



While relishing the challenge it did mean a swift amending of the plans that had already been put tentatively in place.

Cameron Sinclair designed the six new greens and J&E Ely were contracted to construct them to USGA spec before Barry Cooper came in to lay the drainage having first come up with a plan which looked like a cross between a map of the London Underground and the face of a weather beaten octogenarian.

"By the time we are finished over 18 miles of drainage will have been installed - that's the distance from Hoylake to Chester," revealed Ian

"The greens were done first and we finished them, and five tees, by Christmas. Cameron, who also acted as supervising architect, said it was nice to leave a contractor knowing that when you came back everything had been done exactly to spec," said Ian, who added that one of the reasons Ely's had been chosen was the wonderful work they had done at nearby Hoylake.

Some of the tees were actually rebuilt in-house with Ian and Tom encouraging the team to study Ely's work on the greens before using the same techniques on the tees.

"It as a great training and development exercise and I learned a lot as well," said Ian.

They have managed to keep nine holes of the course playable at a time while the work has been done but as Ian points out the members had no golf during much of the two previous winters anyway.

"There has been quite a bit of disruption but the vast majority of the membership are right behind us



because they voted for it with their pockets and want the job done as per the plan," admitted Tom.

He has been Chairman of Green for three years having previously held a similar post at Burghley Park, in Stamford, Lincolnshire.

When he moved back home to the north west to settle he joined Caldys and before long he found himself doing the same job.

"When I took over I told Ian that I wanted to work together and saw myself and the green staff as part of the same team.

"I see my job as giving the guys support, encouragement and the investment necessary to get Caldys

Golf Club to the standard we aspire to and then to communicate with, and manage, the membership, rather than the other way round," explained Tom.

"If we can keep the membership informed and up to date with what we are trying to do, they respond, and the whole thing goes forward. That's what we have found with this massive project," said Tom, who could be used as an identikit Chairman of Green.

Tom is a huge fan of Alistair McKenzie and particularly his recently-discovered book *The Spirit of St Andrews*.

"Reading his thoughts on golf and



GRASPING THE NETTLE

This page: Barry Cooper had a considerable job on his hands and more than 18 miles of pipe have been used

its development going back to the 30s they are as relevant today as they were then and are the same guiding principles we have here at Cald.

"We want to do what's best for Cald, its members and visitors, but also for golf and the game. We've got a lot out of the game and we want to put something back for the future. That means doing the best quality job we can with the long term in mind and managing the

course ecologically and environmentally as well," said Tom, who has hopes that the course may be used as a final qualifying venue when The Open returns to Hoylake in the near future.

He has also ensured that the greens staff have the tools they require to do the job and a five year rolling programme with Toro dealer Cheshire Turf Machinery ensures that the club gets the best equipment at the most competitive price because the length of the agreement also allows the company to plan ahead. New maintenance and storage facilities have also been built to house staff and machinery.



Nearing the end of the drainage contract Ian and Tom are delighted with what has been achieved particularly given the constraints of working through a wet winter.

"With a free rein it would have been great to have done the work in the summer when the ground conditions were at their optimum rather than the winter as the disruption would have been much less but we know that members wouldn't have wanted to lose any more of their playing season, particularly when they'd been off the course so much in the last two years," said Ian.

"We currently have eight weeks to completion but, talking with the drainage team, we would have been

finished by now using the time spans summer would have involved," he added.

"We have told the members that the new system will start to work immediately but that it will take a couple of years for the ground to settle so it might not be perfect straight away."

As for the greens, which reused the existing turf, they are settling in very well and will be hand cut probably for the rest of this year.

Having bitten the bullet and taken advantage of the innovative fund raising scheme instigated by the club, Cald Golf Club members can now look forward to year round golf from now on.



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MULTI TASKING MACHINES

Roland Taylor looks at those machines that can be used for a variety of jobs

The last two decades have seen a spate of new courses spring up across the country, some having been established on land that originally grew crops whilst others were integrated into existing parkland.

Wherever they have been built the landscape has been altered, in some

cases considerably. Future generation will look on these as complementing, improving or desecrating the existing countryside. This has very much been the case with famous landscapers of yesteryear such as Lancelot Capability Brown. His work still raises the question today - vandal or



genius? Throughout the 1700's he travelled the length and breadth of England creating gardens for the aristocracy. His designs were on a large scale, lavish and certainly revolutionary. Artificial hillsides changed flat landscapes and extensive water features were created by damming streams. Groups of trees were planted to draw the eye to some distant focal point. The only things that were missing were tees, fairways and greens. As far as is known he had no connection with golf, but his work and vision included a lot of what could be considered to be close to golf course architecture. Some of Brown's original landscapes could well now form part of an existing course.

