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# Greens MOWERS

IN THE  
SPOTLIGHT

hours on the clock, Philip commented that it has proved itself to be an extremely reliable and efficient machine which had never let them down. Pedestrian machines are only used in special circumstances, such as for matches.

The grooming reels were supplied with the machine and Philip commented that he would not have bought without them. In his opinion the machine gave "an excellent quality of cut especially when considered against its cost". Standard bottom blades are used with life and cost both acceptable. The reels are normally sharpened just once during the winter and then back-lapped "as and when necessary" during the cutting season. Philip was very pleased with the way the reels kept their cut and adjustment.

Ease of use, operating and manoeuvring, was considered to be equal to any other greens mowers triple, four of the five greenkeepers use the machine regularly and all like it.

A couple of reel bearings have had to be replaced, using original parts from Hayter as these are "not over priced".

Philip's brother, and joint Head Greenkeeper, Greg said that Hayter had been extremely supportive and re-welded without quibble one minor crack in the frame. The machine still has all its original hydraulic pipework which has never leaked, although one internal seal in the transmission had to be replaced.

"No" said both Bowes brothers, "we can't fault the Hayter T93 and we'd certainly consider another".

## Ransomes E-Plex at Lydney GC, Gloucestershire

"It'll be interesting to compare costs after a year's use," said Graham Wissett, Head Greenkeeper at Lydney in Gloucestershire. "Not having engine or hydraulic oil and filters to replace nor any diesel fuel to buy must make a considerable cost saving," he suggested. Lydney bought the all electric E-plex after an extended one month trial, the machine having first been R S Bird Ltd's demonstration machine.

Lydney is a private 9 hole course on relatively level ground

between the town and the Severn. Graham admitted that he wouldn't have bought the machine without this long trial period. He suggested that this was the only way to buy any machine particularly if it was radically different to other machines you are used to. Certainly the radical concept and untried principle gave him initial cause for concern, but use has refuted this concern.

"Its not a machine which will suit everyone," he suggested, "however it has proved to be ideal for our needs. You soon forget how it is powered." The E-Plex has now proved that it will cut 29 greens between charges and still have enough power to get back to its battery charger.

While knowing that it was an untried machine and principle, Graham was confident in the support he would receive from Ransomes and Birds, and added inducement was given by the fact that Birds gave a three years (free) service contract with it. The most obvious advantages of the machine apart from its economy of operation are its quietness. With a housing estate alongside the course the advantage when going out to cut greens at 5.30am is obvious. Other significant advantages are the lack of oils to spill and the minimal maintenance requirement. Graham said it was nice not to have to check oils and water or for worn pipes nor to have to wear ear defenders.

Power is provided by a bank of eight 6 volt batteries. Battery life is still an unknown quantity, Ransomes recommend replacing batteries in rotation, however Graham intends to wait until they go down and then to replace them all, using a local battery supplier at a cost estimated at £500. Following recommendations Lydney run the batteries down almost "flat" before recharging, using the machine as a run-around if necessary. Charging takes about seven hour, i.e. overnight and once plugged in is automatic.

The E-Plex has a charge meter on the dash, and Graham said that reel speed, and so quality of cut, remains constant "until the batteries are virtually dead - the



Graham Wissett and the Ransomes E-Plex

reel drives being the priority service." Quality of cut is considered to be at least as good as any other greens mower. Furthermore the machine has stayed "on cut" exceptionally well without needing any resharpening. The service which does show charge level is reel lift, "you notice this getting sluggish as the charge runs down," Graham said. Slopes do have some effect on the machine, and speed can be reduced by as much as 30% when climbing. There is no engine braking when going downhill but Graham is happy to use the brakes if necessary to check forward speed. He believes that Ransomes have made a modification to this.

