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.
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. Later, 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-
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 turf growers 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.

Assessments
Any assessments of turf suitability should include the following:

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

Health
Show that 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 the 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 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 certified. 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. In an ideal world all the 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)
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

www.bigga.org.uk
GREENKEEPER TRAINING

Abingdon and Witney College: Farm Campus, Hornton cum Studley, Oxford OX13 1BY Contact: Alan Brown or John Revis Tel: 01865 357994 Fax: 01865 358931 Email: alan.brown@abingdon-witney.ac.uk Web: www.abingdon-witney.ac.uk Information: Farm Campus is the base for Abingdon and Witney College's education and training in greenkeeping, sports turf and allied land-based courses for the whole of Oxfordshire. Courses include: NQV Levels 2 & 3 in Sports Turf, Landscaping and Nursery. We also offer a range of short courses for the Industry including Health & Safety, pesticide training and chain-saw operation. For more information contact either Alan Brown or John Revis on tel: 01865 357994 or 01865 358931.

Ashby Bryan College: Ashby Bryan, York, North Yorkshire, YO21 4QF Contact: Central Admissions: Tel: 01904 772221 Fax: 01904 772288 Email: info@ashbybryan.ac.uk Web: www.ashbybryan.ac.uk Information: National Certificate in Horticulture, National Diploma in Horticulture (Sports Turf Option), Higher National Diploma in Horticulture (Sports Turf Option); All programs available full or part-time. Block release courses: NQV Level 2 Greenkeeping, NQV Level 1 Greenkeeping and Sports Turf Maintenance, NQV Level 4 Horticulture. Short courses: FPHA spraying, chain-saw and blower courses.

Berkshire College of Agriculture: Hall Place, Burchett's Green, Maidenhead, Berkshire SL6 2QW Contact: Laurie Brown Tel: 01628 624444 Fax: 01628 624491 Email: enquiries@berkshire.ac.uk Web: www.berkshire.ac.uk Information: Full-time programmes - BTEC First and National Diploma and Higher National Diploma. Part-time programmes - NQV 2 in Amenity Horticulture, Sports Turf Care and Light and Black Earthcare and HNC Sports Turf Technology. Short courses - Greenkeeping for golfers, NPTC Chain-saw Competence Certificates, NPTC Chain-saw Operation Training Courses.

Bromley College: Southwark, London SE1 0LL Contact: Ken Donnelly Tel: 020 8138 1300 Fax: 020 8138 1300 Email: enquiries@bc.ac.uk Web: www.bc.ac.uk Information: Full-time programmes - BTEC First and National Diploma and Higher National Diploma. Part-time programmes - NQV 2 in Amenity Horticulture, Sports Turf Care and Light and Black Earthcare and HNC Sports Turf Technology. Short courses - Greenkeeping for golfers, NPTC Chain-saw Competence Certificates, NPTC Chain-saw Operation Training Courses.


Horticulture College: Warboys, Guildford, Surrey GU3 7EP Contact: David Smith Tel: 01483 884003 Fax: 01483 884003 Email: info@hortic.ac.uk Web: www.hortic.ac.uk Information: Part-time courses: HNC Level 2 Sportsturf college day release and workplace visits/assessments, Level 2 Edexcel first Diploma college day release for those without qualified workplace assessors, Edexcel HNC Turf Science and Management college day release or workplace based, NQV Level 2, 3 & 4 Greenkeeping Management delivered both in the workplace and over the internet using the colleges 'Mollnet System'. Part-time courses: NVQ Level 2 Greenkeeping and Sports Turf Maintenance, NVQ Level 3 Greenkeeping and Sports Turf Maintenance, NVQ Level 4 Amenity Horticulture. Short courses: FPHA spraying, chain-saw and blower courses.

Nescot - North East Surrey College of Technology: Ragingley 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: NQV Levels 1, 2 and 3 in Amenity Horticulture (Greenkeeping options); Pesticides Application - Certificate of Competence. Part-time Day Release. Duration: Two years to Level 2. Further Spraying Courses. Also available: RHS General and Advanced Certificates in Horticulture:

Oaklands College: Oaks Road, Hertford, Hertfordshire, AL1 4PA Contact: Ian Merrick Tel: 01727 837000 Fax: 01727 837228 Email: ian.merrick@oaklands.ac.uk Web: www.oaklands.ac.uk Information: Full-time courses: National Certificate in Greenkeeping and Sports Turf Maintenance. Evening Courses: leading to NQV Level 2 & 3 Greenkeeping. Modern Apprenticeships. Evening Courses: leading to NQV Level 2 & 3 Greenkeeping. Modern Apprenticeships. Evening Courses: leading to NQV Level 2 & 3 Greenkeeping. Modern Apprenticeships.

