Neil Green on one of his favourite mowers - the Hayter 424 Turf Mower.

Stefan went on to explain that when the subject of using purpose-built fairway mowers has arisen he presents the following example based on 60 cuts per year.

Self-propelled Mower cost £30,000. Life 5 years
Total cuts over 5 years = 300
Purchase price divided by 300 = £100 per cut
Ongoing Maintenance is 10% of purchase price.
The total price per cut of fairways is £110

Gangmowers cost £10,000. Life 15 years
Total cuts over 15 years = 900
Purchase price divided by 900 = £11 per cut
Ongoing Maintenance is 10% of purchase price.
The total price per cut of fairways is £12.50

The units are returned to Lloyds every three years for a complete refurbishment. For Stefan, who has been chosen this year as Sussex Greenkeeper of the Year, gangmowers are the answer because he considers them a sound investment that give years of service and are economical to run. They produce the results.

In 1997 the BIGGA National Tournament was staged at this course. The Lloyds Leda gangmowers have high carbon chromium steel reels and bottom blade to give long life and cutting edge retention.

There is a choice of 4, 5, 6 or 9 bladed reels. Roller bearings are used throughout the units, for smooth action and longevity. The standard model is 760mm wide with a 190mm diameter reel and there is a choice of cast or pneumatic wheels.

The giant version has a 6-bladed 250mm diameter reel. Towing fame mountings are available for a trio, quintuple and septuple of units.

The Leda Husky outfits three gangmowers and are attached to the tractor on a three-point linkage frame. Five and seven trailer-mounted systems are also available.

The Lloyds Pentad hydraulic 760/5 Gangmower is a trailer unit that allows the operator to control the five free-floating mower units through a box located on the tractor.

Approaching Ryston Park Golf Club from the south you leave the Cambridgeshire fens with their dark, rich, peaty soil and climb into the gentle landscape of Southwest Norfolk.

This nine-hole parkland course, which is almost on the edge of the fens, was constructed in 1930. On this higher ground, overlooking the flat landscape, the soil profile is sandy loam.

Neil Green, who joined the club as Head Greenkeeper two and half years ago, has considerable experience when it comes to mowing grass.

One of his first priorities was to change the condition of the rough and semi-rough areas around the course. For this purpose he chose the Hayter T424 Turf Mower because of his considerable experience of using this machine.

A weekly mowing programme was established with a cutting height of 80mm for the rough and 51mm on the semi-rough. The practice area is mown to 25 mm. One year on and the areas have improved considerably and both Neil and the club members are very happy with the results.

Said Neil, "I chose the Hayter because I already knew that it would produce a quality of cut on relatively long grass. There are a number of small trees planted around the course and the machines manoeuvrability makes it easy to mow close to them.

"There are only two of us to look after the course, so time is paramount and this mower certainly has the high output we are looking for. The Hayter is very economical to run and as it is used for long periods comfort and ease of use are also important factors.

"The mower is occasionally used for cutting fairways and changing the units takes us under an hour to complete."

The fairways at Ryston are aerated once a month with a slitter. As the profile of the soil is sandy, drainage is good. Surprisingly, the course also holds up well in drought conditions.

"In the seven and half years I have worked with Hayter machines I have had very few problems," concluded Neil.

Ryston's Hayter T424 has five mowing units that produce a cutting width of 3.5metres with a mowing speed of 14kph. The mowing configuration can be changed at the flick of lever.

A 51hp Kubota diesel engine provides ample power and the 4wd with differential lock provides plenty of versatility for dealing with varying ground conditions. Hayter's say that the driving platform and engine cowling can be tilted to provide access, along the whole length of the machine, so servicing work can be carried out easily.

Which mowing equipment a greenkeeper decides is best for him will be based on a number of factors, but throughout the preparation of these features one aspect has stood out far above the rest - the local backup support provided by the manufacturers and suppliers.