In constructing a new course the placement of the greens and their adjacent fairways, bunkers and tees is of prime object, but for the overall image to be right attention to visual effects and existing features should also play a significant part in the final design. Whilst visiting a course under construction a few years ago it was pointed out to me that the architect had incorporated a lake near a green not only as a hazard to the unwary golfer, but also to reflect the church in the background. Water features





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and banks of flowering shrubs such as rhododendrons for late spring colour and acers for autumn to set off the rich green of the playing surface are good indications that landscaping practices have at some stage been involved.

Naturally, as far as maintenance is concerned, the main focus must be on the playing areas. However, it is easy to forget how much of the actual landscape is also man made, especially after it has been established for a few years. Unless some degree of management is carried out nature will, at some stage, take over and the original concept can eventually be lost. Trees die, lakes silt up, rampant vegetation takes over and erosion

destroys dunes and hills. Steams and watercourses become choked with weeds and flooding creates unwanted water features. Land management by necessity is an integral part of any course programme.

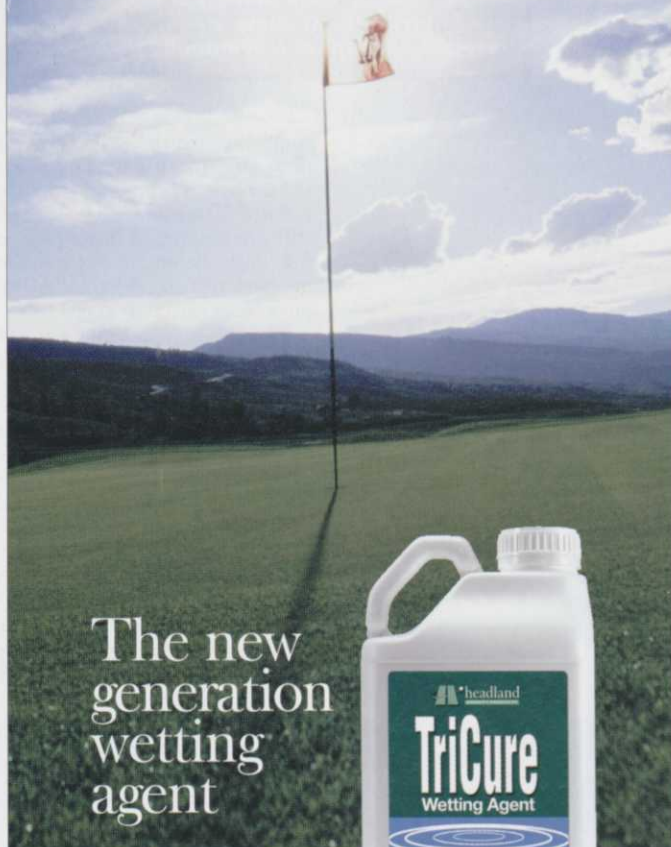
Fortunately, there are machines on the market that will make the operations easier and faster. Having this type of equipment readily available is the ideal situation, but unless there is sufficient all-year-round work for it the capital investment is not warranted. The alternative is hire and there are now specialist outlets offering this type of equipment for either long or short periods. This also enables a course to carry out a true evaluation of the machine's capabilities at only a minimal financial outlay.

Earth moving

At some stage there will be a need to carry out work on the underlying soil. This could involve building a new tee or bunker, replacing worn areas of turf or dealing with an erosion problem. Having removed the turf the soil may require attention as in some cases it is likely to be fairly compacted.

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MULTI TASKING MACHINES

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springs to mind and whilst these will do an efficient job in breaking up the soil structure other operations will be required to prepare a suitable bed for either seed or turf. A better proposition might be one of the specialist machines that are now available that produce an ideal tilth in one pass.

Once the turf has been removed stones may litter the surface and need to be extracted. In the past women were employed in agriculture to collect stones which were then used to fill potholes in the lanes and roads. Enterprising manufacturers soon came up with a mechanical solution. Today's landscaping stone rakes or buriers are spin-offs from those agricultural machines and are a highly effective answer.

A stoneburier uses the reverse rotation of its blade system to throw the soil and stones into a grille; the soil

passes through while the stones drop down and are buried. With the rakes there is the additional operation of collecting and disposing of the stones. Tractor powered units or pedestrian versions are available.

Either a compact tractor or skidster is the ideal power source for a wide range of landscaping machinery. When it comes to moving large amounts of earth a front loader is needed. There are plenty of these around and very likely most readers will already have one. Buckets come in a variety of widths and carrying capacities. Other necessary attachments for preparing sites are scraper and levelling blades and again there is a wide choice.

