FIGHTING THE FUNGUS

CHEMICALS and the GREENKEEPER

19 ➧ slow or no growth season (which obviously varies in extent depending upon geographical area, but also with respect to the nature of the turf). Systemic fungicides work well and have the longer term of preventative effect. Also, they have a broad-based effect, so can deal with secondary diseases, and they do tend to discourage worm casting. While there has been suspicion that systemics can encourage thatch fungi, the link is very tenuous and can be safely ignored for the most part.

The systemic fungicides which have been widely used to date have been part of the benzimidazole (Benlate, etc.) family, and closely related in their chemistry. While no doubt these fungicides will continue to be widely used in future, the good news is that a completely new systemic fungicide has come onto the market recently – fenarimol (Rimidin) – which gives more options in terms of alternation of fungicides, so long as care is taken to avoid severe yellowing from use on *Poa annua* dominated greens, as can occur.

Alternation in the use of the types of chemical used for disease control (where practical) is good practice when disease has to be treated regularly, but this is not just a case of using different brand names. Alternation needs to be between different groups of fungicides. The benzimidazoles are very similar in action, as are the dicarboximides (eg. Rovral and Mascot Contact). Fenarimol is different and so too are Chlorothalonil (Daconil) and Quintozene. The reason for alternation is to avoid the development of disease resistance. Even though there is no proven resistance to any fungicide in the UK, this has occurred in the USA, where chemical usage is much more intensive.

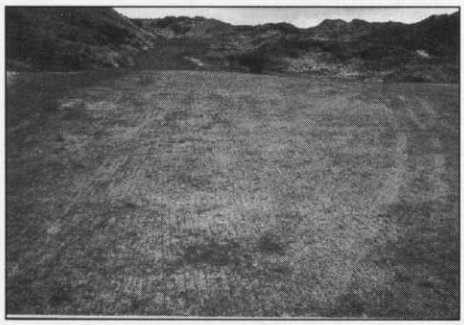
Beyond choice of chemical, there is always the thorny question of whether to use fungicides as a preventative or a curative treatment. The principle has to be to stick to curative applications wherever practical, to limit chemical input into the environment. However, in certain situations, eg. at clubs which suffer four or five outbreaks of fusarium every year when treating curatively, the application of systemic fungicide on a preventative basis from September onwards can actually reduce chemical applications – and leave better greens.

Using fungicides on the golf course for diseases other than fusarium is comparatively rare. However, it can be necessary from time to time and in these situations accurate identification is essential to ensure the right specific can be applied quickly to deal with diseases such as brown patch, severe anthracnose or dollar spot. Also, to ensure that fungicide is applied in the most effective way, eg. when dealing with grade two fairy rings or superficial fairy rings, or to avoid fungicide use when it could actually be harmful (eg. for take-all) or totally unnecessary (eg. for yellow tuft).

All in all, there is a lot to get right when using fungicides on the golf course even before getting to the operational end of applications themselves, ie. handling and spraying.

The more everyone knows about fungicides availability and disease identification, the better. After that, good training in spraying is vital, ensuring the lessons learned are actually applied. Then, fungicide use will be effective and safe. Even so, the launch of a new fungicide which has no Hazchem warning has to be good news.

■ **The author, David Stansfield, is the golf course agronomist with PSD Agronomy Limited.**



The Moore Uni-Drill – and before and after results

SOWING

There used to be three traditionally accepted methods of establishing grass on landscaped lawns, sports grounds, golf courses and embankments. Now there are two others. Meet Uni-Drill and Liquid Sod

Traditional methods

1 **Conventional Seeding:** This is the method usually applied to the bare prepared ground by drop or broadcast seeding. Germination by this method may take up to 30 days and before there are signs of establishment the seed is exposed to erosion, seed eating predators, drought and weed invasion, creating competition for the germinating seeds. Whilst satisfactory results can often be obtained by conventional seeding, it should be remembered that these factors may result in a need to re-seed at extra cost, not to mention the set-back in producing a satisfactory turf cover.

2 **Hydroseeding:** This is a method that was introduced in the United States in the 1950s. It incorporates water (which activates the seed), a protective mulch or seed carrier, fertiliser and the seed mixture and is applied to the open ground by a spraying machine in one application. This method reduces the cost over conventional seeding and it reduces the establishment time. However, hydroseeding still has the disadvantages of leaving the seed to germinate naturally, again leaving it vulnerable to erosion, birds, drought and weed competition as well as fertiliser leaching.

3 **Rolled Turf:** This is established turf brought in from a commercial turf grower. By laying rolled turf there is immediate erosion control, immediate green-up (even in the off season) and good anti-leaching capabilities. Rolled turf however can be expensive to purchase and it may bring with it foreign soil. Purchasing ready grown turf may not necessarily offer the choice of species variety demanded and it needs an added labour cost for laying over the prepared site.

