

POWER PACKED

29 → he course without any specific finesse, then a compact tractor will do all, and probably more, that you ask of it.

If, however, you feel your course deserves the light tread of a machine which has been purpose-designed to maintain turf with matched implements

throughout the year, carry loads 'on-board' with minimal risk of surface marking and move about swiftly and quietly without discomfort, then you need to look seriously at a specialist turf vehicle.

At the end of the day, you will probably decide that you

want both and this is likely to be an excellent decision when aiming solely for the optimum solution to year-round course management and maintenance. It's then just a question of persuading the person holding the purse strings! Good luck.

COMPACT TRACTORS UP TO 26HP

Make	Model	Power	Drive	Transmission	PTO	Price
John Deere (0949 60491)	670	19hp	4	M	540	£8556
	755	20hp	4	H	540	£9243
	855	24hp	4	H	540	£10111
Ferrari (061 624 6390)	22-3W	22hp	4	M	540/1000	£8470
Ford (0268 533000)	1220	16.7hp	4	M or H	540	£7616
	1520	22.7hp	4	M or H	540	£9332
Hinomoto (0789 415588)	C144	17hp	2 or 4	M	540/1000	£5770
	C172	20hp	2	M	540/1000	£5880
	C174	20hp	4	M	540/1000	£6600
	C174 HST	20hp	4	H	540/1000	£7300
Honda (081 747 1400)	H 6522	22hp	4	H	540	£9350
Iseki (0954 718981)	TX2140F	16hp	4	M	540/1000	£6135
	TX2160F	18hp	4	M or H	540/1000	£6585
	TU318F	17.5hp	4	M or H	540/1000	£8575
	TU320F	20hp	4	M or H	540/1000	£8985
	TA525F	25hp	4	M	540/1000	£11300
Kubota (0844 216685)	B4200	12.5hp	4	M	540/860	£5420
	B7100	16hp	4	M	540/825	£6630
	B1550	17hp	4	M or H	540/825	£7280
	B1750	20hp	4	M or H	540/825	£8500
	B2150	24hp	4	M or H	540/825	£9015
Lamborghini (0788 891446)	Runner 250	25hp	4	M	540/1000	£8990
Massey Ferguson (0203 531000)	1010	16hp	4	M or H	540/790	£5901
	1020	21hp	4	M or H	540/790	£8132
	1030	26hp	4	M	540/1000	£9135
Same (0788 891446)	Solaris 25	25hp	4	M	540/1000	POA

Key: Drive: 2 = two wheel drive; 4 = four wheel drive; 2 or 4 = model available in either two or four wheel drive versions; Transmission: M = gearbox; H = hydrostatic; PTO: Rear power take-off speed(s) in rpm; POA = Price on application.

SPECIALIST TURF MAINTENANCE VEHICLES

Make	Model	Engine Power/type	Transmission	Wheels	Features	Price
Cushman (0473 270000)	Turf Truckster	22hp, 27hp P	M	3 or 4	2S; H; P	POA
		22hp D				£9965
John Deere (0949 60491)	1800 Utility Vehicle	18hp P	H	4	2S; PS; H; P	£6656
GMV (0532 347699)	Ground Maintenance Vehicle	43hp P	M	4	2S; H; P	£14750
Huxleys (0962 733222)	Huxtruk	23.5hp D	H	3	2S; PS; H; P	£10750
Jacobsen (0536 417777)	Workhorse	23.5hp D	M	3	2S; H; P	£8995
Sisis (0625 503030)	Hydomain Twin 25	25hp D	H	4	2S; PS; H; P	£11990
Toro (0480 476971)	Workman 3000	27hp P	M	4	2S; PS; H; P	£11590
		21hp D				£12590

Key: Engine type: P = petrol, D = diesel; Transmission: M = gearbox, H = hydrostatic; Features: S = number of seats, PS = power steering, H = can be used with hydraulically powered attachments, P = can be used with PTO powered attachments.

● All information was compiled from details supplied by each manufacturer. Prices shown represent the basic starting price for each of the models and are subject to VAT. For space reasons, data has been kept to a minimum and shows solely the base model. For the full specification of any machine, together with its optional equipment and accessories, please contact the supplier's sales department on the telephone number given.