The distance from the course of a designated dealer for a particular brand or mower is also significant. If service and supply of replacement parts is poor or mediocre then regardless of how well a machine performs retaining a greenkeeper's loyalty and support is going to be severally tested.

Water – it's something we all need of course...

Water is an essential ingredient of life - that's no secret. It is central to the process of photosynthesis in plants, the complex set of chemical reactions that fuels the biosphere. Photosynthesis uses water extracted from soil, carbon dioxide from the atmosphere, and energy harnessed from sunlight as raw materials to produce simple sugars. These sugars are the basic building blocks for plant and animal tissue of all types, and fuel the vast array of metabolic processes in most all organisms. Water is an essential raw material in this miraculous process.

Water is also consumed in large volumes by plants in the process of transpiration. Water is pulled from root tissue through the plant to leaf tissue where it is lost to the atmosphere as water vapour.

Transpiration has a tremendous cooling effect on the plant and transports nutrients to the leaves in the process. Without water there would be no plant life. Without water there would be no life at all.

Turf on golf courses, like all other plant systems, uses water as a basic input. Without adequate supplies of soil moisture on a continuous basis high quality turf for golf is not possible. The only sources of water for turf are natural precipitation and irrigation.

In arid climates irrigation is essential for maintaining vigorous turf. In climates with adequate precipitation irrigation is used to supplement rainfall during dry periods. Despite the climate, underground irrigation systems have become common on golf courses around the world.

A question that most courses face at some point in time is whether or not to upgrade or to install a new irrigation system, both of which are expensive propositions. A number of factors can enter into a decision:

The cost of maintaining an old system can become a major concern when labour, availability of replacement parts and pumping costs are factored in. At some point the cost of continual repair of old technology can become too much.

Continue to learn

Upgrading old technology with more reliable new technology can be reason enough for change. Irrigation renovations can range from whole system replacements from pumps to sprinklers, to the repositioning of new sprinkler heads for better coverage, to the replacement of only the control system for improved timing and reporting.

A more likely reason for considering an upgrade is the unending quest for improved turf quality and improved playability. The golfing public is continually demanding better conditions.

New irrigation systems are typically designed to give broader coverage by increasing the amount of turf area watered. Double and triple rows of sprinkler heads in fairways has become the norm. 'Wall-to-wall' irrigation coverage across a course is not uncommon.

New systems are also designed to give more uniform coverage. In general, the more sprinkler heads on a course the more flexibility in applying water.

More heads typically increases the uniformity of distribution by allowing a given area of turf to be watered by multiple sprinklers. State-of-the-art heads are designed to increase the uniformity of distribution within their individual spray patterns.

New systems are designed with improved control, computerised control systems give substantially more power and flexibility to turf managers for customising and fine-tuning watering practices.

All of these factors together give turf managers the ability to improve turf uniformity and quality over larger areas and to minimise problems associated with undue wetness and dryness, such as reduced vigour from drought stress, disease, and susceptibility of soils to compaction.

The need to conserve water in golf turf management is becoming an increasingly important consideration in renovating irrigation systems, especially when combined with the golfing public's expectation for greater playability.

Water availability, the cost of water, and the quality of available irrigation water are all becoming major issues in turf.

The need to conserve water is no longer a problem specific to arid regions. It is becoming increasingly important where competition for water is intense, a growing problem in heavily populated urban areas.