The machine has been used without turf groomers for the past season, however these are to be fitted for the next. Lydney checked the ability of the electric lift to cope with the extra weight - by loading 50kgs of sand into the boxes. Verti-cutters are not available. Individual units can be switched off allowing narrower and offset perimeter cuts to be made. Lift height stops are adjustable by screwdriver to ensure that the units come up just sufficiently high enough to clear humps.

There are some downsides to the machine, one is that there is no power steering, however Graham said this is no real problem, you just develop different techniques, wider sweep turns and a three point turn if necessary, this has eliminated steering (skid) marks. Another expressed wish was for a sprung seat.

Overall Graham said, "I think the design is brilliant, exceptionally well thought out with easy service swing out cutting units, only a single spanner for all adjustments. Certainly if it were stolen tomorrow I would buy another and I don't think that I will have a different opinion in a year's time."

## Toro 3200-D at Wimbledon Common GC

When Greenkeeper International visited Ron Green, Head Greenkeeper at Wimbledon the machine had not been delivered. It had been ordered without demonstration, nor had Ron seen the machine, its specification or even a brochure. This indicated the club's faith in manufacturer and dealer - Ian Kerry Machinery. But the machine was not an entirely unknown quantity as the club has had several previous Toro greensmasters. Where there was a little apprehension was over delivery as the club's Toro 3000 which was sold in part exchange has already gone, however Ron is confident that Ian Kerry "will see them right".

The club is in the unusual position of being joint private user of a public course - shared with the London Scottish Golf Club on the Common. Greenkeeping costs are divided equally. Policy is decided by a ten strong committee, five from each club with a Course Liaison Manager providing the link. Course staffing is three, including Ron with maintenance being based at the Wimbledon Common club premises. This tight staffing level means they have to have reliable machinery and depend on the supplier for service. Ron could not be more complimentary over the service given by Ian Kerry Machinery.

Servicing is scheduled monthly by Ian Kerry Machinery who do all oil changes and fully check the machine at that time, They undertake such repair and replacement, including sharpening, as deemed necessary. Back-lapping is undertaken when required, probably about fortnightly.

The new machine replaced a Toro 3000 which needed a new engine among other work, but they have retained a 17 year old GM3 which has clocked up some 3300 hours because, having spent

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# Greens MOWERS

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The Wimbledon Common Golf Club's team and their Toro 3200-D

a lot of money on it a season or two ago, it was considered worth retaining. No pedestrian mowing is undertaken and greens are cut daily.

The groomers were removed from the GM3 and 3000 as they were found to "ripple" the perimeter cut, and Ron will not have them on the new machine. The club has verti-cutters for the GM3. The change to diesel power was an important factor in upgrading - a petrol engine 3200 is available, however transporting and storing petrol is proving to be an ever increasing difficulty, whereas there is already a diesel tank in the yard. The clubs, through David Shore, the Course Liaison Manager, are endeavouring to change into a rolling replacement programme.

#### Lloyd Paladin 21s at Dyrham Park Country Club, Barnet

Don Wilson, Course Manager, declares himself to be a dedicated pedestrian man, giving in part the justification that the course is built on heavy London clay - with some variety in the greens which he mole ploughs each year. His other reasoning was that pedestrian mowing gave a better and faster green and a more attractive finish with no edge marking and this was something the members required. The club selected Paladins for several reasons not least of which was the fact that Lloyds at Letchworth were very close to hand for parts and service. However the principle reason was that Don considers that the mower produces a better finish than the other machines which he has tried. The build quality and engineering also received praise.

The club has three of the machines, all of the same age, which are individually numbered. It also has two Jacobsen triples which lack of time and money dictate be used at weekends during peak season - One of the Greenskings is used for verti-cut-

ting. Don does not believe in groomers - or rakes.

There have been no problems with the machines, service is simple and grease points are excellent and readily accessible, nor does the machine shed its grease on the greens.