Update

It's official – the BIGGA Turf Management Exhibition 1993 was the best yet – and the forward planning starts NOW to make sure of another big success in 1994!

Information packs, complete with an application form and full details of how to take part in the industry's most popular indoor event, will be sent out to 1993 exhibitors this month. To be sure of the same stand space, exhibitors are urged to act straight away and return their completed application form with their deposit by June 1st at the latest.

Letters of congratulation for the January event have been flooding in. Arthur Harrison, sales director of Sisis Equipment, Macclesfield writes:

"Hearty congratulations to all involved with BTME. To say it goes from strength to strength would be an understatement. This year's exhibition was as good a show as we have experienced anywhere, for many a year.

Particularly encouraging was the greater number of visitors to our stand from an obviously increased attendance. We were impressed by the quality of visitors also, as well as the spectrum of 'non-golf' visitors which have hardly been abundant in previous years. Overseas visitors which we welcomed were from Norway, Sweden, Holland, Germany and France.

With so many shows in the past year attracting adverse comments, it was a pleasure to be present at a successful one and to experience something like the old-time 'buzz' which some thought would never return.

Long may you continue to get it right."

Look out for the start of an amazing new BTME '94 competition in next month's Greenkeeper International.

We've got prize packages worth up to £500 to give away, as BIGGA lets you join in the success of an event we call "the show of the year".

So what's up for grabs? Watch this space and find out!

Greenkeepers' Library

by DAVID WHITE



Harold Hilton: one of the great golfers of his day

Turfgrass Science, Agronomy Monograph 14¹, provided students, teachers, researchers, golf course managers and others with a source of information pertaining to the historical, technical and applied aspects of turfgrass science and management. Published in 1969, more copies of this have been sold than any other in the series. Now, the state-of-the-art information on turfgrass is available to you.

Turfgrass, Agronomy Monograph 32, updates some of the topics from the first monograph and offers detailed information on many new topics. As such, *Turfgrass* complements information contained in the earlier monograph and various turfgrass textbooks and reference books. The monograph is divided into five primary sections. The first explores the turfgrass industry and includes chapters on historical aspects of research and education, current status of the industry, and artificial turf. The turfgrass physiology section focuses on ecological aspects, energy relations and carbohydrate partitioning, and stresses due to salinity, temperature, shade, and traffic. The third section is on soils and water and emphasises soils and amendments, nutrition, fertilisation, water requirements, and irrigation. The management section offers chapters on energy conservation and efficient maintenance, integrated pest management, turfgrass management operations, and plant growth regulators. The last section addresses research techniques related to field and controlled-environment research, diseases, insects, weeds, and breeding.

The chapters include: 1. Turfgrass Science – Historical Overview, 2. The Turfgrass Industry, 3. Artificial Turf, 4. Ecological Aspects of Turf Communities, 5. Energy Relations and Carbohydrate Partitioning in Turfgrasses, 6. Salinity and Turfgrass Culture, 7. Physiological Effects of Temperature Stress, 8. Shade and Turfgrass Culture, 9. Effects of Traffic on Turfgrass, 10. Soils, Soil Mixtures, and Soil Amendments, 11. Nutritional Requirements and Fertilisation, 12. Water Requirements and Irrigation, 13. Energy Conservation and Efficient Turfgrass Maintenance, 14. Integrated Pest Management, 15. Turfgrass Management Operations, 16. Plant Growth Regulators and Turfgrass Management, 17. Field Research, 18. Controlled Environment Research Methods for Turfs, 19. Research Methods and Approaches to the Study of Diseases in Turfgrasses, 20. Methods of Research in Turfgrass Entomology, 21. Turfgrass Weed Science Research Methods, 22. Breeding Improved Turfgrasses. Though aimed essentially at the American market there is much that the British and European greenkeeper can learn from such a learned work, though I would have to admit that much of the technical data went straight over my head!

Published by the American Society of Agronomy, **Turfgrass Science, Agronomy Monograph 32**, hardback 828 pages, is available from the ASA, 677 South Segoe Rd, Madison, Wisconsin 53711-1086 USA. The cost is \$42.50 including postage. Prepayment in US dollars is required.