Backhoes are fairly specialist pieces of equipment, so hiring a complete unit is often the best option in most cases because a tractor fitted out to



perform the same operation cannot usually be used for any other task. For confined areas or where access is restricted a skidster with a backhoe attachment is a solution. There are specially designed ditching buckets for clearing out silted-up ponds or watercourses.

If a deep, wide trench is needed then the backhoe is probably the best choice, but when it comes to laying cables, irrigation systems or drainage a specialist trenching machine is the answer. These will produce an adequate deep and wide trench with minimal disturbance to the surrounding area. They come either as self-powered units or as attachments for a tractor or skidster.

Erosion

Wind and water can play havoc on exposed sites and slopes, especially if these consist of light or sandy soil. The sediment washed from them gets into watercourses and drainage systems where it can silt up and cause a blockage. Sand is often blown onto the course and once it is ingrained in the turf can act as a highly effective, unwanted abrasive, especially on mower blades. Any ground cover that would help to stop erosion occurring will be difficult to establish under these conditions. The seeds are washed away long before they can put down a strong root system. Some assistance is needed to aid their development. This is available in the





form of three-dimensional matting, which traps the soil and gives the plants a better chance to colonise. These products which are said to be adapted for most types of slope are rot proof, lightweight and easy to install.

Over-seeding

For carrying out this operation there is a wide choice of purpose built tractor-mounted or pedestrian machines now on the market. Some form of slitter or spiker unit produces a concentrated pattern of openings in the soil. Either a brush or rake then ensures the seed is incorporated into the earth and finally a rear roller firms the ground and closes the holes. A wide range of both hopper capacities and working width is available. However, not all manufacturers recommend their machines for fine areas so do check the equipment's suitability for your purpose before buying or hiring.

Trees

These form an integral part of any landscape. Occasionally nature becomes highly destructive as was the case in the gales of the 1980's and with Dutch Elm Disease.

In both cases replanting had to be carried out on a fairly extensive scale. On most courses this operation will be necessary from time to time as trees die, become infected or are blown down. The fastest way

to carry out this task is to use an earth auger to make the holes. This can be either a hand-operated unit, or an attachment fitted on a compact tractor or skidster. When planting trees using this method it is important to ensure the soil on the sides and bottom of the hole is loose enough to allow the young roots to penetrate the surrounding area. Earth augers are an alternative way of digging holes for tree planting and have the added advantage of being ideal for fencing or putting in gateposts.

Other tree work may require the services of a tree specialist.

Where once a golf course was part of the surrounding landscape it is often now the only green oasis in a concrete jungle. They effectively preserve all that is left of the original landscape.

The same applies to coastlines, heath, moorland and parkland. In all these areas they form a buffer for flora and fauna to survive that would otherwise be lost. But some controlled management is needed if they are to flourish.

For some readers what effectively is estate management is down to someone else and their only concern is the playing surfaces.

For others their responsibilities cover all aspects related to the course and its surroundings. Fortunately, they are well catered for when it comes to landscaping machinery.

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NEMATODES

A detailed microscopic photograph of soil. The soil is dark brown and crumbly. Several plant roots are visible, appearing as thin, light-colored lines. Numerous small, white, thread-like organisms, which are nematodes, are scattered throughout the soil. Some of these nematodes are attached to the roots. There are also several larger, pale, spherical structures, which are cysts, attached to the roots. The overall scene depicts a soil environment heavily infested with nematodes and cysts.

Fig 1: Cyst nematodes on roots (courtesy of CSL)

THE UNSEEN TERROR

Dr Ruth Mann and Sue Hockland look at nematodes and the damage they can cause

Nematodes (or eelworms) are non-segmented colourless microscopic worms, found in almost all environments worldwide. More than 18,000 species of nematode have been described. Every type of life form will have at least one nematode species that can feed on it. Most nematodes associated with soil are beneficial, feeding on fungi or microscopic life and thus helping to return nutrients to the soil. Others are predators or parasites of insects and their eggs. We may even use entomopathogenic species to try and control other pests in our turf, such as *Heterohabditis megidis*, which may control chafer grub infestations. However, there are 'terror' species that feed on our turf causing unseen problems until significant damage has been done.

Thousands of plant-parasitic nematode species exist but, fortunately, relatively few species parasitise turf grass. The species found on grass can have one of two appearances; long thin worms (such as stunt nematodes and root-lesion nematodes) or sac-like organisms (such as cyst nematodes (Fig 1) or root-knot nematodes). Plant-feeding nematodes feed with a stylet, which is a needle-like appendage used to pierce cells and inject enzymes that digest the cell contents. The resultant material is then sucked back into the nematode. They are obligate parasites, needing the host plant for multiplication but capable of limited movement away from the plant roots. They can either burrow into the plant (endoparasitic nematodes) or they may browse on roots and root hairs (ectoparasitic nematodes). Such feeding often results in lesions, nodules or galls being produced on the roots (Fig 2). Some species are also vectors of virus disease.