All three machines go back to Lloyds for a winter overhaul and sharpen, with back lapping being undertaken at Dyrham as necessary, normally two or three times a season. Don said the machines stay on cut well, and seldom need adjusting although this is checked each time they go out. Adjusting the cut is simple, but it does need a box spanner - "this need for a spanner", Don said, "ensures that adjustment is not undertaken by the operator without due consideration." Cutting even in the wet is not a problem.

The club has eight greenkeepers when at full strength, machines are not specific to any greenkeepers and all handles are set at the same height. Transport wheels are not used as normally each greenkeeper has a Cushman which he uses to move himself and the mower from green to green. Don said that he particularly liked the Honda engine, advantages he cited were its reliability, quietness and economy,



Don Wilson and the Lloyd Paladin 21s

and on top of this was the eco-friendly use of unleaded fuel. It has an oil alert switch which ensures that it cannot be run without oil.

Replacement is scheduled for after the machines have done four seasons of work, but prior to that Don is also hoping to buy two more similar machines for his tees.

#### Huxley 358 Greensmowers at Barton-on-Sea Golf Club, Hampshire

Barton on Sea is a private 27 hole links type course which while long established has recently had to move further away from the sea. Greens are built to full USGA specification. The club bought the second production machine from Huxleys in 1988 and this is still with them, but now down graded to a tees machine. Since then they have bought a further two machines, respectively for the '91

and '93 seasons and it now anticipates replacing the oldest machine next year as part of a five year replacement plan.

Course Manager is Tony Gadd and he said he and all the greenkeeping staff are extremely happy with the Huxleys. The fact that Huxleys are only an hour away and provide an extremely efficient back-up service adds to the fact that the machines are British and priced "right". All machines have combs but not roller brushes.

Tony admitted that the oldest machine has had its troubles and that it is coming to the end of its economic life, but one of the advantages of Huxleys being a small British firm was that they took trouble to listen to the greenkeeper (and Barton greenkeepers in particular) and then acted on this. This has meant that many of the early niggles and problems have been corrected in

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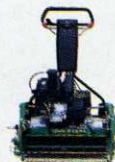


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# Greens MOWERS

IN THE  
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Robert Hollier, Tony Gadd and Chris Parsons and their Huxley 358s

the latest models.

A feature of the machine is its good clearance, but Tony reckoned that early machines had sacrificed clean collection as in wet conditions the rollers collected and clumped clippings. Having learnt this Huxleys have made slight design changes to the boxes so that new machines collect 100% of the clippings.

Other features which were noted were the ease of working on the machines and the ease of adjusting the machine. Quality of cut was equal to any in Tony's assessment. Reliability, overall, has been excellent. The machines have all wheels driven and this is considered an essential requirement, probably because the machine is heavier than some and has more weight over the back wheel. Stability on the current model is good but the earlier machine was prone to tip. The latest model also has strengthened cutting unit lift arms to cure the problem of earlier breakage's, but Tony said one of the most significant advances is the improved hydraulic pump capacity which gives a much smoother drive.

Several different operators drive the machines but most of the greens mowing is done by the two first assistants, all are pleased with the machines. Tony said all his staff are consulted before the club buys a new machine. He commented that where anyone has preferred another model of greens mower they have accepted that their preference was not sufficiently strong to warrant a change, especially when it meant loss of commonality of parts and a difference in the location of important controls such as lift/lower.

## Dennis FT610 at Fawley Parish Council

Peter Stevens, Head Groundsman at Fawley Parish Council in Hampshire, admitted to being a "new boy" when it came to green-



Peter Stevens and his Dennis FT610

keeping as the parish has only recently built its own 9 hole course on reclaimed land. His requirement was for a versatile and inexpensive mower for the greens which are relatively small, and this led to selection to the Dennis for its cassette reel change. Compaction is a major problem on the site as is lack of capital and these criteria exclude the purchase of a ride-on triple unit.

The course is to be opened next spring and one of Peter's worries is that the maintenance requirement is higher than existing staff and machines will be able to cope with, thus he has retained some reservations.