Harold Horsfall Hilton came to the golfing scene when golf was exploding into a popular sport with new clubs being started all over Great Britain. Hilton was to some extent a very private man but his famous win of The Open in 1892 brought him to the forefront of the great golfers of the day. Incredibly he won The Open again in 1897 before taking the Amateur Championship. He lost the finals of the Amateur Championships of 1891, 1892 and 1896 and it was not until 1900 that he first captured the trophy. Hilton went on to a repeat victory in the 1897 Open and also took the Amateur Championships of 1901, 1911 and 1913. He became the first and even now the only British player to win the US Amateur. Perhaps his greatest year was 1911 with his win of the Amateur Championship, a near miss in The Open and his victory at Apawamis, perhaps the greatest jewel in his crown, ending with the controversy of the 'rock' incident – which is fully explored.

The stories of these contests and all Hilton's other major tournament appearances are related in detail creating delightful sus-

pense as the events proceed. The author, John Garcia, has traced Hilton's golfing life and brings out his eccentricities, his achievements and his disappointments, giving a unique picture of one of the greatest ever amateurs. **Harold Hilton: His Golfing Life and Times**, is a lively account of perhaps the greatest British amateur golfer and of his contemporaries. It is enhanced by a foreword by Herbert Warren Wind.

Limited to 750 numbered and signed copies, **Harold Hilton: His Golfing Life and Times** is priced at £25 including postage, available from Grant Books, Victoria Square, Droitwich, Worcs. WR9 8DE.

There can be no doubt that environmental issues raised in Britain are not likely to lessen or go away, even though we are perhaps a long way from having the draconian laws which our American cousins are forced to abide imposed upon us. Ours is perhaps a simpler task in a less complicated environment, for we have only a smattering of pests in number compared to those in the USA, and a far easier climate. Nevertheless, it is important that every golf course manager be properly armed in every aspect of his craft and environment is no different from any other. Thus I can recommend the latest American publication **Golf Course Management and Construction: Environmental Issues**, as being worthwhile armory.

The book is described as a summary and assessment of the technical and scientific research on the environmental effects of construction and management on turfgrass systems, though in running to 951 pages, I would have to say – some summary!

The book is organised into eight chapters. The intro provides an overview and historical perspective regarding turfgrass management and environmental quality. Chapter 2 discusses the relationship of turfgrass management to the critical issues of water resources and also focuses on the issues of water use, water quality, soil and water conservation, and movement within the water cycle. Chapters 3 and 4 provide a state-of-the-art scientific review and assessment of the literature regarding the environmental effects of nutrient and pest management practices. Chapter 5 provides an introduction to concepts necessary for development of integrated management systems for turfgrass. Chapter 6 covers the direct and indirect effects of golf course management and construction on wildlife and aquatic organisms. Chapter 7 is an introduction to the issues of conservation and protection of wetlands which is emerging as a critical environmental concern of the 1990s, whilst an appendix, Chapter 8, (418 pages!) contains tables of toxicity tests related to the effect of chemicals used for turfgrass management. Each of the chapters includes a section on research and information needed to resolve the issues surrounding the positive and potentially adverse effects of turfgrass management. The book's intention is not to suggest or recommend site-specific turfgrass management practices. However, the information presented may be used as an introduction to the general principles for evaluating the potential environmental effects of turfgrass management.

Good textbooks should always have a highly detailed index, though some publishers fail miserably in this aspect. I am pleased to say this book is awarded top points on that score, for like the aforementioned 'Turfgrass Monograph 32', it leaves nothing to chance: seek and ye shall find! One could hardly describe it as a 'good read' and certainly I didn't, indeed couldn't, read it from cover to cover in a single stretch. In places I found it unnecessarily complicated for my admittedly limited scientific taste, nevertheless I feel it has a place in our library as a useful tool of reference.

Golf Course Management and Construction: Scientific Issues, edited by James Balogh and William Walker, is published by Lewis Publishers, 121 S. Main St. PO Box Drawer 519, Chelsea, MI. 48118, USA. The cost is \$78 US currency, or may be ordered through any major bookshop in the UK, such as Foyles.