Plumpton College: Lower Mead, Pulborough, West Sussex, RH20 1DL Contact: David Blackmur Tel: 01273 892044 Fax: 01273 892044 Email: enquiries@plumpton.ac.uk Web: www.plumpton.ac.uk Information: Full-time courses: FEPA Short courses. Also available: Edexcel HNC Turf Science & Sportsground Management: National Certificate Horticulture, First Diploma Turf Science, NQV Level 2, 3 & 4 Greenkeeping Management delivered both in the workplace and over the internet using the college's 'Mollnet System'. Part-time courses: NQV Level 2 & 3 Greenkeeping and Sports Turf Maintenance (Day release or work based), NQV Amenity Horticulture (Greenkeeping and Sports Turf options); plus varied short courses including Chainsaw, Brooklaun/Storimes, P&A/PA6A/PA9 etc.

Reaseheath College: Cheshire, CW5 0SR Contact: Brian Jones Tel: 01278 675536 Fax: 01278 675536 Email: enquiries@reaseheath.ac.uk Web: www.reaseheath.ac.uk Information: Full-time First Diploma Horticulture (Sports Turf Option) - 1 year. National Diploma Horticulture (Sports Turf Option) - 2 years. BTEC Higher National Diploma in Sports Turf Management - 3 years. Part-time: HNC Golf Course Management with Open Learning option, NQV Level 1-4 Greenkeeping with Farm Tasks option. Also courses available. Short courses: FPHA, Chemical Safety, Safe Lifting, Chainsaws, Off-road Vehicle Driving, First Aid.
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 Greenkeepers Training Committee at Aldwark Manor, Aldwark, Ayle, York Y061 1UF. Tel: 01347 838640 or visit their website at http://www.thegtco.co.uk

Training providers guide
Available courses guide

England

Sparsholt College
Sparsholt, Winchester Hampshire SP5 9JF Contact: Ray Broughton Tel: 01962 776441 Fax: 01962 776587 Email: rbroughton@sparsholt.ac.uk Information: NVQ Level 2 Greenkeeping Practice, NVQ Level 3 Greenkeeping Supervision, City & Guilds Professional Management Studies, National Diplomas in Golf Course Management and Golf Studies, National Certificates in Greenkeeping and Sportsturf Management, GTC Greenkeeper Certificate, GTC Certificate in Golf Course Supervision, FEPA, short courses, Chainsaw, 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 867611 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, TDBL Assessors awards, FEPA, Chain Saws, MTT. Other Courses: National and First Diploma in Horticulture and Garden Design.

Warwickshire College
Rural Leamington Spa & Moreton Morell, Moreton Morell, Warwick, Warwickshire, CV35 9BL Contact: Brian Cook Tel: 01926 318260 Fax: 01926 318300 Email: enquiries@warwickcol.ac.uk Web: www.warwickcol.ac.uk Information: Greenkeeping Courses: HHW Sports Turf & Golf Course Management (Day Release 2 year Programme also distance learning option); NVQ Level 2 & 3 Day Release and Workshop Option (no course to date); two year NG in Horticulture with Turf Option; BTLB Certificate in Turf Irrigation. Short Courses: Introduce your Committee to Turf Culture; Compacting for the Greenkeeper - various times throughout the year - ring for details. FEPA: Spraying, Certification, Chainsaw Certification; TDBL: First Aid. Also BTEC General and Diploma, PMI, PPA2 and PPG.

Writtle College
Chelmsford Essex, CM1 6PL Contact: David Campbell Tel: 01245 424200 Fax: 01245 428546 Email: www.writtle.ac.uk Information: SPORTSTURF PROGRAMMES NVQ Level 2, Sportsturf NVQ Level 3, Sportsturf Maintenance. NVQ Levels 1, 2 & 3: Amenity Horticulture, HHW - Sportsturf Science, HHD - Sportsturf and Golf Course Management. Other Programmes: National Certificate, National Diploma (with Sportsturf Option). BSc (Hons) Sportsturf Science and Management, 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.

Greenmount College
Antrim County Antrim BT41 4PU Contact: Declan Gallagher Tel: 028 94 426794 Email: declan.gallagher@dshd.gov.uk Web: www.greenmount.ac.uk Information: Day release courses to (a) NVQ Level 2 Greenkeeping and Sportsturf, (b) NVQ Level 3 Golf Course Supervision National Diploma in Horticulture with turf options, FEPA, Health and 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: NVQ Level 2, Sportsturf; NVQ Level 3; Sportsturf Maintenance. NVQ Levels 1, 2 & 3: Amenity Horticulture, HHW - Sportsturf Science, HHD - Sportsturf and Golf Course Management. Other Programmes: National Certificate, National Diploma (with Sportsturf Option). BTLB Certificate in Turf Irrigation. Short Courses: Introduce your Committee to Turf Culture; Compacting for the Greenkeeper - various times throughout the year - ring for details. FEPA: Spraying, Certification, Chainsaw Certification; TDBL: First Aid. Also BTEC General and Diploma, PMI, PPA2 and PPG.