The newcomers

Uni-Drill: Used to overseed Wembley Stadium in 1992, Moores Uni-Drill has won many converts, especially at the championship links courses in the North West of Ireland, where it has helped those under pressure to produce the best playing surfaces. It can be used with a small 25/35hp

THE SEED

Above: A tee prior to Liquid Sod application at West Middlesex GC ...and the same tee nine days later

tractor, the most commonly used in this sector, and follows ground contours to give an even planting at a constant depth. Grass seed planted at a depth of 12mm has revealed an excellent rooting structure, which holds the sward together better than shallow planted seeds, which tend to be more easily scuffed off. The drill has a slitting action, thus moving the first inch or so of soil, relieving soil compaction and aerating the soil in a single pass, making conditions ideal for grass growth.

Equally important, the Uni-Drill creates minimum disturbance of the playing surface, covering the ground in a one-pass operation, levelling, seeding and aerating. The slitting action stimulates regrowth and gives healthier and more vigorous rooting.

In Ireland probably the best example of the drill's success may be seen at Portmarnock. Preparing for a major championship is always a challenge for any greenkeeper, but in the case of Iain Ritchie, who had joined the club only six months before, this presented an even greater problem. When Iain arrived at Portmarnock, one of Ireland's most famous courses, he found that most of the fairways had very few good grass species in them and there were many bare patches. His priority, therefore, was to introduce new seed mixes into each fairway.

This he did using a Moore Uni-Drill and an Iseki 35hp tractor. His staff over-seeded each fairway in four directions, where necessary also over-seeded the semi-rough and the rough. This action not only introduced new seeds into the tired fairways but, as Iain observed, helped to break up surface compaction and allowed some of the established grasses to regenerate themselves by the new growth from their split roots.

Iain also saw that all of the grasses on the fairways had an increase in root depth and a more vigorous root growth, this having the effect of causing less surface damage. Within the year the course was playable to championship standard and since the Walker Cup Iain has kept up a once a year fairway maintenance routine, over-seeding other compacted and bare areas such as paths. Iain and the Portmarnock Golf Club have found the machine a good investment that has paid for itself in the few years they have owned it. As for maintenance, the club have spent nothing in the three years of ownership.

Liquid Sod: This is a uniquely developed process created in the United States and now being introduced into Europe. This process eliminates the problems of creating a sward by conventional methods, utilising as it does the latest technology in seed pre-germination.

The first stage is the 'patented' method of pre-germinating (or sprouting) the seed in a controlled, scientific environment using an optimum level of water, oxygen, temperature and nutrients. The pre-germinated seed is then taken to a stage further in its development towards an ideal growth, giving it an advanced root system and crown or blade before actually arriving at the site in the form of plantlets.

The second stage uses a patented spraying machine and tank that mixes the plantlets with formulated fertilisers, water and a mulch. This mixture is then delivered to the site ready for spraying to the prepared surface without any damage to the plantlets.

The advantages claimed by the Liquid Sod system are summarised as follows:

◆ Erosion Control. The expense of laying turf in many areas for erosion control may be prohibitive. Ordinary seeding methods may take a longer time to establish. The Liquid Sod method has been known to stabilise soils on highly vulnerable areas in a matter of 72 hours.

◆ Fertiliser leaching. Because the plantlets in the process are growing at the time of application, the fertiliser that is added is utilised immediately. Thus the Liquid Sod method reduces the possibility of leaching.

◆ Irrigation. Newly seeded areas require irrigation and in some areas can take up to 54,000 gallons of water (a depth of 2ins) per acre per week for three weeks to promote growth and satisfactory establishment of the sward. Because the seed is pre-germinated in this process, the water used to establish the seed is eliminated and therefore there is a saving of several thousand gallons of water.

◆ Germination. The company claims that the Liquid Sod pre-germination process carried out under controlled conditions can increase the germination potential of seed mixtures by as much as 26%.

◆ Weed competition. When hydroseeding, water and fertilisers are used to cover soil which may contain weed seeds. Tests have shown that weed seeds brought to the surface during cultivation processes sprout rapidly. Liquid Sod seed is advanced to such a level that it can compete against weeds and can in some circumstances effectively eliminate the competition.

◆ Predators. Many areas of newly sown seed can be quickly devastated by seed eating birds. This is costly and time consuming. Liquid Sod provides a plantlet which has a substantial reduction in its vulnerability to seed consuming predators.

◆ Time savings. Golf courses, tennis courts, bowling greens, race courses and any other area using a turf surface requires quick establishment. The company claims the process will produce a mature sward of turf in a matter of weeks, ahead of any of the conventional methods. Areas in northern regions which have a short growing season, the company suggests, make Liquid Sod a viable method of creating a high quality surface.

◆ Cost. There are many cost advantages claimed: it gives an almost 100% guarantee of a satisfactory coverage compared to the conventional methods of sowing seeds. There is no need to re-seed because of failure or unsatisfactory cover. Also, depending on the seed type, nutrient requirements and general application techniques, Liquid Sod claims a substantial advantage in cost over the rolled turf method. Precise mixtures can be specified and sown in the proportion required, there is no invasion of foreign soil, labour costs are reduced and the price per square metre is lower by as much as 30% compared to that charged for rolled turf.

Why we

JIM ARTHUR on the new European golf green specifications

Any sensible business must take a hard look at money spent on development – in effect to see whether investment is justified or subsidies are deserved or even potentially productive long term, or could give, even in the much longer term, a reasonable prospect of improved efficiency or profitability. However golf is not, sadly, regarded as a business by so many who control the amateur aspect of the game, now widely enjoyed by so many from such a wide range of character, ability and background.