BRUCE STANLEY reports on the activities of one golf club determined to ease the curse of slow play



Tackling

FRUSTRATION

Slow play, as at many other clubs, has been a contentious issue for Lyneham Golf Club in Oxfordshire since the course initially opened a little over two years ago. Now, at the approach of the first anniversary of the completion of the clubhouse and all 18 holes, positive steps are being taken to eliminate the problem for the benefit of players and the greenkeeping staff alike.

"There is little doubt that slow play is one of the greatest single frustrations on most courses in the country," commented general manager, Neil Biggs. "We appreciate that it is not unique to Lyneham but, being a new club, we are determined to nip the problem in the bud before members and visitors become set in their ways."

The result will, he hopes, improve not just the pleasure of playing a round at this scenic course, but enable the green staff to carry out their work with fewer hold-ups or interruptions.

Lyneham Golf Club is situated in the gently rolling Evenlode Valley, midway between Burford and Chipping Norton. Created out of former farmland, it covers 144 acres, measuring 6,808 yards with a par of 72. The club is privately owned by a founding board of directors, with both membership and 'pay and play' facilities open to the general public. In less than a year, membership has grown to almost 700, making the course very busy at weekends, public holidays and during fine weather.

"The problem of slow play was first drawn to the attention of members in a newsletter more than 12 months ago," explained Mr Biggs. "However, the ever increasing demand for golf brought matters to a head at the end of last year. Quite simply, we had to take urgent steps to speed up throughput which, at certain times, was painfully slow."

A letter, sent to all members in early January, spelled out the measures being implemented by the club. They include:

- Better management of tee time bookings to avoid a two ball match following a group of four balls. Members and visitors are made aware of the matches booked ahead of them and advised that it may be better to start at a different time. If a two ball match still insists on following a four ball, the players are asked to refrain from complaining if held up! Anyone booking a weekend morning start is recommended to make up a four ball. If unable, then the club will attempt to do it for them if necessary.

- Competitions to be better managed with entries being taken up to 14 days in advance. All matches will be played in three balls and made up 'selectively' by the club's secretary. No other matches will be booked during the times between the first and last players in a competition teeing off.

- The course to be patrolled at all busy times by members of the club's staff. They will carry a list of teeing-off times for each group and will insist on play being speeded up if one group is falling behind. To this end, the directors have drawn up guide-

lines with regard to the acceptable times for a typical four ball match to reach specified points around the course. These times are being posted on prominent signs alongside the 4th, 7th, 10th, 13th and 16th tees, with a guide-line time of 3 hours 40 minutes for the match to be back in the clubhouse. Two and three ball matches should be even quicker!

- Other measures include making one player responsible for the speed of play, and course etiquette, in his or her match; restricting start times for visitors until after 10.30am at weekends; and using a first tee starter during busy periods.

Neil Biggs commented that the process was principally one of education and that more experienced players were equally as likely as beginners to be responsible for slow play. "Our letter states that there is only so much that the club can do. The rest is down to the players," he said.

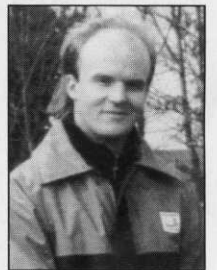
Guidance given to golfers includes being ready to play a shot immediately the way ahead is clear; keeping up with the match in front, rather than simply just ahead of the match behind, while being prepared to invite a faster match through; walking briskly between shots; clearing the green quickly when the last player has holed out; and being aware that in a friendly game or matchplay, there is no need to hole out on every occasion.

The result of the letter has been a 'dramatic improvement', pointed out club secretary, Cyril Howkins. "Players are now thinking and talking about the time taken to complete a round and even apologising if they exceed our guide-line times by a few minutes, promising to do better next time," he said.

And what of the greenkeeping benefits? "It can be painful at times watching a four ball putt out," comments head greenkeeper, John Heslip. "If we just happen also to be working on that green, there can be a great deal of wasted time waiting for the match to play through. I'm hopeful that the steps taken will lead to less interruptions, less waiting and increased safety on all parts of the course."

