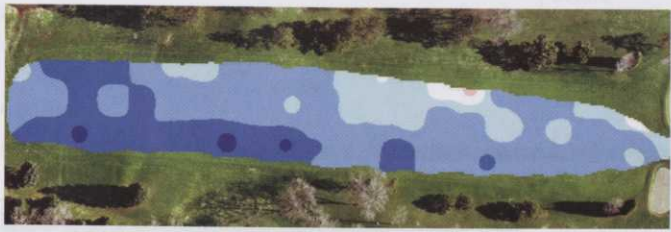


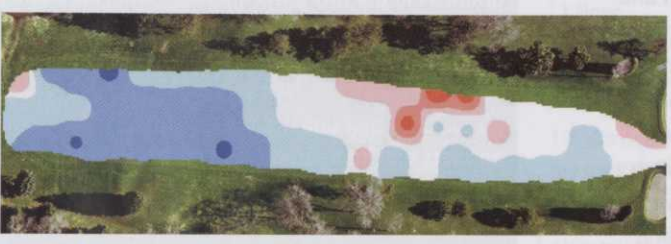


Compaction (resistance in psi)

- 100-150
- 150-200
- 200-250
- 250-300
- 300-350
- 350-400
- 400-450



▲ 5cm depth



▼ 12cm depth

▲ Soil compaction at 5cm and 12cm. Greater compaction at 12cm occurs just below tine aerification depth, creating a cultivation pan

were located in the landing area of the fairway, which receives the most golf cart traffic. There was no clear relationship between soil texture and surface compaction.

The highest level of compaction by depth was concentrated at 12 to 15cm indicating the presence of a cultivation pan just below tine aerification depth. Deep tine aerators, which are becoming increasingly popular, are designed to penetrate this deeper layer of compaction.

All of this information together verifies the fact that considerable variation in soil characteristics such as texture, organic matter and compaction can exist across large turf areas such as golf course fairways.

It also indicates that the extent of soil variation may dramatically affect the way different areas are managed. A fairway's soils from one end to the other may have significantly different capacities to retain nutrients and water and to resist compaction.

A detailed knowledge of soils in a case such as this could help the course manager and greenkeeper to design more effective treatment programmes on a site-specific basis. If soils are at the heart of growing healthy turf, then the more they know about them the better the job they can do.



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UK SURVEY ON USE OF BIOLOGICAL PRODUCTS - HAVE YOUR SAY!

Stella Rixon, of the STRI, is keen to gather information about the use of biological products and would very much like you to take the time to photocopy or email this questionnaire and return it to her at the address listed at the bottom of the page

CONTROVERSIAL SUBJECT

Ever since their arrival in this industry, 'biologicals' have been a controversial subject.... Around about four years ago, biological products were going to be the next big thing for turf managers and the market was flooded with products claiming a variety of benefits from improved turf growth and thatch breakdown to disease reduction....some were so confident to make the statement 'no disease' or your money back! Unfortunately the results were not quite as spectacular as the claims, leading to a lot of scepticism in the turf world.

We've had articles flying back and forward in the industry trade magazines for and against, turf managers who swear by them, others who haven't seen anything from them and many others who haven't yet tried one. And it hasn't helped that the experts can't seem to agree either. There has been a number of industry conferences and seminars presenting pro's and cons through both British and American research, but in most cases viewers came away with the eternal question lingering 'So will they work or won't they!'

STRI RESEARCH

Over the last few years, the STRI have performed some field trials on both soil and USGA rootzones using a variety of microbial products with mixed results – some positive, some with a negligible effect and others with no benefit seen at all. This research has been carried out both in-house, funded by STRI/R&A and work undertaken for commercial companies. Clearly, the latter is sensitive information and even the STRI agronomists will not be informed of the results, unless the company themselves release the data. Therefore, the STRI advice on these products to date has had to be one of caution, as achieving successful results can be elusive and therefore could be an expensive learning curve for a Club. The reasons for the frustratingly varied results are numerous, some of which I hope to cover in (my future) this article.

HAVE YOUR SAY...

In the meantime, the STRI would like YOUR help on this subject. We are conducting a UK wide survey on use of biological products to study the exposure of these products, how, why and where they are used, what percentage of users have had positive results and most importantly what is the secret to their success?! I will discuss the findings in future articles and the results will be made publicly available.

BIOLOGICAL PRODUCT USE QUESTIONNAIRE

In an effort to gain a greater understanding of the use of biological products in the turf grass industry, STRI courteously request that you complete the following questionnaire. You are not required to give your name.