Nervertheless the Dennis has been used for the past season without any problems and it has done an exceptionally good job. In addition to the cutting unit the council has a verti-cut cassette, and Peter said he likes the look of the sorrel roller unit.

Prompted for design faults, Peter did say that the box could usefully have a handle at the front, but otherwise he had no criticism of the machine.

Servicing is simple and reliability has been total. The machine negotiates the undulations in several greens without trace of

scalping despite the fact that it has a relatively long wheelbase. Supply was by Jenman Engineering of Durley.

## John Deere 2243 at Broadway Golf Club

When Broadway needed a new greensmower, service and parts back-up were high on the list of priorities. Cedric Gough, course manager, said that he was not prepared to buy an untried machine nor one where the parts back-up was not 100%. Nor did he expect to be charged for overnight delivery for items which should be in stock.

Other reasons for the selection was the fact that the reels are offset and Cedric was impressed with the units, furthermore the machine is not complex or over endowed with electronics. This latter feature was important because the club has its own greenkeeper/mechanic who undertakes most of the clubs work. The new JD 2243 is the recently introduced diesel engined model, and Cedric commented that diesel engines were synonymous with reliability.

Cedric has been to Langar in Nottinghamshire, John Deere's UK depot, and been particularly impressed with the way they operate, getting parts from where ever in the world they are and getting them in fast. He was impressed by the computer net which located parts, and he praised the way that JD record faults and can provide the mechanic with the number of

previous similar faults which have occurred and what the best solution to them is.

## Jacobsen Greensking 5 at Enmore Park GC, Somerset

Enmore Park's GK5 has yet to be delivered, the 18 hole private course is committed to Jacobsen for several reasons, firstly they believe in the product and are used to it, having had several previous models, and, secondly and perhaps no less important, they reckon they get superb service from dealer B.S. Mowers of Bristol.

Gary Cook who is head greenkeeper at Enmore Park said that these reasons were important, because "(while) there may be others mowers and dealers, which are as good, there is everything to be said for the devil you know."

In fact most of Gary's knowledge of the new machine is hearsay, but he commented that the GK4 has proved itself and the GK5 is basically similar with added improvements. Of course the new machine will be diesel powered.



Jacobsen Groundsling 5



John Deere 2243

# NATIONAL SURVEY OF

by Dr S W Baker,  
Senior Research Officer STRI

Most of the research work that is carried out on golf course construction and agronomy is based on replicated experimental plots, for example on the trials grounds at the Sports Turf Research Institute. This gives the necessary controlled conditions so that the effects of different treatments, e.g. grass type, fertiliser rate or pesticide application can be studied in conditions where all other aspects of construction and maintenance are held constant. For instance, in a construction trial the rootzones may vary but all plots on the trial area will be sown with the same seeds mixture, receive the same amount of fertiliser, top dressing and aeration and all plots will be subjected to artificial wear at the same times.

This careful scientific approach is essential if we are to understand in detail the response of turfgrasses to different forms of management and to make meaningful comparisons between dif-



Survey work in action with the concentric rings being used for infiltration measurements

ferent products so that the best possible advice can be passed on to golf clubs. However there is also a need to monitor what is actually happening on golf

courses as this allows a wider range of environmental conditions to be considered, it can provide some additional information on interactions between different

management procedures and it also gives information of long term development of golf greens by selecting greens that have been established for many years.

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# GOLF GREENS

Monitoring of the performance of a large number of golf greens also gives an indication of any commonly occurring problems that should be addressed by additional research work.

In 1993 the Royal and Ancient Golf Club of St Andrews agreed to finance a national survey of golf greens. Many of the objectives of the monitoring work are listed above but there was a particular need to identify performance requirements for golf greens, especially for playing quality. The need to examine performance requirements has been brought about in part by work by the European Committee for Standardisation (CEN) which is developing standards for sports surfaces, including golf greens. However from a research point of view it is also essential to develop a range of measurement techniques to characterise the performance of a golf green and to identify ranges of values that provide an acceptable compromise between the needs of the golfer and the

needs of the greenkeeper. This gives objective methods for assessing all future trials on golf green management.