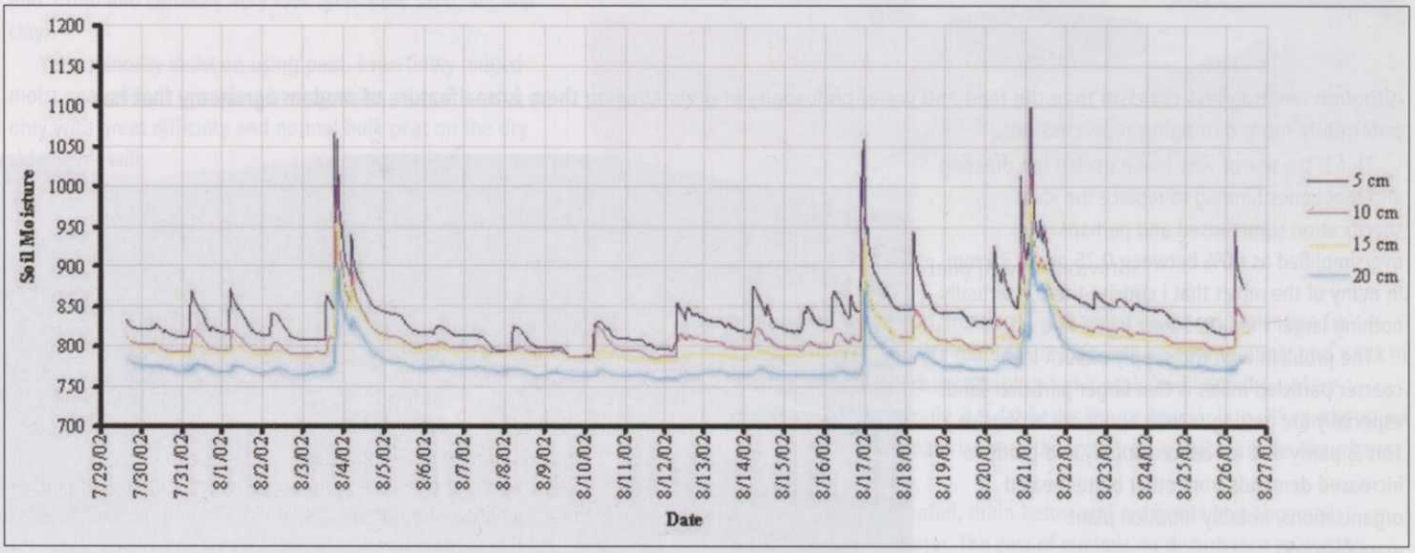
In golf turf management water use is becoming a classic issue of 'getting more for less', or more specifically, better turf for less water. The ability to detect where and how much water is needed, and to then apply it with precision only in those locations is the ultimate challenge.

In the past the irrigation industry has focused with great success on applying water uniformly to non-uniform surfaces. The challenge now is to develop the ability to apply water non-uniformly depending on the need.

It is an issue of using high performance sprinkler heads with sophisticated controls in a well-designed layout that is tailored to the variability in soils and topography existing across a golf course.

Key to the conservation of water in turf management will be the incorporation of sensing technologies that measure or predict

Van Cline, PhD, of Toro, studies the considerations for upgrading irrigation



moisture status across a golf course giving managers the ability to pinpoint applications. All of these pieces exist today, although the sensing component has not yet been effectively integrated into the complete irrigation system. Research is progressing in this important area however.

The precise application of water only where it is needed to optimise turf quality while conserving water depends on a better understanding of conditions affecting moisture dynamics than is the norm today on golf courses. Agronomists and engineers at Toro have been working with various sensing techniques to monitor moisture status on golf course fairways.

One promising technology under investigation is soil moisture sensing using both static or buried sensors located strategically in a fairway to represent a uniform set of conditions, and portable sensors that can be used to map soil moisture conditions at a given point in time over large turf areas.

Buried capacitance sensors can provide an accurate picture of changes in the soil moisture pool at multiple depths. This information can then provide feedback to the effectiveness of irrigation or rainfall.

The graph (**above**) illustrates changes under a bent grass turf at four depths (5, 10, 15 and 20cm) during a one-month period in the summer of 2002 on bent grass plots at the University of Minnesota.

The large sharp peaks were rainfall events while the smaller peaks were irrigation events. The stair-stepped pattern downward was the daily depletion in the soil moisture reservoir caused by transpiration.

This type of information can be used to set upper and lower limits for the optimum soil moisture condition under a turf acting as trigger points for turning irrigation on and off.

