQ Levels 1, 2 & 3 - Amenity Horticulture. HNC - Sportsturf Science. HND - Sportsturf and Golf Course Management. Other Programmes; National Certificate. National Diploma (with Sportsturf Option). BSc (Hons) Sportsturf Science and Management. BSc (Hons) Horticulture. BSc (Hons) Landscape and Amenity Management. MSc Landscape and Amenity Management. NVQ 2 and 3 Service Engineering. First Diploma Agriculture (Mechanisation), C & G Agricultural Mechanics Certificate. FEPA. Chainsaw. Tractor Driving.*

IRELAND

Greenmount College Antrim County Antrim,BT41 4PU **Contact:** Declan Gallagher **Tel:** 028 94 426794 **Email:** declan.gallagher@dardni.gov.uk **Web:** www.greenmount.ac.uk **Information:** *Day release courses to (a) NVQ Level II Greenkeeping and Sportsturf, (b) NVQ Level III Golf Course Supervision National Diploma in Horticulture with Turf options FEPA, Health & Safety and a range of short courses.*

Teagasc College College of Amenity Horticulture,National Botanic Gardens, Glasnevin,Dublin,DUBLIN 9 **Contact:** Pat Suttle **Tel:** 00353 16376133 **Fax:** 00353 18040212 **Email:** college@botanic.teagasc.ie **Web:** www.teagasc.ie **Information:** *Block release courses in greenkeeping providing Level III Certificates by the National Council of Vocational Awards.Level III Certificate in Golf Course Management. 3 year full-time course. National Council for educational awards a National Diploma in Horticulture (Greenkeeping specialisation).*

SCOTLAND

Elmwood College Cupar Fife,KY15 4JB **Contact:** Ann Bain **Tel:** 01334 658842 **Fax:** 01334 658888 **Email:** abain@elmwood.ac.uk **Information:** *Full time National Certificate Greenkeeping; Block Release SVQ Level II, SVQ Level III Sportsturf block release and Outreach available, and SVQ Level IV. HNC/D Golf Course Management available as full time, block release and distance learning. HNC Golf Facility Management, (HND Golf Facility Management subject to validation for 2002). PDA for football and cricket available both block release and Outreach. FEPA and COSHH, chainsaws, tree climbing and rescue techniques and Health and Safety short courses also available.*

Gosta Training Ltd 5E Clydeway Centre ,45 Finnieston Street,Glasgow,G3 8JU **Contact:** Iain Forbes **Tel:** 0141 248 2772 **Fax:** 0141 248 2453 **Email:** learn@gostatraining.co.uk **Information:** *SVQ II, III and IV also Modern Apprenticeship in Amenity Horticulture for all options including Sportsturf and GTC Training Manual. Attendance Day/Block release from November-March. Short courses with certification include Pesticides, Chainsaw, First Aid, Risk Assessment, Abrasive Wheels, Back Actor and Small Machinery. Consultancy service for Site Risk Audits, Machinery Risk Assessments, Machinery Permit to use system ,COSHH and Noise Assessment, Health & Safety, Policy development.*

Langside College Rutherglen Campus, Buchanan Drive,Rutherglen, ,Glasgow,G73 3PF **Contact:** Colin S Urquhart **Tel:** 0141 647 6300 **Email:** colinurq@perseus.langside.ac.uk **Information:** *SVQ, SGA, HNC, HND. Full time and part-time courses in Greenkeeping, Groundsmanship, Golf Course Management, Horticulture, Land and Environment and Applied Ecology. Short courses for land-based industries including Risk Assessment and Pesticides.*

Oatridge Agricultural College Ecclesmachan, By Broxburn,West Lothian,Edinburgh,EH52 6NH **Contact:** Steve Miller **Tel:** 01506 854387 **Fax:** 01506 853373 **Email:** info@oatridge.ac.uk **Web:** www.oatridge.ac.uk **Information:** *HNC In Golf Course Management (Part-time): Full-time National Certificate in Greenkeeping and Sportsturf Management: SVQ Level II and GTC Manual (Day and Block Release): SVQ Level III Sportsturf (Day and Block Release) SVQ Level III in Ground Care Machinery, full range of Amenity Horticulture, Landscaping and other land based subjects at HND and HNC, National Certificate and SVQ Levels; Short Course - FEPA, Chainsaw, Forklift, First Aid.*