Golf, although representing a huge investment nationally, is too small an industry to be able to support pure academic research – there must be an expected if not attained end-result of commercial or practical value, as opposed to discovery for discovery's sake alone.

It is necessary to differentiate between fundamental research and work on evaluation assessment or investigation. Much can be gleaned from the study of contemporary work over the whole world of golf on specific parallel problems – with due caution against taking on board philosophies based on conditions which are not relevant to our (temperate European) environments.

Many of the world's major breakthroughs, for example in medicine or nuclear physics, have been the results of accidents! But one must have a seeing eye, as did Sir Alexander Fleming in making the connection which led to the development of penicillin. Frankly, pure research is so costly and so unlikely to lead to worthwhile discoveries in the short term that it must necessarily be confined to those bodies, ie. university departments, properly equipped with all the vastly expensive hardware from electron microscopes to multi-bank computers, which expense could not conceivably be justified for the benefit of what the outside world tends to regard as a fairly frivolous hobby!

There is in fact no commercial justification for the establishment of departments of serendipity from which once in a blue moon and with accompanying shouts of Eureka, inspiration produces shattering results.

The above philosophy directly relates to the procrastination and arguments appertaining to one tiny aspect of golf, namely the specifications for the construction of golf greens, now approved in principle by the Joint Golf Course Committee of the Royal and Ancient.

By dint of a great deal of work behind the scenes and a good measure of compromise and give and take by all concerned, three specifications for construction have now been agreed, and (even more importantly) it was further agreed that there should be no question of 'compromise', taking a bit of this or a bit of that from one specification and adding it to another.

These three specifications need to be established primarily because far too few of those engaged in building new golf courses, whether developers, designers or constructors, know little or anything of the technical problems involved and, as is so often the case, seek advice from those with even less qualifications or practical experience. One can never stop fools being parted from their money, nor innocents abroad losing their all in setting up what they erroneously perceive to be what the customer wants.

The second reason for setting up and agreeing standards is the vexed and increasingly important impact of litigation on the golfing scene. Those building to agreed and approved specifications can at least gain some shelter from that protection. Deviations – especially by employing methods specifically prohibited in these specifications – can and have resulted in massive claims for total rebuilding of new greens, costing insurance companies – especially with added legal costs – sums well in excess of £1.5 million. Insurance companies are increasingly concerned about being taken to the cleaners and are refusing further insurance cover to miscreants.

Much has been written about these three specifications, which I will not repeat save to say that there is really no fundamental difference between all three in the standards laid down for the root zone itself. The differences relate to the drainage layers. Where there is effective drainage, as on some true links or even (more rarely) sandy heaths, with guaranteed drainage potential of 200 cm (8") per hour, then specific under-drainage is not needed (provided any constructional compaction is corrected).

With the vast majority of sites, under-drainage is vital. A herring bone or grid system of plastic drains is let into a prepared and consolidated base and any surface effect of

need to keep our eye on Europe...

such drains masked by a stone carpet, which in turn is blinded by a filter layer to prevent infiltration of the root zone particles into the stone. Extra drains to provide intercept (cut off) drainage is specified in the case of greens cut into a slope – and also provision to deal with any low areas, e.g. the front perimeter of the stone carpet.

It is important that the ratio of particle size between successive layers does not exceed 1:10 if drainage is to be effective and particle drift prevented. The basic difference between the true USGA Green Section specification (not sand-only construction) – yet another modification being due in 1993 – and the UK system is largely in the size and depth of stone in the drainage carpet. On very flat sites, in order to achieve the desired minimum fall of 1:80 of the herring bone system under the UK specification, the base may be valleyed – unnecessary, of course, where the green rises from front to back at a slope of more than 1:80.

Long experience shows that using a larger stone ('25-40 mm clean' being specifically laid down) in deeper depths permits full mechanisation of construction and consequently cheaper costs. Whilst there may be exceptions when using very skilled and experienced operators when it may be possible to mechanise building to USGA standards – generally it is safe to state that 100 mm (4") of pea gravel will not support a 360° swing excavator, especially on our normal soft conditions, and the gravel of the USGA spec. merely gets pushed into the base. Neither the depth nor the stability of the pea gravel permits mechanical handling save under rock hard dry conditions – as in the States – and thus much of the construction involves costly and slow hand work. Working on plywood boards with high levels of labour-intensive hand moving of gravel sand and root zone mix can give excellent results, but at a cost.

Those who attended the Harrogate workshop prior to the BTME itself (as well as others) will have seen the USGA video on building greens and been horrified at the errors shown, ranging from bulldozing turf, top soil and subsoil off in one indiscriminate mess for re-use on green surrounds later, to tracking bulldozers back and forth over fragile root zones, not to mention tractors and spinners lashing on lime and fertiliser so heavily that one could not see the machine, let alone the poor operator!