Please note that under the Data Protection Act, your personal answers will be treated in the strictest of confidence and will be only used in a general way to analyse the overall findings of this survey. Thank you for your co-operation in completing this exercise.

Please tick where appropriate

BACKGROUND INFORMATION

1. Your name (optional)

2. Name of Club (optional)

3. Type of course/club:

- | | |
|---|---|
| <input type="checkbox"/> Golf heathland | <input type="checkbox"/> Winter sports pitches |
| <input type="checkbox"/> Golf parkland | <input type="checkbox"/> Cricket |
| <input type="checkbox"/> Golf links | <input type="checkbox"/> Tennis |
| <input type="checkbox"/> Golf seaside | <input type="checkbox"/> Bowls |
| <input type="checkbox"/> Golf upland/moorland | <input type="checkbox"/> Other - give details below |

PRODUCT USAGE

4. Have you ever tried a 'biological' product?

- Yes – Go to question 6 No – Go to question 5

5. If **NO**, please identify why you have not used a 'biological' product. Rank in order up to 3 of the below, 1 being the main reason why you have not used a product.

- | | |
|---|---|
| <input type="checkbox"/> Don't know of any product | <input type="checkbox"/> Unproven results |
| <input type="checkbox"/> No need to use one | <input type="checkbox"/> Too expensive |
| <input type="checkbox"/> Other – give details below | |

AIMS AND PRODUCT DESCRIPTION

6. If **YES**, what were your aim(s) for using it?

Rank in order up to 3 of the below, 1 being your main aim.

- Biologically activate new sandy rootzone
- Reduce thatch
- Reduce dry patch
- Reduce anaerobic black layer
- Increase growth + density
- Increase desirable grasses
- Increase rooting
- Generally reduce disease + fungicide use
- To actively control a disease outbreak instead of using a chemical fungicide

7. Please identify the product(s) used and their contents (continue on separate sheet if necessary):

If more than 1, please list each on a separate line. If you are unsure of the content, put a '?' in the appropriate column. Organic content refers to seaweed, vegetable/ animal composted waste, etc.

Product Name	Liquid or Granular?	Organic content?	Nitrogen content?	Bacteria?	Fungi?	Other (give details)
e.g. Bio	L	?	4%	✓	None	

PRODUCT APPLICATION

8. What area did you use the product(s) on?

- Fine, short mown turf e.g. golf or bowls green, cricket pitch
- Golf tees
- Winter sports pitch- high wear areas only
- Larger area e.g. fairway, winter sports pitch, cricket outfield
- Other – give details below

9. Did you leave any similar areas untreated for comparison i.e. a control?

- Yes
- No – all greens/ whole pitch treated

10. How many years have the products been used for?

- 0-1 years
- 1-2 years
- 2-3 years
- Over 3 years

11. What month(s) of the year were the products applied?

- J F M A M J J A S O N D

DESCRIPTION OF AREA TREATED

12. Describe the top 150mm of rootzone in the treated area.

- Sand-dominated
- 100% sand
- Soil-based

13. What is the average soil pH of the treated area? _____

14. What is the age of treated area?

- 0-5 years
- 6-10 years
- 11+ years

15. What was the dominant grass species of the area before and after bio-treatment?

Please tick most appropriate box on each line.

Poa annua	Bent	Bent +/-or Fescue	Rye
Before			
After			

16. How much nitrogen (kg per hectare) is applied to treated area/year?

Before treatment	
After treatment	

17. How would you describe the drainage of the treated area?

- Poor – less than 5mm per hr
- Average
- Good – over 20mm per hr

18. How much aeration is carried out on the treated area?

- None
- Once a month
- 3 times a year
- Every 1-2 weeks
- Every other month
- Less than 3 times year

19. On average, how many fungicide applications are applied per year on the treated area?

Before treatment	
After treatment	

RESULTS

20. Following product application, what results did you get?

Rank in order, 1 being the most obvious result and 6 being the least noticeable effect.

- No noticeable effect
- Increased growth
- Increased rooting
- Reduced dry patch
- Less fertilizer required
- Less disease + fungicide use
- Control of a specific disease outbreak – give details below:
- Greener colour
- Improved wearability
- Reduced thatch
- Increase in bent/fescue grasses
- Less fertilizer required
- Time/money saved

Negative results – give details below:

21. Please give the results seen an overall mark:

On a sliding scale, 1 represents very positive results, 5 represents negative or nil results and 3 = reasonable results.