The second application of soil moisture sensors under investigation for input into irrigation control is the use of time domain reflectometry (TDR) measurements collected in a sampling scheme across a fairway to quantify soil moisture variation.

When used in combination with GPS locations this TDR data can be mapped giving a visual representation of soil moisture conditions at a given point in time.

When repeated several times during a growing season, predictable moisture patterns emerge showing areas that are consistently drier or wetter.

This type of information has the potential of being fed into a map-based irrigation control system to more efficiently apply water.

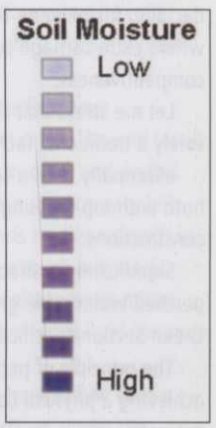
The maps (below) document changes in soil moisture on a Minnesota golf course fairway through the 2003 growing season.

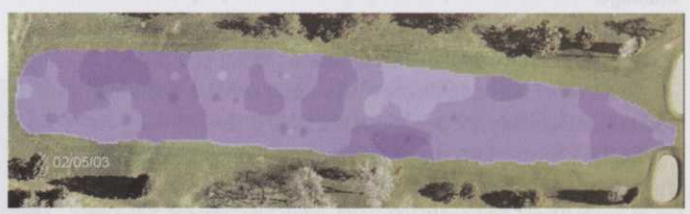
The darker blues represent higher soil moisture while the lighter blues represent drier conditions. The concept is to use maps like these to adjust run times for individual heads depending on their location and its relative wetness or dryness.

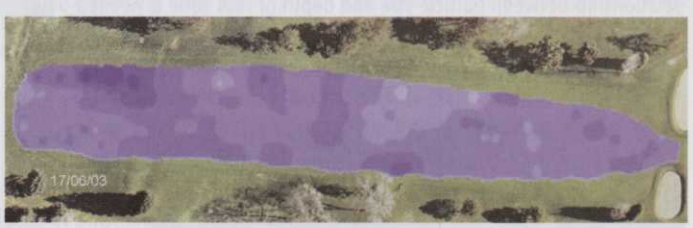
In summary, a major challenge in irrigating golf turf today is to use water more efficiently to grow a higher quality product.

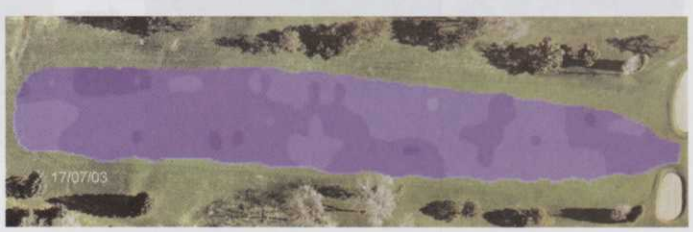
Any irrigation system upgrade should take this challenge to heart.

Better sprinklers, more versatile control systems, sensors that can provide feedback on moisture conditions, and system layouts that are sensitive to site conditions that influence moisture dynamics are all part of the solution.









Too fine by half

Jim Arthur BSc investigates the use of fine sand in top dressing

Although creating less criticism than the feed and water philosophy in greenkeeping there is one feature of modem agronomy that has potentially more damaging repercussions.

This is the use of very fine particled top dressing and root zones tending to replace the ideal specification summarised and perhaps oversimplified as 80% between 0.25 and 0.75 mm. In many of the mixes that I criticise there is virtually nothing larger than 0.25 mm, just a fine silt.

The problem with the supply of such ideal coarser particled mixes is that larger particled sands especially are getting scarcer and more expensive. This is partly due to reduced supply and partly to increased demands from other better healed organisations, notably filtration plant manufacturers.

Sources of the correct sand cost significantly more and in these days of cost being sadly the sole deciding factor, very fine sands are used, even where extra carriage costs reduce their competitiveness.

Let me stress that this is not an academic nor solely a traditional factor. It is

essentially both a scientific and a practical one, both with top dressing and in root zones used in constructions.