The measurements of playing quality and development of performance standards will be discussed in a later issue of Greenkeeper International, but in this article I wish to consider some of the findings particularly with respect to soils, grasses and management.

## THE SURVEY

Over a seventeen month period between June 1993 and October 1994 my colleagues Tim Lodge, Phil Hind, Jonathan Hunt, Daniel Binns and I visited 74 golf clubs around the country. To minimise travel costs there was an inevitable concentration on northern and central England but the overall geographical coverage was from south-west England to the north of Scotland (Figure 1). We tried to select different types of course roughly in proportion to their numbers in the country as a whole. As a result 55% of the

courses visited were classified as parkland, 14% as meadowland, 11% as golf links with smaller numbers of moorland, upland, heathland and seaside courses. At each course testing took place on two greens selected by the greenkeeping staff as being one of their best and one of their poorest greens. This gave a total of 148 greens with a variety of construction types and ranging in age from six months to over 120 years.

Our measurements were varied including soil physical and chemical properties, grass cover, species composition, thatch depth and playing characteristics (green speed, hardness and the stopping distance of balls fired at the turf simulating five iron and nine iron shots). At each course the greenkeeper kindly filled in a detailed maintenance questionnaire and questionnaires were also filled in by players so we could get an impression of the performance of each green.

The main results and principal findings are given below.

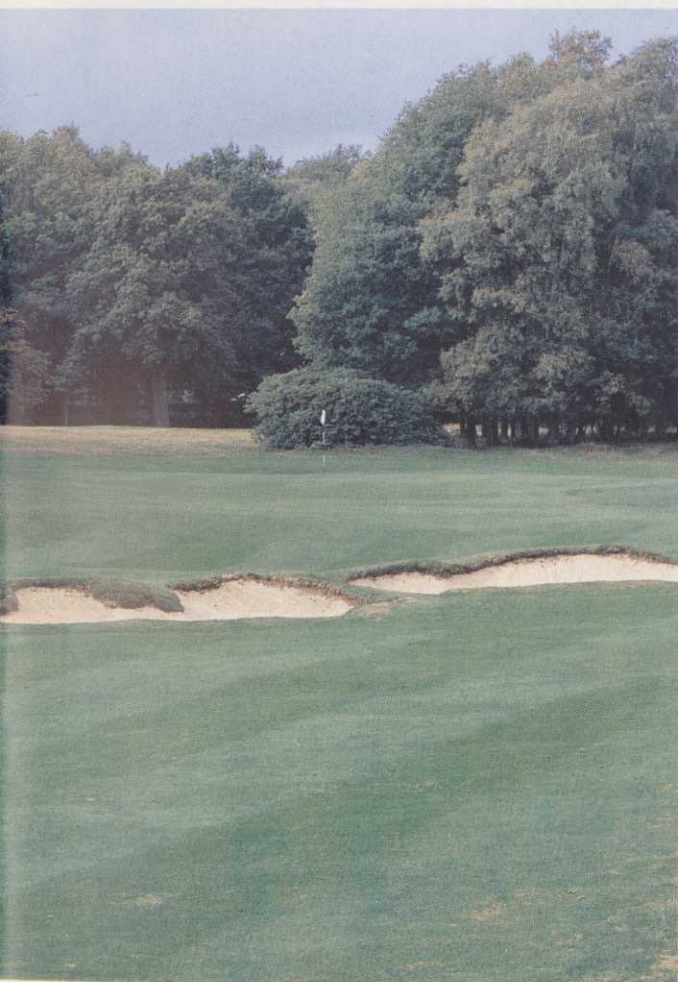


Fig. 1: Location of courses in study

## SOIL: PHYSICAL PROPERTIES

We did not specifically choose courses where the greens had modern sand dominated root-zones (although some were included in the study), so the greens were developed on a number of soil types. For the lower 100-180mm depth, 47% of the greens had a sand or loamy sand textured soil, 35% were on sandy loam soil and 18% on heavy sandy clay loam or clay loam soils. Rootzone amendment and