It is worth remembering that, at a conservative estimate, bearing in mind that the UK system with deeper layers of larger stone has been extensively used (not just by me alone) since the mid sixties, there are well over 3000 golf greens built to this system, none of which, given reasonable post-construction maintenance, has ever given a moments concern in well over 25 years. While agreement on the physical criteria laid down to identify satisfactory – and unsatisfactory – raw materials is important, it is even more important to be able to analyse reliably, consistently and logically, eg. root zone mixes especially. At present ten identical samples sent to ten testing laboratories will result in ten different results. This would not be so much of a problem if the same samples resubmitted a month later were reported on identically by the same ten stations, but sadly, too often, they are not.

For those who want more details of these specifications, they are available through BIGGA, but my main point in discussing them is that it is not the specifications themselves which are important (though agreement is always welcome) but the use to which such specifications are put. What are 'we' or 'they' going to do with them?

With current work on CEN standards for the European Community raising problems for each and every one of us, it is vital that not only these specifications are advanced, but that they are advanced by knowledgeable, convinced and qualified persons who can stand their corner.

With the German standards diametrically opposed to both ours and the USGA spec., with the French shrugging their shoulders and indicating, as always, that they will take no notice of agreed standards anyway and with the rest of Europe looking to us for a lead, we, need, as usual, leadership, which as usual is lacking.

Perhaps if all concerned in British golf – from those governing the game from sheltered Elysian heights to all players, amateur or professional and to all greenkeepers from our top men to the lowliest probationer – realised what will happen to our golf courses if German views prevail, there would be less apathy and more active opposition. Currently, in Germany, new courses may not have fairways wider than 30 m with semi-rough 3-5 m, and the rough may not be mown more than once a year, whilst there must be large open plastic lined pits: at the side of each green to take the drainage and 'effluent' from the stone carpet, amongst countless other daft 'green' notions.

Frankly, while we may be prepared to put up with countless invasions on our life style, suffer multitudinous officious regulations as to what we may or may not do, I feel that if the Germans start to impose their ideas on golf on us, then the Scots at least might well start World War III. It is no good putting this down to rabble rousing on my part.

If we do not impose our ideas and standards, others will be imposed on us and we need golf-minded, experienced, forceful advocates if we are to make any impact on Teutonic stubbornness and EC invasiveness and pettifogging regulations.

The day may yet dawn when golf will be regarded as a self-damaging occupation, to be shielded from the public gaze and confined to an incurable minority, with recruitment specifically prohibited as being harmful to the mental and physical health of younger generations, and even passive golfing (on TV) banned on the grounds that it might corrupt or damage the health of non-golfers.