Mixing on site should never occur.

Significantly it affects the specifications for both perched water table greens (of which the much quoted and dare one say, Green Section specification, is only one).

The principle of perched or suspended water table greens depends on achieving a physical balance between moisture retention and free drainage.

Sand-only, i.e. 100% sand greens - a heresy of short life aimed at achieving free drainage under high irrigation in hot arid climatic conditions - have no water retention (to cope with such excessive levels of irrigation) and are emphatically not perched water table greens.

The finer the particles the greater their surface tension and the more their moisture retention levels and vice versa. To balance this out a specific relationship between particle size and depth of root zone is needed over the stone or gravel drainage layer to achieve a head of water.

If there is insufficient head, the water will not jump the gap and remorselessly builds up in the root zone, with virtually none reaching the drains.

Mixing root zone of fen soil and sand is best done centrally, off site.

The end result is hole cups full of water and soft squelchy waterlogged greens.

The only solution is not aeration - the holes merely close in after a short time - but lies in increasing the depth of root zone. In one well documented case which cost the architect and the agronomist £1 million each the greens had to be rebuilt.

The tees, built up with the same very fine sandy root zone, drained perfectly as they were built up 2-3 feet in depth, so the head was sufficient to force the water through.

This is such elementary junior soil physics that it astounded us as to why such a simple error could not have been recognised in the specification. In passing, matters were not improved by the contractor skimping on the already inadequate specification for the root zone depth.

The financial deduction is that it is a false economy using a finer but slightly cheaper sand because a significant extra depth is required and not just the odd inch either which more than eliminates any saving.

What is hard to understand is the current agronomic vogue of using such fine sands, often carted for hundreds of miles, from e.g. Cheshire, to sites a relatively short distance from Bedfordshire pits. Yes, it costs a few quid a tonne more, but this is often equalled by extra haulage, let alone greater depths being needed. If there is a reason will someone please tell me?

Another problem with root zones is that there is a fashion for mixing inadequate volumes of organic matter with the sand giving an 80:20

proportion, instead of in my book 70:30 and in a recent construction which I specified and supervised 60:40, using fen soil at 40% so as to match the existing greens. The end result was a new green built in days not weeks in late October and in full play from the start of May.

The type of organic matter is just as important as the quantity. Many agronomists would agree with me that the ideal mix is fen soil with Leighton Buzzard or equivalent sand with virtually all the particle size range between 0.25 mm and 1 mm and certainly very low 'fines' (fine sand, silt and clay).

Yet a minority insist on using peat. Even finely mulled moist peat cannot provide a homogenous mix with sand, or only with great difficulty and normal bulk peat on the dry side never will.

Furthermore the subsequent and all important top dressing should be the same as the root zone and sand-peat mixes quickly separate out and the peat element largely blows or washes away or is collected by the mowers.

A blinding layer being spread by a long jibbed excavator.

Fen soil, in passing, is a geological not a trade term, the product from the re-establishment of water features on drained fenland derived from opening up as water features wetlands for conservation reasons.

Why when we have sufficient supplies of the ideal materials for root zones and top dressings to meet all current needs do we use poorer products - just because it is slightly cheaper but vastly inferior. Note that fen soil is not technically a peat but an ideal and not too rich (fertile) source of essentially needed humus (organic matter) capable of being finely screened.

Properly constructed perched water table greens with the right specification have lasted for 40 years. The USGA Green Section started their green specification in 1960 but it has been so modified over the years to be virtually unrecognisable, but still if not excessively modified it still works well.

My specification, which started quite independently in the mid 60s, differed fundamentally mainly in the drainage carpet - of much larger stone as opposed to fairly fine gravel, primarily to achieve stability on our softer soils.

With stone you can run a long jibbed swing excavator on to the centre and leave it there to spread successive layers of blinding and root zone. This is not easily possible with pea gravel. Ever run your car over a 4" layer of gravel on your drive? All you get is ruts and disturbance! The problem in some countries is that there is no natural stone, but plenty of gravel. This smacks of improvisation, not principle!