WALES

Pencoed College Pencoed,Bridgend,Cardiff,CF35 5LG **Contact:** Paul Discombe or John Sullivan **Tel:** 01656 302672 **Fax:** 01656 302601 **Email:** pfdiscombe@bridgend.ac.uk **Web:** www.bridgend.ac.uk **Information:** *Courses:- NVQ Sportsturf Level 2-3, HND/HNC in Turf Management. Short courses: Pesticide application, Chainsaw Operation and many others. TDLB Assessor Courses*

Welsh College Of Horticulture Northop Mold,Flintshire CH7 6AA **Contact:** Graham Wright **Tel:** 01352 841034 **Fax:** 01352 841031 **Email:** graham.wright@wCoh.ac.uk **Web:** www.wcoh.ac.uk **Information:** *Full-time - Higher National Diploma in Turf Management. Part-time - Day release Higher National Certificate in Turf Management. Block Week - NVQ Amenity Sportsturf Levels 2-3. Briefing Days - NVQ Level 4, TDLB Assessor Courses D32, 33, 34. Day Courses - FEPA, Chainsaw Certification, First Aid, C.I.E.H.*

IT'S A GAS

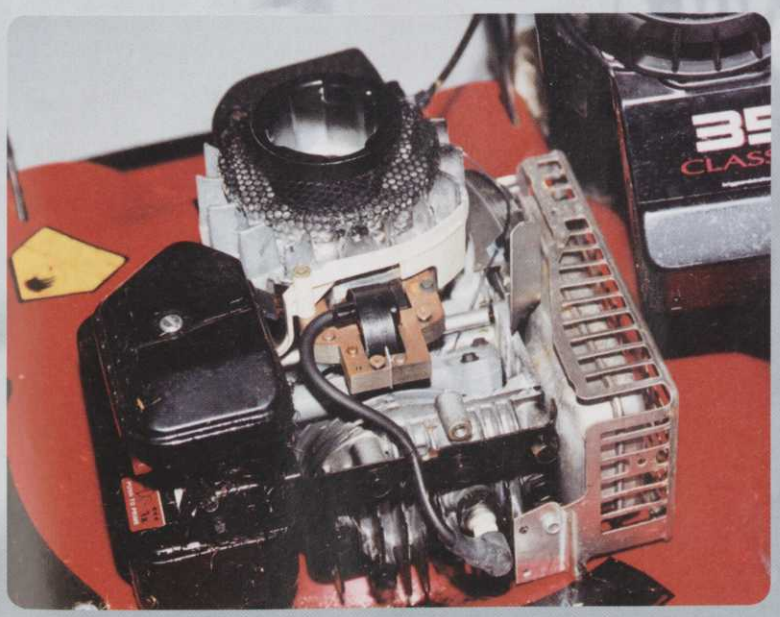
Roland Taylor takes a look at pollutants and how emission control is now such an important issue

No one would place a child a room full of toxic gases, yet every day we subject them, along with the rest of planet's population, to high levels of pollutants in the air that we breath.

In this article we are looking at the smaller engines found on all golf course equipment, although what is written, equally applies to all equipment and road vehicles that use combustion as a source of power.

It is a fact of life that there are a number of conditions and pollutants around which can cause serious health problems, not all, are the result of the internal combustion engines.

One of these is the 'greenhouse effect', there seems to some confusion as to what creates this phenomenon. If the earth's surface is to sustain a rich variety of growth it requires an average temperature to be maintained. Global warming occurs due to a cocktail of certain gases including, water vapour, carbon dioxide and methane, raising the temperature levels. The cause is largely due to man's intervention in nature, which results in excessive amounts these gases, being produced and released into in the atmosphere.



Damage to the ozone layer is another cause for concern. This is like a skin around the planet that protects the surface from the suns harmful ultra violet radiation. Here the culprit are CFCs (Chorofluorocarbons) which are commonly found in aerosol solvents and in the past refrigerators. These break down the layer so the earth and its population is exposed to the sun's rays. A very good reason to protect the skin on bright sunny days.

Combustion engine emissions play only a minor part in these two phenomena, their role is closer to home. Engine exhaust and fuel evaporation are two sources of pollution involved.

Petrol and diesel fuels are made up of hydrogen and carbon atoms. In a perfect combustion the fuel (hydrocarbons) is mixed with air (oxygen and nitrogen). When burnt this produces carbon dioxide, water and nitrogen, all three relatively harmless.

In an engine the results are different. A mixture of fuel and air creates unburned fuel (hydrocarbons), nitrogen oxides, carbon monoxide and carbon dioxide – a real witches brew.