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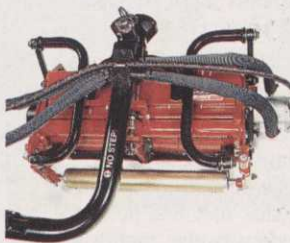
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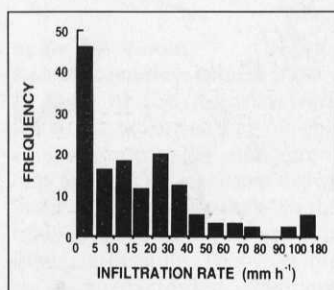
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# NATIONAL SURVEY OF GOLF GREENS



**Fig. 2: Number of greens with water infiltration values within specific ranges**

top dressing with sandy materials meant that the surface layer (10-90mm) was generally lighter, with 65% of greens having a sand or loamy sand texture and only 6% occurring in the sandy clay loam and clay loam categories. Inevitably the highest sand contents were found on the links and heathland courses, along with newer courses where sand dominated rootzones had been used.

Drainage rates were measured by ponding water in two concentric rings and measuring the rate at which water entered the green's surface. The range of infiltration rate values for all the greens summarised in Figure 2 and some important points are evident. The highest value of 171mm/hr was recorded on a long established heathland course and in general the questionnaire completed by greenkeepers indicated that drainage problems were minimal on those greens with 285% sand in the rootzone but increased as the texture became heavier.

Infiltration rates also decreased with the age of the green and averaged a very respectable 22mm/hr for greens up to five years old but fell to an average of 10mm/hr on greens greater than ten years old. This is likely to be a function of increased compaction and greater blockage of the pore space by organic matter, but changes in construction practices over time could also be important as many of the newer greens have been built with specially prepared rootzone mixes.

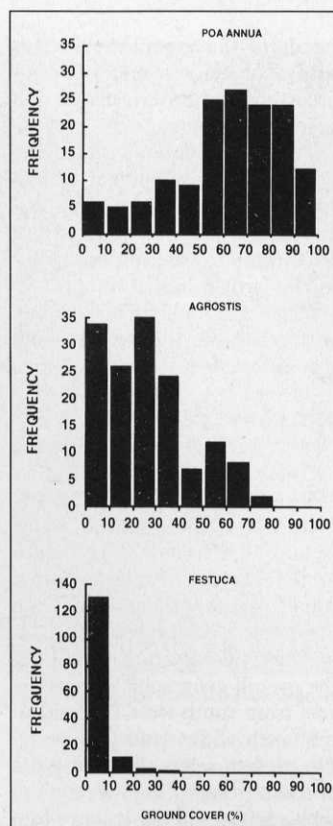
Rainfall intensities of over 20mm/hr for anything but a few minutes are very rare but ideally infiltration rate values should be >20mm/hr if the green is to cope with very high intensities of rain, for example during a summer thunderstorm. However a minimum drainage rate of 10mm/hr is a more realistic target for most golf greens and provided that they do not have major hollows

that hold water, any surface ponding will normally be short lived. In the study 43% of greens had infiltration rates <10mm/hr and almost one third had values less than 5mm/hr. This situation is far from ideal. It must be remembered however that half of the greens were deliberately selected as being amongst the worst on the course and poor drainage would have been one of the factors influencing greenkeepers' nominations of greens to study. Indeed infiltration rates were significantly higher on those greens classified as "good" by the greenkeeper, averaging 14mm/hr compared to 8mm/hr on greens classified as "poor".