Even where no green construction is involved, the veto on very fine soil/sand mixes for top dressing is just as important, as super fine (ie <0.25 mm) particle size material. It may well be easy to apply and work in with minimum disturbance to play, but it seals and impedes surface drainage. Agronomically, it is far better to use coarser ie >.25 mm even up to 1 mm than finer material even though there is slightly more disturbance to putting surfaces.

Greens etc. so treated, drain better and are firmer and above all perform better in winter. The cost of minimising disturbance to putting surfaces in the growing season is far greater than disturbance from aeration to try to improve drainage.

One can understand commercial sources lacking access to pits with coarser sand eulogising in the way golfers approve, but it does not alter principles.

Why choose inferior finer mixes with the wrong performance characteristic by buying, as too many do, primarily on price. The end result is often vastly expensive and often avoidable reconstruction and, in this day and age, there is less and less money to pay these unnecessary bills.

It is gratifying to note the enormous swing towards traditional golf; in Denmark especially, and chastening to think that their much criticised prohibitive EU fungicide regulations have forced greenkeeping to adopt austere measures to avoid fangal disease against which they (and soon we will) have no defences.

Many Danish courses have already started going back to fine fescue dominance and many more are following sound practices, under the inspired leadership of Chris Haskell.

The feed and water Poa annua school represent a high cost policy dependent on fungicides. Without the latter, as has been seen in Germany and elsewhere, greens can be totally destroyed.

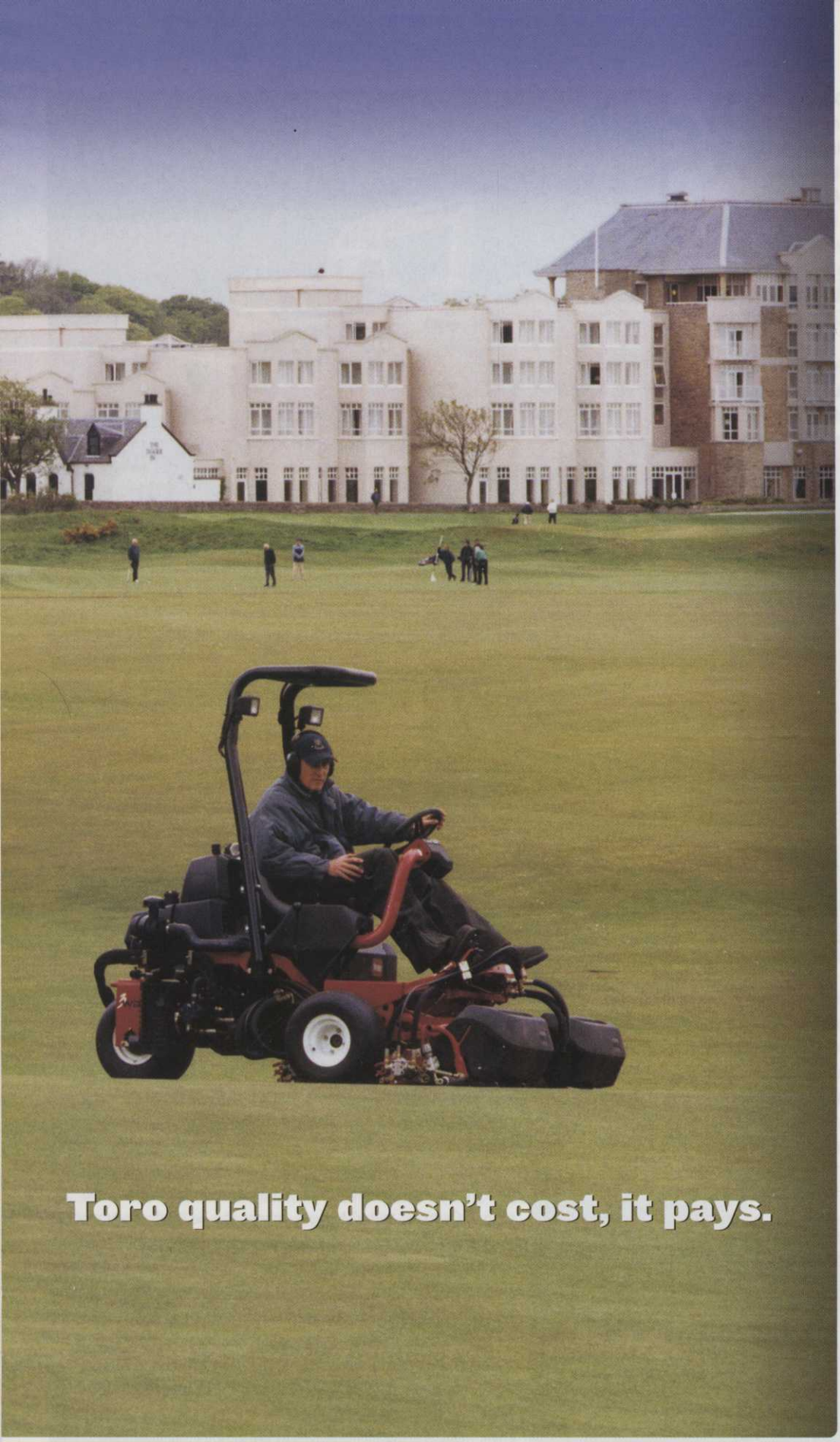
It seems that quite inadvertently the 'Greens' have influenced and justified sound greenkeeping for the better. We must now attack the other basic faults - excessively too fine sand/soil mixes for root zone and top dressing.