Hydrocarbons

Basically this is unburnt fuel. This mixes with the nitrogen oxide and when exposed to sunlight produces ground level ozone – a major component of the smog, hence the reason for the continual shroud now over a number of large cities throughout the world. From a health point of view it can cause irritation to the eyes, damage the lungs and aggravate respiratory problems such as asthma. Exhaust hydrocarbons also have the potential to cause cancer.

Nitrogen Oxides

These are formed from the nitrogen and oxygen in the air being subjected to a high temperature plus pressure. Their role has already been mentioned in the formation of ozone, they also contribute to the production of acid rain.

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Carbon Monoxide

This is a real nasty. As the result of incomplete combustion the carbon in the fuel is only partially oxidised. As far as humans are concerned, oxygen levels in the bloodstream are greatly reduced and those with a heart condition are most at risk.

Carbon Dioxide

This is the stuff we exhale. In the normal ecosystem plants and trees take this in and convert it into oxygen. With the changes that man has bought about to the environment this natural cleaning system no longer works at a100% – the greenhouse effect is one of the results. Some environmental agencies now consider carbon dioxide is becoming a pollutant.

There are slight differences in emissions from diesel engines.

Particulates

These are made up of suspended carbon particles and the amount of these released will depend on the quality of fuel.

Soot (Carbon)

Most exhaust contaminates are carried in soot. Petrol units produce less soot, but more carbon monoxide.

Apart from exhaust emissions there is also another area associated with the engine that create atmospheric problems – evaporation.

This is one of the major factors for hydrocarbon pollution, especially on hot days and it can occur in a number of ways:–

- If a fuel tank becomes hot then fumes escapes through the vent in the cap.
- Engine and exhaust heat will vaporise fuel, this continues for relatively long period after the unit has been switched off.
- Vapour is always present in fuel tanks and this is forced out during refuelling – the shimmering haze that can be seen on all garage forecourts.
- There are other indicators that signal a power unit is producing excess fumes or something sinister might be going on inside.

White smoke

Mainly evident when an engine is started up, it usually disappears when the unit warms up. Water droplets (condensation) plus unburnt fuel in the cylinder cause this. In the worst scenario it could indicate that water from the cooling system has gaining access to the combustion chamber.

Blue Smoke

Burning oil plus unburnt fuel generally causes this. May be the result of excessive wear, broken oil ring or more likely a poorly tuned and maintained engine.

Black smoke

A combination of soot, oil and or unburnt fuel, this could also herald a mechanical failure. In the case of the last two, some action to rectify symptoms is needed fairly quickly, if a major problem is to be avoided.

As has already been shown, the combustion process, although now highly refined, is still relatively inefficient and this can be escalated by other contributory factors:–

- The quality of the fuel used
- Type of engine, whether it is a standard model, turbo charged or has fuel injector.
- Incorrectly tuned engine
- Fuel pump or carburettor settings
- The workload it is subjected too.
- Engine running temperature
- Lack of maintenance.

Stringent legislation in some countries has meant that that engine manufacturers have made considerable strides in reducing emission levels with models now on the market 70% cleaner than a decade ago.

This is the result of changes in the cylinder and valve configurations, finer tolerance throughout, and more sophisticated fuel/air supply systems. Power units are more compact having greater fuel and oil economy and less vibration, plus the lowering of another emission – noise.

On some models the catalytic converter has been introduction. These use very high temperatures to burn off the unused fuel before it is emitted from the exhaust, but they are a highly sensitive components that are likely to be damaged if an engine is not properly maintained.

Another reason why problems can occur is that some of the contaminates from an incomplete combustion remain inside the engine. These eventually find their way into the sump where they mix with the oil to form lacquer and a thick sludge. This then passes into oil ways and adheres to components causing a reduction in an engine's efficiency as the power output drops and fuel consumption and emissions increase.

Out of all this there is a clear message regard controlling the level of emissions. While, engine manufacturers now produce power units that comply with present and future legislation once these are out in the field, it is the responsibility of the users to maintain these standards. The fact is modern engines require very little maintenance, so by look after them regularly and correctly this can be achieved.

Oil

This has two main jobs, to reduce friction and to help dissipate heat. If it is in short supply or contaminated, serious damage to the engine can occur. The message is, check the levels are correct every time the equipment is used. This not only applies to the engine, but also to any other components that uses oil, such as hydrostatic drives and gearboxes.

Change the oil as outlined in the instruction manual using top quality recommended lubricants.

Airfilters

If these are dirty they alter the