Nematodes can multiply quickly under ideal conditions. The life cycle can be as short as 17 days or as long

as 2-3 years, with often hundreds of eggs being produced. Each species has its own peak of activity during the year, with some species active at temperatures as low as 1°C. They survive adverse periods as eggs, juveniles, or in a dormant state.

Large nematode populations are associated with easily-draining sandy soils at field capacity (the same irrigation point as that preferred by grass), but nematodes will exist in all soil types and parasitise all of our grass species. However, we believe that the numbers are usually in equilibrium, with healthy turf being able to withstand a certain amount of attack. Symptoms of nematode damage tend to occur during periods of active plant growth, when infested areas appear as irregular patches of stunted growth, usually showing signs of nutrient deficiency. This is an indirect result of the nematodes destroying the amount of roots available for water and nutrient uptake. The turf may appear yellow due to an apparent lack of nitrogen, but when fertiliser is applied no effect is seen. The turf may become thin with individual plants dying prematurely. In a few cases greenkeepers have reported that the grass takes on the appearance of anthracnose symptoms without the black stem bases, as the leaves turn yellow through to orange/red.

Plants under stress for other reasons are also more susceptible to nematode attack; a slight moisture deficit may cause drought symptoms as the infested roots cannot absorb enough water, and hot weather, low height of cut and low fertility all exacerbate the problem. Greens and tees are not usually uniformly affected and 'hot spots' of nematode activity occur as a result of the patchy nature of their distribution. The edge of the symptom patch is diffuse compared to the rather sharp lines associated with

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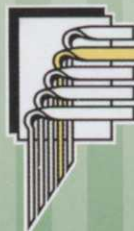


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NEMATODES

THE UNSEEN
TERROR



Fig 2: Galls at the root tips of smooth stalked meadow grass caused by grass root-gall nematode (*Ditylenchus radicum*) (courtesy of CSL)

some fungal diseases, or inappropriate application of fertilisers / herbicides. Nematode activity may also be revealed for other reasons, for example, where tractor wheelings have consolidated the soil, preventing nematode activity and thus allowing better growth of grass (Fig 3).

We are noticing an increase in nematode problems on golf courses and sports turf in the UK and Ireland. It is possible that these have been overlooked in the past, or perhaps we are becoming more adept at recognising them, but increasing emphasis on the production of quality turf for professional use has heightened the need to investigate problems. Environmental conditions over the past few years (above average rainfall, cool springs and mild winters) have allowed a slow increase in nematode populations to occur and we are now seeing the resultant symptoms expressed. Perhaps some of the new grass varieties are more susceptible to nematode damage than was previously the case.

Nematode activity can lead to other problems. Nematode-induced damage to the grass root system allows other pathogens easier access.

For example, *Colletotrichum graminicola*, the pathogen that causes anthracnose, needs a senescent area of roots of the annual meadow grass plant for infection. The damaged areas left by nematodes may provide entry points for *C. graminicola* and the resultant anthracnose symptoms are a secondary infection which we see and treat without realising we have not discovered the original culprit.

Identification of nematodes is important but difficult due to the numerous different species found in the soil, most of which do not have a detrimental effect on turf grass growth. In fact some species encourage growth by helping to break down organic matter found in the soil thus releasing nutrients back to the plants. In cases where high numbers of nematodes have been observed in samples sent to STRI we have recommended that a test for nematodes is carried out. This can be done at the Central Science Laboratory (CSL) near York by the Invertebrate Identification Service. CSL is one of the few institutions in the UK that can identify nematodes to species level as part of a commercial service. If nematodes are suspected, the method

of taking samples is important, as any isolations, counting and identifications can only be as good as the sample provided. Samples should consist of at least 200g of turf and soil from the top 6 inches or so of the area showing symptoms. If plants are dead, then a sample from the edge of the affected area is also recommended. A further identical sample should be taken from a healthy area so that the numbers of nematode species can be compared. Stem or leaf nematodes (*Ditylenchus* or *Aphelenchoides* spp.) and cyst or root-knot nematodes (*Heterodera* or *Meloidogyne* species) concentrate in the turf itself, whilst many other pathogenic species are found at varying depths in the soil. The samples should be wrapped in damp newspaper or placed in a polythene bag which is then sealed. Each bag should be placed in another bag, together with an appropriate label and sent by overnight delivery.

Research

Some research is being carried out on nematodes in the UK but not specifically on the problems of nematodes in turfgrass. We need more data on the species causing problems so that environmentally sound control