The club insists that no ball is played to a green while the flag is out. However, this has not always prevented frustrated players firing a 'warning shot' at a greenkeeper or slow-moving match ahead. The same applies on the fairway. "We do all we can to stay clear of matches," said John. "However, the demand for golf means that there are many times when we have to work in harmony with the golfers. It needs give and take on both sides, but if all players moved along a little quicker, having repaired their pitch marks and replaced their divots, it would make our job easier and eliminate much of the wasted time we spend on the course."

■ The editor will be pleased to hear from readers with views - different, unique or downright controversial - on ways of speeding up play. The best ideas will be published.



John Heslip, head greenkeeper at Lyneham Golf Club: 'Slow play causes frustration among players and green staff alike'

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Facts about

FERTILISER

DAVID LAWSON takes a practical look at nutrients for your golf course

It is worth remembering that all soils contain some plant nutrients. Even a rootzone comprised of sand contains potassium and magnesium with possibly some phosphate. However, the actual amounts of nutrients held within the soil 'reserves' are governed primarily by the proportions of organic matter and clay minerals present. The soil organic matter, in particular, holds a store of nitrogen, sulphur and phosphorus which with time is released to the turf through the activity of micro-organisms. The higher the soil's temperature and moisture contents, the greater the rate of nutrient release. For this reason there is normally a flush of turf growth in the autumn when the soil is warm and wet.

In the indigenous soils of the golf course fairway the organic matter supplies adequate amounts of nitrogen and other nutrients for turf growth. These organic nutrient reserves are continually replenished from leaf clippings and dead roots, which break down to form soil humus. In addition, the turfgrass and soil receive nitrogen dissolved in rainwater. Although the actual amount will vary from region to region, the total amount of nitrogen supplied annually in rainfall is between 3 and 4 grams per square metre. This is equivalent to

the amount of fertiliser nitrogen applied in an average fertiliser dressing. Clay material in fairway soils will also hold short-term reserves of nutrients.

Therefore, most fairways do not require any fertiliser on a regular basis. However, badly worn approaches and walk-off areas will benefit from an annual application of nitrogen fertiliser. A convenient way of doing this is to apply a slow release fertiliser in the spring. Resin coated fertilisers are particularly effective as they will support even growth right through the growing season from one spring application.

Nitrogen

It is on the tees and greens where fertiliser application is essential. By far the most impor-

tant fertiliser nutrient for turf is nitrogen, which has to be applied to close mown turf in order to allow the grass to recover from wear and tear. The reserves of nitrogen within the soil or from top dressing materials and rainfall are not adequate, particularly as nitrogen is being removed in clippings.

The most severely nitrogen depleted situation is the sand-only rootzone. Trials at the STRI have shown that for fescue/bent turf 25 g/m² of nitrogen (N) should be applied each year. Using normal, soluble fertilisers this will require at least seven separate dressings each year, as no single dressing should exceed 4 g/m² of nitrogen. On rootzones constructed from sand-soil mixes the organic soil nitrogen has been so diluted that again a relatively high input of fertiliser nitrogen is required: about 20 g/m² of N per annum. This would be applied within a minimum of five dressings where soluble fertilisers are used.

Because of the low 'background' nitrogen content of these free-draining sandy constructions, it is often necessary to extend the fertiliser programme at either end of the main growing season. This allows the turf to recover from wear during the winter months. ➔ 37



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Facts about

FERTILISER

35 → On these rootzones it is perfectly acceptable to use traditional soluble fertiliser products based on ammonium sulphate. The inclusion of organic nitrogen in spring and early summer is also worthwhile, but it is important not to rely on organic products for the main source of nitrogen as severe disease problems can occur. Sand-texture rootzones do quickly become very acidic, so to counteract this less acidifying fertiliser materials can be used. Liquid nitrogen fertilisers normally contain urea-nitrogen, which is only half as acidifying as ammonium sulphate. In addition, these liquid products are a convenient way of applying small amounts of nitrogen at either end of the main growing season. These liquid products vary dramatically in the amounts of nitrogen which they contain and it is often difficult to ascertain how much is being applied with one application. Advice on this can be obtained from the STRI.

Slow release nitrogen fertilisers have been developed largely to reduce the number of fertiliser applications and to 'even out' the pattern of growth. Such advantages would be seen most obviously on high sand content rootzones. However, care should be taken in their use on golf greens. Materials which work



through their low solubility (IBDU and ureaform) do not have the same ability to discourage annual meadow-grass establishment as ordinary soluble products containing ammonium sulphate. The long-term effects on turf quality from application of coated, controlled release fertilisers has not, as yet, been investigated.