1 2 3 4 5
 Excellent results obtained _ _ _ _ _ No noticeable effect

22. Would you consider using biological products again in the future?

- Yes
- No

23. Any other comments you would like to make?

(Continue on separate sheet if necessary)

**Thank you for your time. Please photocopy and return
 FAO: Stella Rixon, STRI, St. Ives Estate, Bingley, BD16 1AU
 or Fax: 01372 270386 or email: stella.rixon@stri.co.uk**



10 Good Reasons to Enter

Lee Penrose, of the STRI, urges you to enter the
2004 BIGGA Golf Environment Competition

Golf Environment
Competition



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Creating markets for recycled resources



The BIGGA Golf Environment Competition its establishment has played a key role in promoting the positive environmental image of golf.



▲ Waste water from the course and adjacent caravan park are filtered through this reed-bed at Brighthouse Bay Golf Club in Scotland. Although not yet winners, the club have benefited from advice and support from the STRI when undertaking ecological management.



▲ This novel, temporary grass storage bay is part of a larger sustainable composting scheme at Kenwick Park Golf Club. This, and other wildlife enhancement work, helped them to become the 2003 champions. Could your golf club be next?

It has helped to develop relationships with English Nature which in turn has generated interest and a more positive relationship with other statutory and non-statutory environmental/conservation organisations including, for example, the RSPB and County Wildlife Trusts. Keith Duff, Chief Scientist with English Nature, has throughout played a major role and has proved a great supporter.

The competition however can only ever be a platform from which to allow individual golf clubs the opportunity to display their environmental excellence.

It gives golf clubs a focal point from which standards are being set and, importantly, shows what should be and is being achieved. The competition provides a benchmark from which individual golf clubs can assess their own environmental performance.

For most clubs entry to the competition is not simply about the chance of winning and proving that they are 'better' than other clubs in the UK, the benefits are wide reaching and numerous:

Below are listed the top 10 reasons why any golf club should enter this year's BIGGA Golf Environment Competition.

1. Have an STRI Advisor visit your golf club for half a day free of charge in order to discuss any aspects of ecological and environmental course management.
2. Increase and improve habitats for wildlife on the golf course, thereby enhancing the golfer's enjoyment of their game.
3. Elevate the prestige of the club and help promote golf as a positive land use to the wider public.
4. Improve relationships and open lines of communication between staff and the membership through raising awareness and discussing ecological issues which are of interest to all.

▼ The BIGGA Golf Environment Competition is not the reserve of rich and prestigious clubs. This superb pond helped Bradley Park Golf Course, a municipal course near Huddersfield, become the 2002 Northern Regional winners



▲ Two-time winners Ipswich (Purdis Heath) Golf Club invested their winnings in a poly-tunnel which is used as a heather and gorse nursery

5. Increase job motivation, knowledge and enthusiasm within the greenstaff through learning new skills and a greater diversity of work.
6. Demonstrating environmental good practice help to place golf in a strong position to lobby local government and opposition bodies who often misrepresent golf as a non-beneficial land use.
7. The competition provides an ideal platform to consider and discuss recent developments in environmental legislation in order to be prepared for any likely changes.
8. Free publicity for the club in STRI and BIGGA literature and potential exposure in local or even national press.
9. New sponsors and more categories mean that your chances of winning one of seven £500 prizes are better than ever. In addition more clubs will receive a visit from an STRI advisor than ever before.
10. You might win the overall title, a cheque for £2,000, a Scott's Weather Master Station and the BIGGA Golf Environment Trophy!

STRI judges have visited hundreds of golf clubs since the competition began and thousands of pounds have been distributed in prizes. Fantastic ecological progress has been made at golf clubs up and down the UK as a direct result of the advice and support received from the STRI ecologists and real wildlife gains have been seen.

Furthermore; wider environmental issues such as organic waste composting, clubhouse/maintenance facility waste recycling, waste water disposal and sustainable energy usage are now being addressed by golf clubs who are at the forefront of sound environmental course management.

Applications to the 2004 competition are welcomed from any golf club whether it be the smallest 9-hole municipal course or a 36-hole hotel and leisure complex, all we ask is an enthusiasm for, and willingness to progress, environmental management!

Applicants are particularly encouraged this year from the Welsh region where the number of clubs entering the competition has been traditionally low.

There really is nothing to lose and everything to gain from entering the 2004 BIGGA Golf Environment Competition – so what are you waiting for?!

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Making the Most of your H₂O

Roland Taylor gives some sound advice on making the most of water features

The recent coverage of the US Masters at Augusta demonstrated how effective water features could be in enhancing the ambience of a course.