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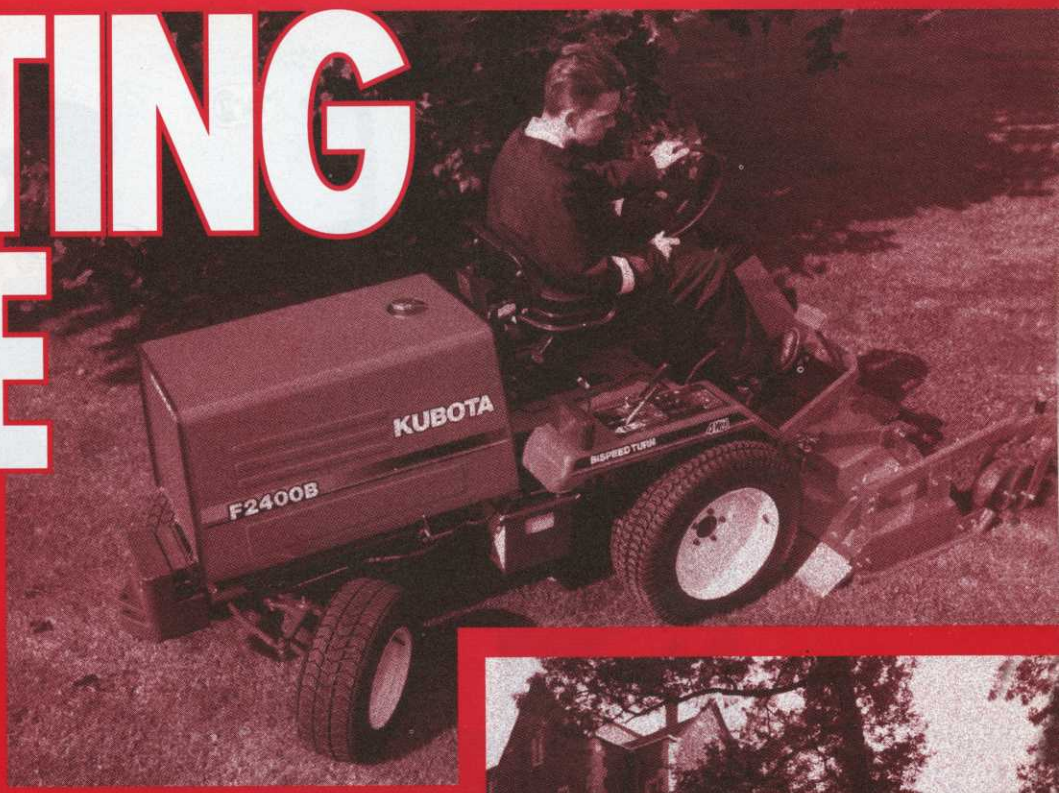
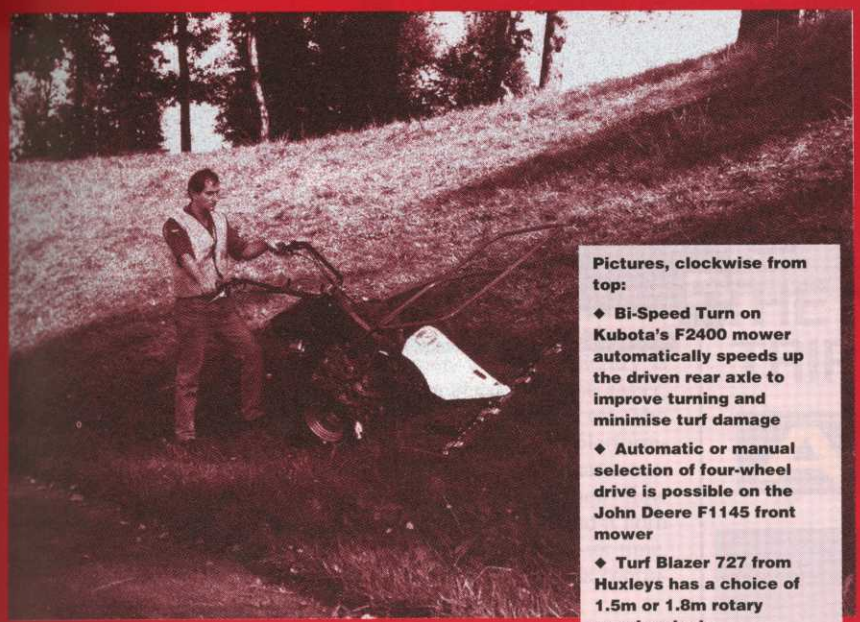
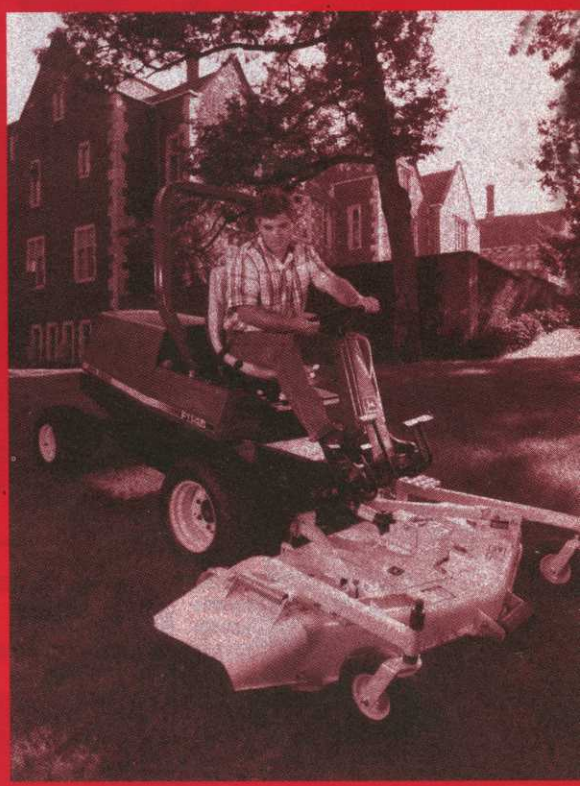
CUTTING EDGE