On golf courses where greens or tees are constructed from loam soil there may be such a substantial amount of nitrogen released from organic matter that the annual fertiliser nitrogen requirement is as low as 8 g/m² of N. This

would be supplied within two fertiliser dressings. However, the annual rate should normally be between 12 and 16 g/m² of N. An ammonium sulphate-based fertiliser programme is appropriate and any excessive acidity produced can be counteracted by applying top dressing materials with a neutral pH value.

Phosphate

Many golf greens contain more than adequate concentrations of soil phosphate for fine turf as a result of the application of phosphate fertilisers regularly over many years. Chemical analysis of the soil will show whether or not this is the case. Many of the newer, free-draining sandy rootzones do not contain such high phosphate concentrations and where soil tests indicate very low amounts, a phosphate fertiliser should be applied to prevent deficiency. An application of around 2 g/m² (as phosphorus pentoxide) can be applied in spring within a mini-granular fertiliser. Alternatively straight super phosphate can be applied at 10 g/m². Such application rates will prevent deficiency without causing an excessive accumulation of phosphate in the rootzone. The presence of a low soil phosphate concentration should not be ignored as it may lead to severe die- → 39

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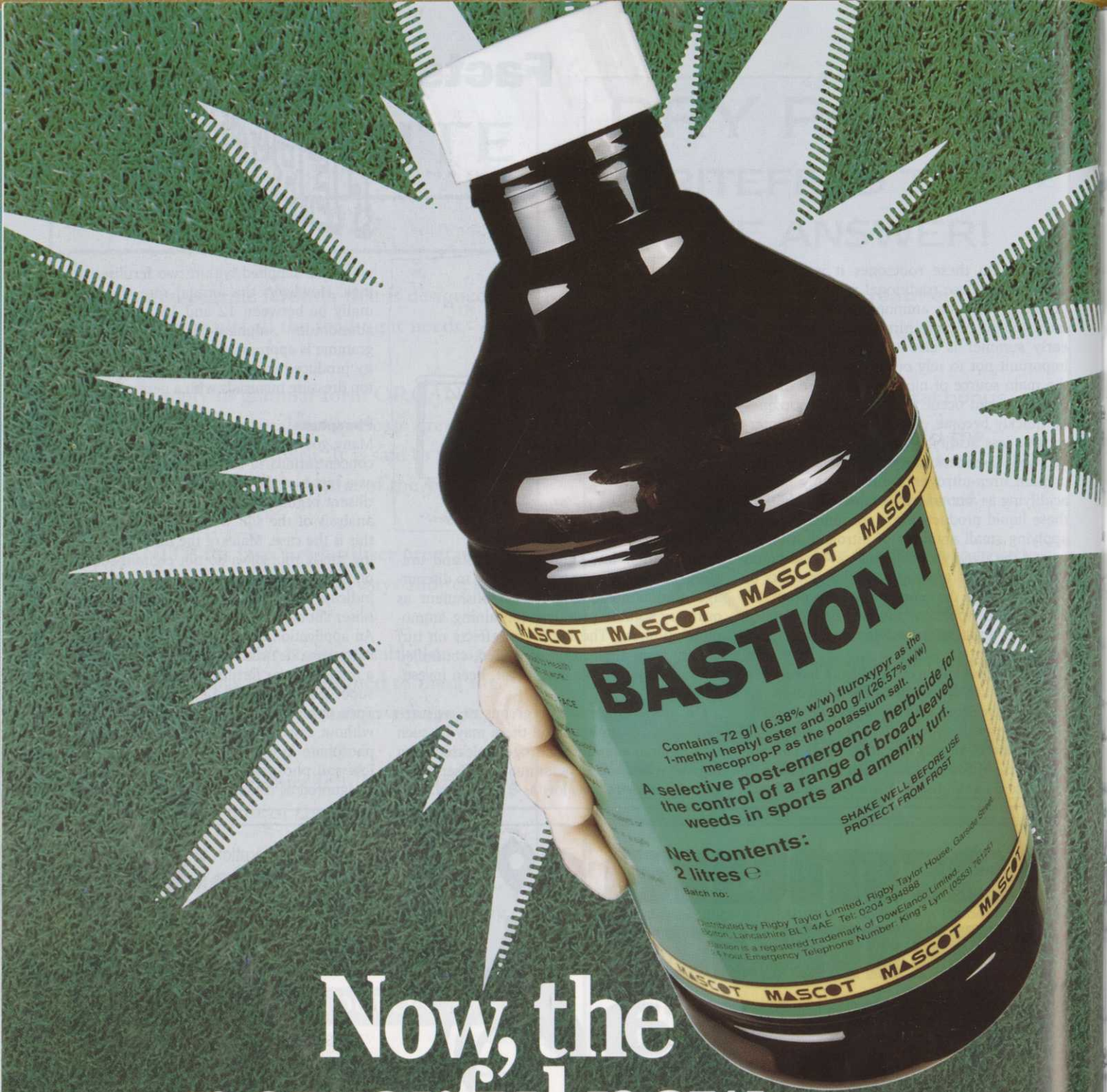
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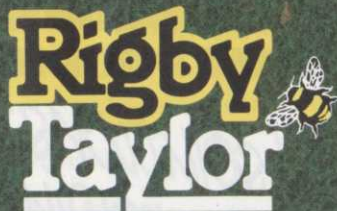
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37 → back in close mown fine turf.