Far too many heresies are promulgated because the correct materials are difficult to find or slightly more expensive. After a while, but often not before the resultant problems are all too evident, it becomes a trademark and such malpractice's are enshrined by being incorporated in prestigious developments.

Then we wonder when we see reconstruction on an heroic scale to correct basic errors which should have been obvious to agronomists and constructors if not sadly to architects, developers or owners.

Why can some people not leave well alone? If it isn't broke don't try and fix it. All the basic principles are constantly attacked often for blatant commercial reasons, yet they do work, give better results and cost so much less.

Author Jim Arthur (right) oversees the spreading of root zone over a blinding layer of Cornish grit.



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Saltex time again

September 7-9

Saltex time again

For those for whom 12 months is too long to go without an exhibition fix Saltex offers the perfect opportunity to catch up with developments within the fine turf industry as well as old friends between Harrogate's exhibition every January.

A fixture in the calendar for the beginning of September, Windsor Racecourse offers exhibitors the opportunity of showing their wares in action, with demonstrations a large part of Saltex's appeal. And with a wide range of ancillary products on display a walk around the extensive Show site will bring you into contact with all sorts of park and leisure equipment.

You could bump into a skateboarding demonstration or see a display of imaginative litterbins or safety equipment for play parks. While not necessarily on your own shopping list it all adds to the flavour and diverse nature of the Show.

Another innovation this year will be the construction of an "instant stadium" in conjunction with the IOG and Penton Media Group which will cover a total area of 30 metres by 50 metres and contain every component part required in a professional stadium complex.

This will include arena seating, dressing rooms, showers toilets, catering facilities, PA system, first aid point, mobile flood lighting, large screen display, portable goals and other equipment, turnstyles and barrier fencing.

But if you are purely interested in fine turf the vast majority of the companies you work with are represented and you will be able to conduct whatever business you need to do to carry you up to BTME & ClubHouse in January.

BIGGA will be well represented at the Show with the Association's caravan a well utilised meeting point for members and a reference point for anyone seeking information on membership, education, Harrogate, indeed any element of the Association's work.

For more information of this event go to the IOG Saltex website at www.iogsaltex.co.uk or Tel: (0) 20 8232 1600