GREENKEEPER International

Spotlight on the latest mowers

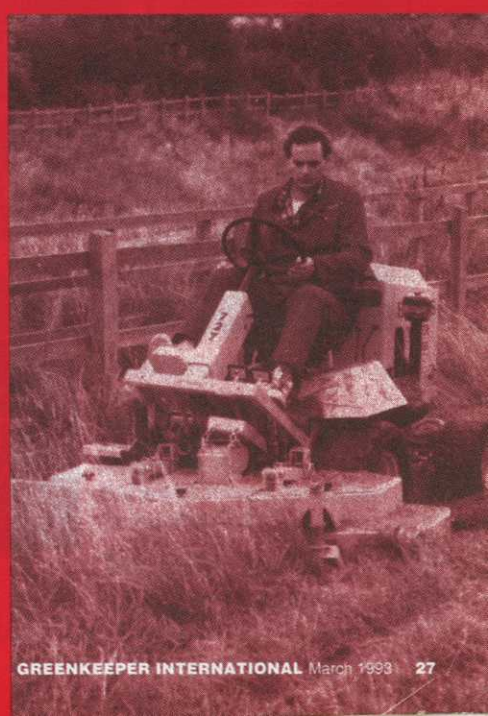




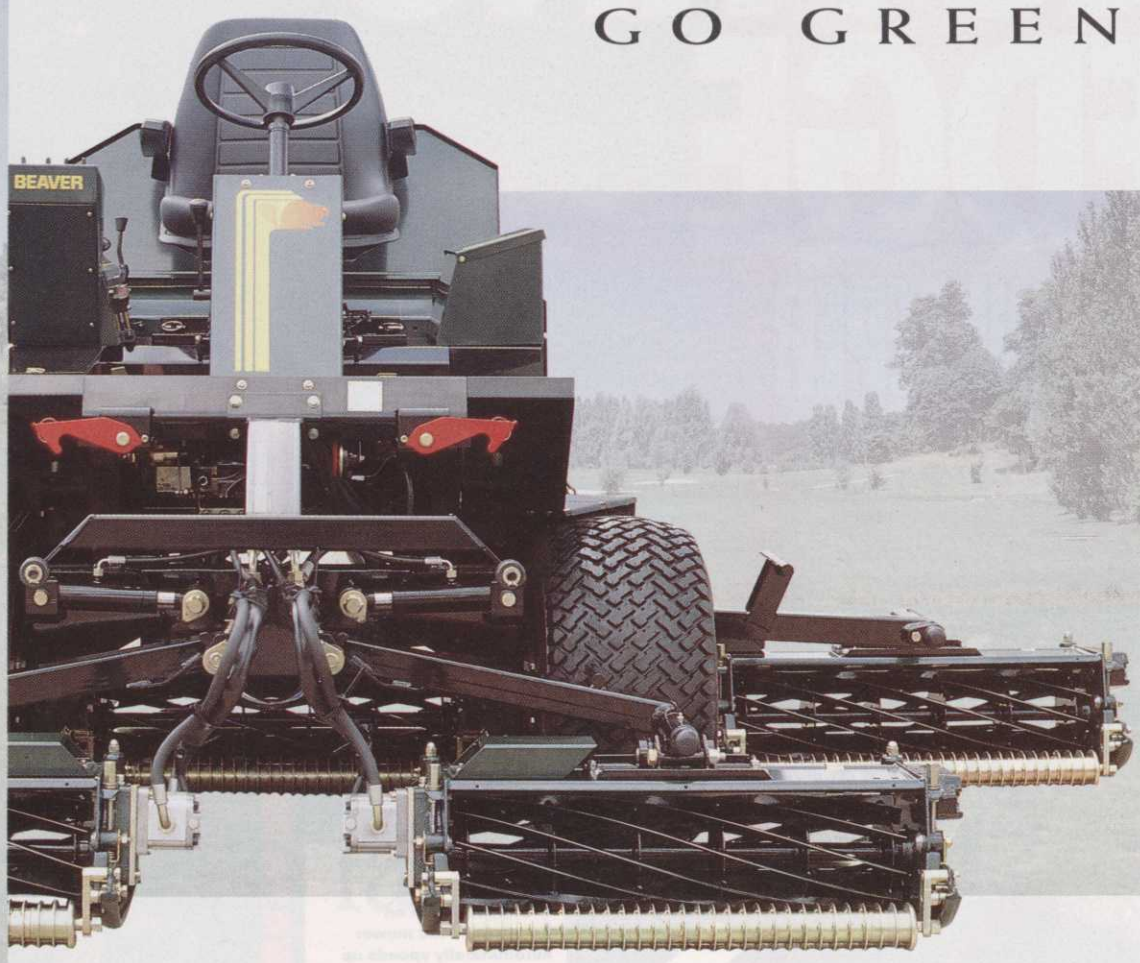


Pictures, clockwise from top:

- **Bi-Speed Turn on Kubota's F2400 mower automatically speeds up the driven rear axle to improve turning and minimise turf damage**
- **Automatic or manual selection of four-wheel drive is possible on the John Deere F1145 front mower**
- **Turf Blazer 727 from Huxleys has a choice of 1.5m or 1.8m rotary mowing decks**
- **Three cutting decks on the Ransomes T-51D Rider Rotary give a maximum mowing width of 3m**
- **BCS Tracmaster's Bank Commander can be used safely on slopes of 60°**



BEAVERS GO GREEN



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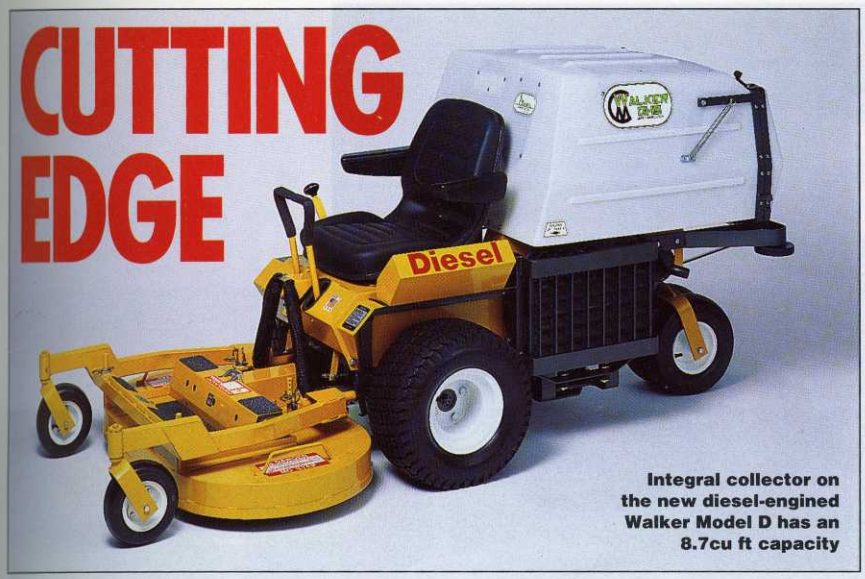


Integral collector on the new diesel-engined Walker Model D has an 8.7cu ft capacity

MICHAEL BIRD reviews the latest mower developments for keeping larger, longer, tougher grass areas neat and tidy

Continuing refinement in the design, specification and operation of cylinder, rotary and flail mowers is making the task of maintaining large areas of grass increasingly more of a pleasure than a burden. Although the basic working principles of the cutting mechanisms have changed little over the past 30 years, the technical improvements introduced on both ride-on and pedestrian machines during the last decade means that there are few excuses for poorly maintained fairways, semi-rough or rough.