Filming showed a triple arched bridge with sunlight behind it and perfectly reflected in a golden pool, an ideal place to relax from the stresses of modern living. The lakes adjacent to the greens reflect the surrounding vegetation and golfers, thus creating an extra dimension to the scene.



Some readers may scoff at these notions, but developing the right image is a factor that should be given careful consideration if any changes to a course's design are being contemplated.

This could be important if a club is looking to stage some high profile competitions in the future and there is a chance of television coverage. Every course management team's priority is to develop quality surfaces that are a challenge to the players.

At the same time it should be a place of relative tranquillity and to a certain degree have scenic qualities. The overall aim should be to create a haven that everyone enjoys playing in and wants to come back too. Water features will make a contribution to this ideal

Water features are in two forms natural or artificial, each has its own impact. If done correctly, the latter will eventually become established and form part of the natural landscape.

NATURAL WATER

This could be a pool, fed by a spring that was originally on the site before the course was built. It will have evolved over several years and developed its own ecology. Alternatively, it could be a wet area that, with a little input from man, has developed into a nature conservation site.

In both cases some management is necessary to avoid aggressive and dominating plant species taking over. Where a site has been neglected it will have become choked up with rotting organic matter, dead branches and silt.

If it is decided to create a wildlife pond then ideally it should have shallow water because species such as frogs, newts and toads reside in this form of habitat. This will also attract other wild life including insect, birds and mammals.

Where it is necessary to carry out work the aim should be to achieve a gradual division between dry land and water and ideally an adjacent area of wild flowers should be established. Any overhanging branches should be removed to allow light to penetrate and stop debris and leaves falling into water.



This type of pond can be built artificially and if one is considering this exercise then it might be worth contacting the local nature conservation organisations for advice.

LARGER EXPANSES OF WATER

These are either ornamental or a source of water for irrigation. Depending on where they are located will govern the type of water features. If it is close to the clubhouse then fountains or cascades may be appropriate. Close to greens the water's reflective qualities will be the main feature.

For this water to remain clear oxygenating plants should be introduced and it is likely that some form of aeration system will also have to be introduced.

On any large area of water the surface can be broken up with water lilies and around the edges reeds and marginal plants add to the overall picture. The additions of banks of colourful shrubs, reflected in the water, will double their effect. If the soil conditions are right for azaleas and rhododendrons they can be planted for spring colour and acers for an autumn blaze.

STREAMS, DITCHES AND WATER COURSES

Most golf courses will include one or all of these and depending on where they are located and the water levels; will determine what can be done to make them attractive.

If there is a regular flow of water then this can be harnessed to make a series of features along its length.

Firstly, look at its shape and decide if by changing its contour and its approaches it can be visually improved. The introduction of dams creates pools along the streams length. This increases the water movement and enhances its appearance.

Dams need not be sophisticated structures, but consideration should be given to ensure they harmonise with the existing landscape. In woodland areas secured logs or railway sleepers will adequately suffice but will look

out of place in locations where natural rock predominates and here the use of boulders or stone is more appropriate. The introduction of some stone or wooden bridges with pools on one side and a waterfall on the other will add to the ambience.

In the case of ditches and watercourses there is less likely to be a constant supply of water, however the soil will probably remain moist for long periods and with these the right type of planting is the answer.

They are a haven for ferns and other damp-loving plants such as hostas and reeds. The banks can be planted with colourful shrubs and spring flowers. Many of these types of plants are ground covering so the level of maintaining these areas can be reduced, especially if mulches are regularly applied.

PLANTS

These fall into various categories, submerged (oxygenators), deep water, floaters, marginal and bog plants.

OXYGENATORS

In nature, submerged plants play a significant role in the well being of the underwater eco system, so it is important that the balance is right.

The formation of algae is one of the most common problems found in ponds and lake. Minute spores of algae thrive and multiply on a readily supply of mineral salts, carbon dioxide and sunlight in the water. Within a short space of time the water turns greens and if the algae is unchecked heavy pollution occurs and the pool or lake becomes unsightly. An adequate supply of oxygenators will reduce the algae spores and in small areas of water clear them completely.

The foliage of oxygenating plants is soft with very fine segments through which the water passes freely without damaging the leaf segments. Nature has also ensured that these plants can deal with virtually any type of water movement even fast flowing currents. Like other plants

these need carbon dioxide for photosynthesises and the product of this process is oxygen, which is released into the water.