Greenland College
Rutherglen Campus, Buchanan Drive, Rutherglen, Glasgow, G73 3PF Contact: Colin S Urquhart Tel: 0141 467 6300 Email: colin.s.urquhart@perseus.langside.ac.uk Information: Greenkeeping Courses: HNC Sports Turf & Golf Course Management (Day Release 2 year Programme also distance learning option); NVQ Level 2 Sportsturf (Greenkeeping and Groundsmanship), NVQ Level 3 Sports Turf Maintenance, GTC Craft Certificate, GTC Certificate in Golf Course Supervision, TDBL Assessors awards, FEPA, Chain Saws, MTT. Other Courses: National and First Diploma in Horticulture and Garden Design.

Elmwood College
Cupar, Fife, KY15 4QJ Contact: Ann Bain Tel: 01334 658862 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. HHW Golf Faculty Management, HND Golf Faculty Management subject to validation for 2002. FEPA for baseball and cricket available also block release and Outreach. FEPA and CDSH, chainsaws, tree climbing and rescue techniques and Health and Safety short courses also available.

West Anglia
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 Greenkeepers Training Committee at Aldwark Manor, Aldwark, Ayle, York Y061 1UF. Tel: 01347 838640 or visit their website at http://www.thegtco.co.uk
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Tel: 01628 824444 | Fax: 01628 824695
E: enquiries@bca.ac.uk
W: www.bca.ac.uk

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Why Myerscough?
At Myerscough College in Lancashire we are good at what we do! We have an outstanding reputation for our diverse range of courses and excellent facilities. We are the only college in the UK to offer a specific sportsturf degree and our facilities for the subject are second to none. Needless to say, our graduates are highly sought after!

What Can I Study?
Courses include:
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- Foundation Degree in Sportsturf
- NVQ Turf Science & Golf Counter Management
- National Diploma Turf Science & Sportsground Management
- National Certificate Greenmanship & Greenkeeping
- Higher Diploma Greenkeeping
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- Purpose built turf technology unit & storage facilities
- Extensive laboratories

Careers Advice Sessions
You are welcome to visit our campus and meet our friendly staff to discuss your options on any of the following days:
- Saturday 13th July 2002: 10.00am - 12.30pm
- Saturday 17th August 2002: 10.00am - 12.30pm
- Saturday 24th August 2002: 10.00am - 12.30pm
- Saturday 7th September 2002: 10.00am - 12.30pm
- Saturday 14th September 2002: 10.00am - 12.30pm
- Wednesday 23rd October 2002: 3.00pm - 8.00pm

Call us for more information on
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- Landscaping
- Golf
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- Sports Conditioning & Coaching

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E-mail: enquire@hartpury.ac.uk
Web: www.hartpury.ac.uk

The Grass is Greener with Myerscough Sportsturf!

The facilities
At the College there are extensive practical facilities and resources including a nine-hole "pay and play" parkland course. A four hole par three practice golf layout, a practical putting green and a bowling green. The College is well equipped to meet the requirements of greenkeeping and sportsturf management courses.

The courses
HNC in Golf Course Management

The advanced level course is offered on a part-time basis. It is suited to applicants who have completed their Level 2 or have been involved in the industry for some time. The programme is based on a range of SQA modules devised to meet industrial needs by providing students with sound, hands-on practical experience, maintaining, renovating and developing sportsturf and amenity facilities both on and off the College site. A wide range of opportunities are available in this diverse and expanding industry with the potential to progress for those people with commitment, qualification and appropriate experience.

Oatridge has an excellent reputation for the quality of teaching in greenkeeping and sportsturf management. The College maintains strong links with local golf clubs, local councils and national bodies such as BIGGA (British and International Golf Greenkeepers Association) and IOG (Institute of Groundsmanship). Oatridge is ideally suited to meet training needs of students and employers from throughout the UK.

Oatridge Agricultural College, Ecclesmachan, By Broxburn, West Lothian, Edinburgh EH52 6NH
Tel: 01506 854387 Fax: 01506 853373 Email: info@oatridge.ac.uk Website: www.oatridge.ac.uk

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- Wednesday 23rd October 2002: 3.00pm - 8.00pm

Call us for more information on
01995 642211

Myerscough College, Bishton, Preston, Lancashire, PR3 0RY
www.myerscough.ac.uk mailbox@myerscough.ac.uk

28 Greenkeeper International July 2002
Roland Taylor takes a look at pollutants and how emission control is now such an important issue

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

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 of these gases, being produced and released into 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 sun's harmful ultra violet radiation. Here the culprits are CFCs (Chlorofluorocarbons) 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.
**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 brought about to the environment this natural cleaning system no longer works at 100% – 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 gained 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 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