Assuming that funds are made available for routine re-investment in new equipment, then lack of training, mower maintenance or interest in the work are the three principal reasons why grass is not cut to a consistently high standard. In very few cases is the design of the machine at fault, particularly in the case of mowers built specifically to tackle medium to large areas of longer grass.

Developments in these machines continue apace on both sides of the Atlantic. The American passion for fairways which look like greens means that most of the big ride-on cylinder mowers finding their way onto British courses already have one or two seasons' work under their belts. This is no bad thing, especially on a unit which can cost upwards of £20,000. The latest arrival from the USA carrying the Jacobsen badge is the LF3810 Fairway Mower, a five unit self-propelled machine with a cutting width of 3m (10ft). Bringing to three the number of fairways mowers from Jacobsen, the LF3810 is powered by a 38hp diesel engine driving the wheels through a step-less hydrostatic transmission. Five or 10-blade reel options are available and the mower can be operated with three, four or five units in work.

There are few things more infuriating than an unnoticed oil leak to turf professionals. To eliminate this possibility on the LF3810, Jacobsen fits its Green Sentry leak detector as standard to the mower. The unit, which is built in to the main hydraulic system, is able to detect oil losses of as little as 85ml by means of a flow switch which monitors oil flow between two tanks. Because it uses a combination of volume and time, this system is able to differentiate between oil 'loss' from the tank caused when extending an hydraulic ram and a genuine oil leak from a joint, union or hose. Also, thanks to a temperature sensitive timer, the Green Sentry is able to compensate for the easier, faster flow rates of hot oil. The unit comes with a platform-mounted console which has a caution light to warn when flow exceeds a certain level and a horn which sounds after a pre-set time, indicating that the flow is continuous, as with a leak.

John Deere's 3365 professional turf mower is the company's first machine to feature the new ESP cutting unit. Standing for 'extra strength and precision', the unit has an improved adjustment system designed to maintain height of cut irrespective of bumps and shocks. Reels and bedknives are made of induction-hardened high impact steel, said to retain an edge longer while the reels are mounted in self-centring Timken roller bearings. Available with six, eight or ten bladed reels, the five unit 3365 has a 3.5m (138in) cutting width and is equipped with a 38hp diesel engine with cruise control.

A choice of two four-wheel drive functions is available on the new John Deere 24hp F1145 front rotary mower. 'On-demand' 4wd automatically engages and disengages according to ground conditions, reducing tyre wear and fuel consumption, while 'full-time' provides maximum traction in poor conditions. The latter can be selected by the operator on the move, even in reverse gear.

Said to have been designed to cope with 'world grass growth conditions', the new Fairway 300 from Ransomes has hydraulically-driven cutting units based on those used on the successful Motor 180D machine. Both height of cut and the cutting cylinders can be adjusted without spanners. Width of cut is 2.9m (114in). Powered by a 38hp diesel engine, the Fairway 300 has four wheel drive as standard. An even bigger diesel engine – 51hp – is used in the latest top of the range Rider Rotary from Ransomes. Equipped with three rotary cutting heads spanning 3m (117in), the T-51D is designed for high output work on larger areas of longer grass.