Potassium

Potassium is known to aid in the drought tolerance of turfgrasses and there is also some evidence that it aids disease resistance. Again, it is sensible to ensure that there is an adequate concentration in the rootzone. If there is a requirement for potassium then between 6 to 15 g/m² (as potassium oxide) should be applied in a year. The higher end of the range is applicable for very sandy rootzones and this is divided into three dressings each of 5 g/m² of potassium oxide. For loam soils a single dressing in the spring of 6 g/m² of potassium oxide would be adequate. The potassium can be provided from micro-granular turf fertilisers or as straight potassium sulphate.

Magnesium and micronutrients

Only on very high sand content rootzones is there any need to be concerned about the levels of magnesium and micronutrients available to fine turf. Even here, visible symptoms of deficiency are not commonly encountered. However, it is possible that very low plant concentrations of magnesium or micronutrients will lead to some impairment in growth. At present there is simply not enough information on this. Therefore, where rootzone chemical analysis reveals low concentrations of magnesium or micronutrients it is a sensible precaution in the spring to apply a magnesium or micronutrient (trace element) containing fertiliser. Many proprietary fertiliser products now contain magnesium and an annual application equivalent to 2 g/m² of magnesium oxide will be adequate. Alternatively Kieserite applied at 7 g/m² or Epsom salts at 12 g/m² will supply sufficient magnesium for the turf.

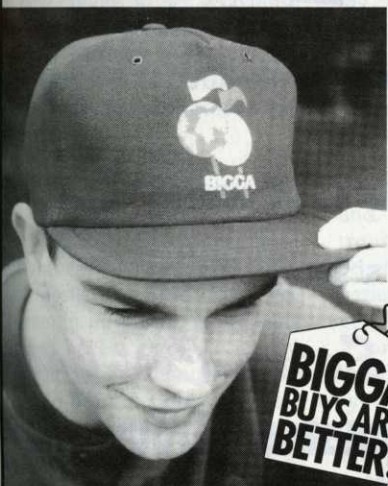
A number of fine turf fertilisers contain a micronutrient content, but there are also available concentrated micro-nutrient fertilisers for use in horticulture and agriculture. Advice should be sought before using such products on fine turf.

Fertiliser products

There are many new fertiliser products coming onto the market – liquids, microgranules, organics and slow release. It is often difficult, from the label, to know what is actually in the bag or container and what their long-term effect on the turf will be. If there is any uncertainty then get in touch with STRI.