The other noteworthy physical characteristic is the air-filled porosity. In the laboratory we measured air-filled porosity at two levels of suction: values measured at a water potential of -4kPa are probably the most useful as this gives an indication of the amount of soil air present through much of the winter period. Using measurements from all the greens in the study, the air-filled porosity of the 10-90mm depth averaged 6.6% and the corresponding figure for the 100-180mm depth was 6.9%. This is below the figure of 10% air-filled pore space which is sometimes quoted as being a desirable minimum value. Indeed 41% of greens had values <5%. Again it must be remembered that the sample of greens was not fully representative as greenkeepers deliberately selected half the greens as being poorer ones from their course, nevertheless when taken in conjunction with the infiltration figures it does suggest that many greens have far from desirable soil physical characteristics.

## SOIL: CHEMICAL PROPERTIES

Greenkeepers were asked to fill in a questionnaire on maintenance and this included information of the fertiliser that they had put on in the preceding twelve months. Most greens received between 75-225 kg/ha of nitrogen, which would seem satisfactory in view of the range of soils at different sites. There were however some cases where we calculated the rate to be over 300 kg/ha which is certainly on the high side even for a sand based green. No phosphate was added on 61% of greens and on 56% of greens no more than 40 kg/ha of potassium (as K<sub>2</sub>O) was applied. Phosphate levels



**Fig. 3: Species composition of the greens examined, showing the number of greens with measured amounts of annual meadow grass (*Poa annua*), bent (*Agrostis*) and fescue (*Festuca*)**

were very variable and there was no relationship between the amount of phosphate applied and measured values in the soil. This almost certainly reflects unnecessarily high levels of phosphate nutrition in the past and the lack of mobility of this element in the soil. In spite of the fact that no phosphate was applied on 61% of the greens, over half the greens had P<sub>2</sub>O<sub>5</sub> levels >30 mg/l.

There was a significant, albeit relatively weak, relationship between the amount of potassium applied and levels recorded in the soil. For the main rooting depth (10-90mm) almost one third of the greens had potassium levels classified as very low and for the 100-180mm depth half the greens had nutrient levels falling into this category.

Potassium is relatively mobile within the soil and normally between 60-150 kg/ha of K<sub>2</sub>O should be added on an annual basis, depending mainly on the texture of the rootzone. In the light of the figures that were recorded it would appear that potassium is being under applied on a fairly high percentage of greens.

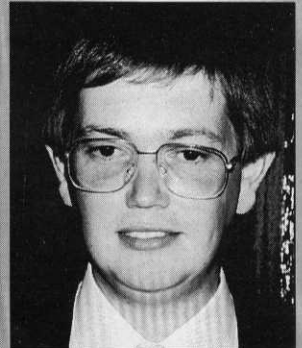
## GRASSES

Averaged over the 148 greens in the study, annual meadow-grass was by far the dominant grass type with three quarters of greens having an annual meadow-grass content exceeding 50% (Figure 3). Bent was the most common of the desirable grass species but fescue was recorded on less than half the greens in the study, with the highest fescue contents being found on relatively new greens less than five years old and on links courses. There were significant relationships between species composition of the greens and the soil physical properties, for example annual meadow-grass increased as the clay content and moisture retention of the green became higher. Fescues on the other hand were more common where sand content was greater and where higher levels of air-filled pore space were recorded.

## SOME CLOSING THOUGHTS

The survey has highlighted the fact that greens developed on all but the sandiest of natural soils will not have the soil physical properties generally thought necessary for ideal conditions of growth. Heavier soils are inevitably more water retentive and this tends to give poorer growing conditions which, along with a variety of other factors, will encourage annual meadow-grass invasion into the sward. It is a credit therefore to the greenkeeping staff at the courses visited that they generally managed to produce excellent putting surfaces in spite of the unfavourable soil conditions that many were having to work with.

MY NEW YEAR'S RESOLUTION IS:



"To appear in Greenkeeper International more often in '96 than Richard Barker"

- Tim Allard, Charnwood Forest GC