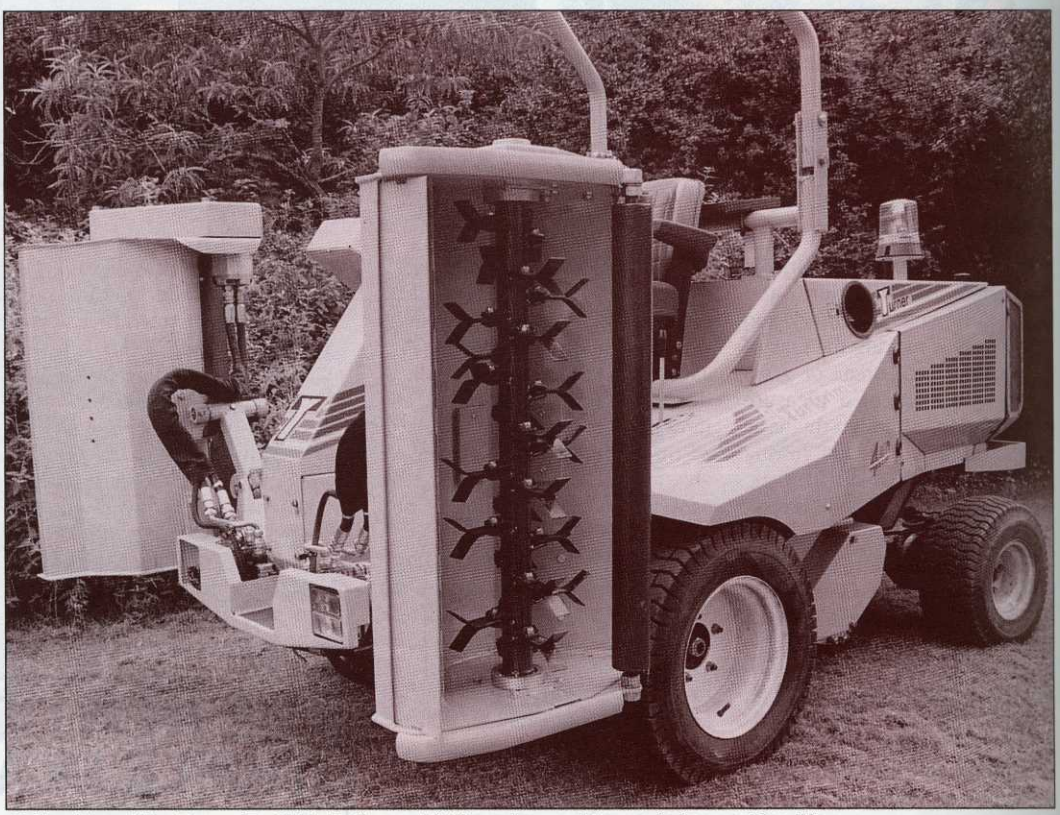
Toro has replaced its RM223-D lightweight fairway mower with the RM5100-D, a five-reel ride-on machine with a 23hp ➡ 30

CUTTING EDGE

29 ➠ diesel engine, hydrostatic transmission and choice of two or four wheel drive versions. The main feature of the RM5100-D compared to its predecessor is a new electronics system known as Automated Control Electronics (ACE). This system is centred on solid state electronics which govern many of the mower's functions for improved operation, reliability and ease of servicing.

Examples of ACE's features and capabilities include electronically actuated hydraulic spool valves; fully automatic monitoring and adjustment of reel speed in line with forward speed; and centralised diagnostic monitoring to pin-point machine problems quickly and more economically. Also standard on the RM5100-D is a spring-loaded positive down pressure system for the five or eight bladed cutting units. Adjustable to four positions in 8lb increments, it increases downforce to maintain cutting reel height over varying terrain. Toro is also playing its part within the environmental movement, producing a rotary cutting deck which recycles clippings into the turf. Known as the Guardian, the 1.8m (72in) deck produces no external discharge, making for safer mowing and reduced mess. Special internal deflectors recycle the grass within the hood causing it to be cut and re-cut, finally forcing the clippings down into the turf. The Guardian can be retrofitted to all Toro Groundmaster 300 Series machines, except the 327.

Tractor lift kits are now available for the Beaver Articulator rotary mower from Hayter's. Using the tractor's hydraulic system or an optional 12 volt power pack, the kit safely raises the mower to give a ground clearance of up to 61cms (2 ft) for convenient movement between sites, reducing wear on the machine's caster wheels and axles. Blade changing and cutting height adjustment is also made easier by the lift kit, as is access for cleaning and servicing. The Articulator consists of a series of independently floating rotary mowing decks able to closely follow



Both sides of the Turner Turf Trim's fine cut flail can be used to maximise working life

Fine cut flails 'a practical alternative to cylinders'

ground contours across working widths of 2.2m or 3.05m (88in or 120in). Cutting heights are from 25mm to 120mm (1in to 4.75in) and power requirement from 25hp to 50hp.

If sheer engine power is the main requirement, there are few rotary machines which come near the l00hp produced by the Turf Blazer Hydro-Power 180 from Huxleys. This 5m (16ft 6in) machine heads a full range of ride on and pedestrian rotary mowers being introduced in the UK by the company. Of principal interest to the golf course user will be the Turf Blazer 727 powered by a 25hp Yanmar diesel and a choice of 1.5m or 1.8m (60in or 72in) cutting decks. Equipped with hydrostatic transmission, power steering and individual wheel brakes for tight turns, the mower offers cut heights from 38mm to 140mm (1.5in to 5.5in).

Kubota has announced two rotary mower developments for 1993. The first is a new 18hp lightweight (400kg) machine with a wheelbase of just 850mm for tighter turns in confined areas. Available with shaft-driven 1.22m or 1.37m (48in or 54in) side-discharge decks, the Fl900 will be available from this spring. The second Kubota development is the addition of Bi-Speed Turn to its F2400 18hp four wheel drive machine. Already proven on the company's compact tractors, Bi-Speed Turn automatically doubles the turning speed of the rear steering wheels when the steering angle exceeds 35deg. This is said to minimise turf damage caused by drag while producing manoeuvrability not normally associated with four wheel drive machines. The F2400 has hydrostatic transmission and can be equipped with a choice of rotary or flail mowing decks.

Fine cut flails are being promoted by Bomford Turner as a practical alternative to cylinders in areas where stones, molehills and other surface problems can greatly increase wear rate and downtime. The new Turner