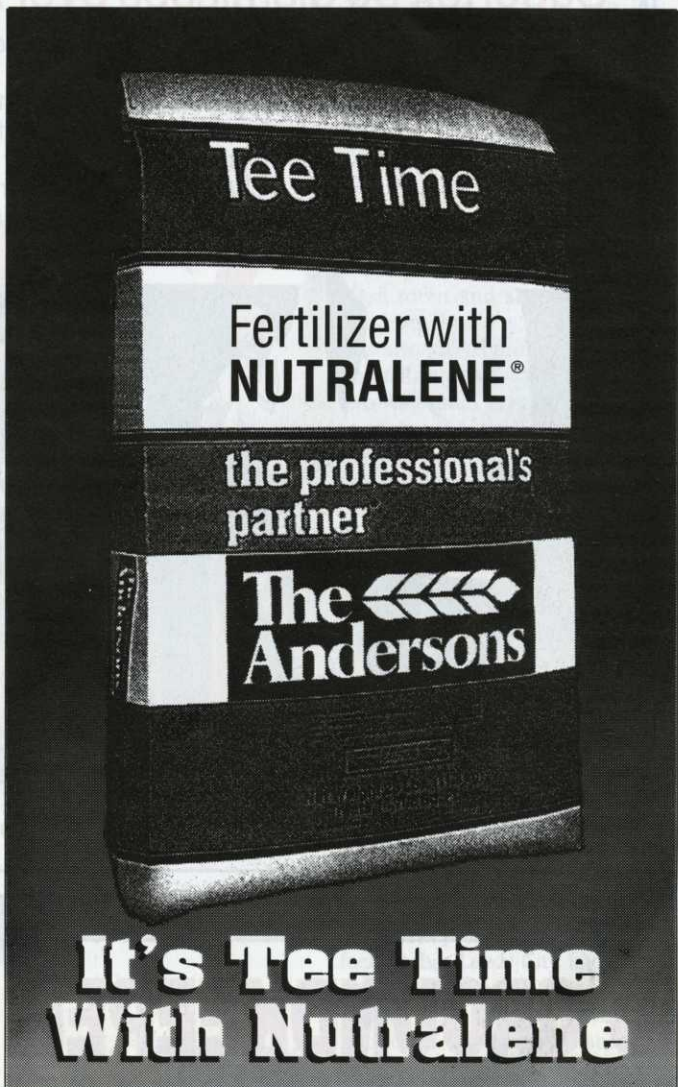
■ The author, David Lawson, B.Sc. Ph.D., is a soil chemist with the STRI.

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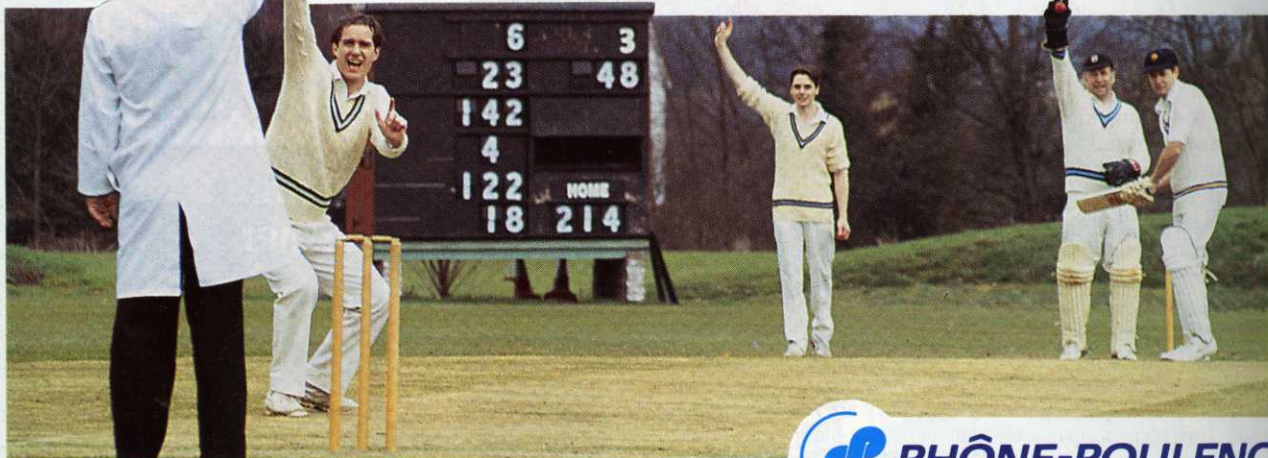
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