They also absorb any mineral salts, thus starving the algae of their vital requirements and so restricting their development. If a sufficient quantity of oxygenators are present then algae soon disappears.

DEEP WATER PLANTS

Water lilies act as sunshades and help with the control of algae plus their stems and roots attract myriads of aquatic insects for any fish to feed upon.

FLOATERS

Some plants such as duckweed float around a pond without any anchorage. Large colonies can form on the surface that then present problems.

MARGINAL PLANTS

Most of these species require shallow water. The leaves and flowers are above the surface whilst the roots remain submerged. These add an architectural and colourful aspect to the margins of a lake, pond or stream. They are often highly ornamental with attractive flowers and foliage and will break a flat outline, making it more interesting and eye appealing.

BOG PLANTS

This category is generally made up of plants that like wet conditions without having to have their roots continually in water. There are a number of species worth considering for ditches or watercourse that are less likely to contain water all the year round.

A point that should be taken into account, when considering plants in relation to a natural pool, lake or stream, is that the chosen species are indigenous to the area.



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PLANTING AN EXISTING BANK

Immediately the vegetation is removed from an existing bank erosion will quickly set in because the roots of the native growth have in the past retained the soil. One method of dealing with this problem is to spray the bank with a systemic herbicide. This gets rid of the top growth, which then decomposes into the soil.

Once this process begins to take place plenty of mulch, in the form of well-rotted manure or compost to smother any weed seedlings, should be applied. The old root systems will continue to bind the soil together. Planting can take place during the winter or spring following the spraying and the new plants roots will then take over in holding the bank together.

FISH

If the introduction of fish is being considered then specialist advice should be sought.

KOI CARP

These are highly fashionable at present so the investment is likely to be considerable.

Because of their habit of happily eating large quantities of oxygenating plants, a filtration system is essential if the water is to remain clear and healthy. They share most of the characteristics of wild carp and can withstand fluctuations in water quality and temperature, but because of their inbreeding they are not as resilient as their wild counterparts.

Some Koi can grow to over three foot in length and have a life expectancy of between 20 and 50 years. They are best suited to locations close to the clubhouse because of their value and protection from predators such as herons and man needs is essential.

TROUT

Where there is a relatively large area of water away from any direct line of play it could be worth considering introducing rainbow and brown trout for any fly fishing members. Alternatively, there maybe local enthusiast of this sport who would be happy to rent the waters from the club, stock it and maintain it. This could be bring in additional revenue from an area that at present yields none

Natural species of fresh water fish such as carp and bream could also be introduced to help maintain the eco system.

SAFETY

Any water, regardless of its depth is dangerous so safety is paramount. A lake with sloping sides of 45 degrees makes it virtually impossible for anyone, even a good swimmer, to get out. Sheer sides are easier to reach and hold onto. An alternative solution is a build a beach area with the water gradually deepening. The rest of the lake or pool could be fenced off using reed beds to make it inconspicuous.

Having a wide planting area of dense vegetation is also another good safety measure. Creating thick barriers of shrubs, such as bamboo, planted



on dry ground up to the waters edges is also relatively effective. Deep-water notices must always be clearly displayed.

MAINTENANCE

An open expanse of water attracts a lot of debris, so for it to remain looking good and healthy requires some management. Left to its own devices algae growth accelerates and dominant plant species take over. Sludge builds up, the volume of water decreases and it begins to smell leading to unwanted insects congregating around it.

If it has reached this point then expert advice should be sought. It may be necessary to remove the sludge build up using a dredger and the introduction of aerators might be suggested.

These units circulate the water whilst introducing large volumes of oxygen, which encourage colonies of aerobic bacteria to form for dealing with the breakdown of organic waste. This type of clean up will have a positive effect on the any pump or filtration systems, as they are less likely to become clogged.

By this stage many readers will probably be saying they do not have the time to implement this. However, ponder this thought. How much time annually is taken clearing ditches and watercourse of natural vegetation?

If these were planted with marginals and flowering shrubs would the same amount of time have to be spent clearing away unwanted vegetation? The overall landscape quality of the course would certainly be improved. Likewise if pools and lakes already exist then their appearances have to be maintained to the highest standards.

Players join a particular club or visit a course for a round of good golf, if they also enjoy the ambience then they are likely to visit more and tell their friends of the pleasant surroundings.

Golf comes under the heading of sporting entertainment, so it is important the venue plays well, looks good and the customer goes way happy and satisfied. Today, they have plenty of courses to choose from so make sure it is yours they want to come back to.

See page 48 for more companies who specialise in lakes.



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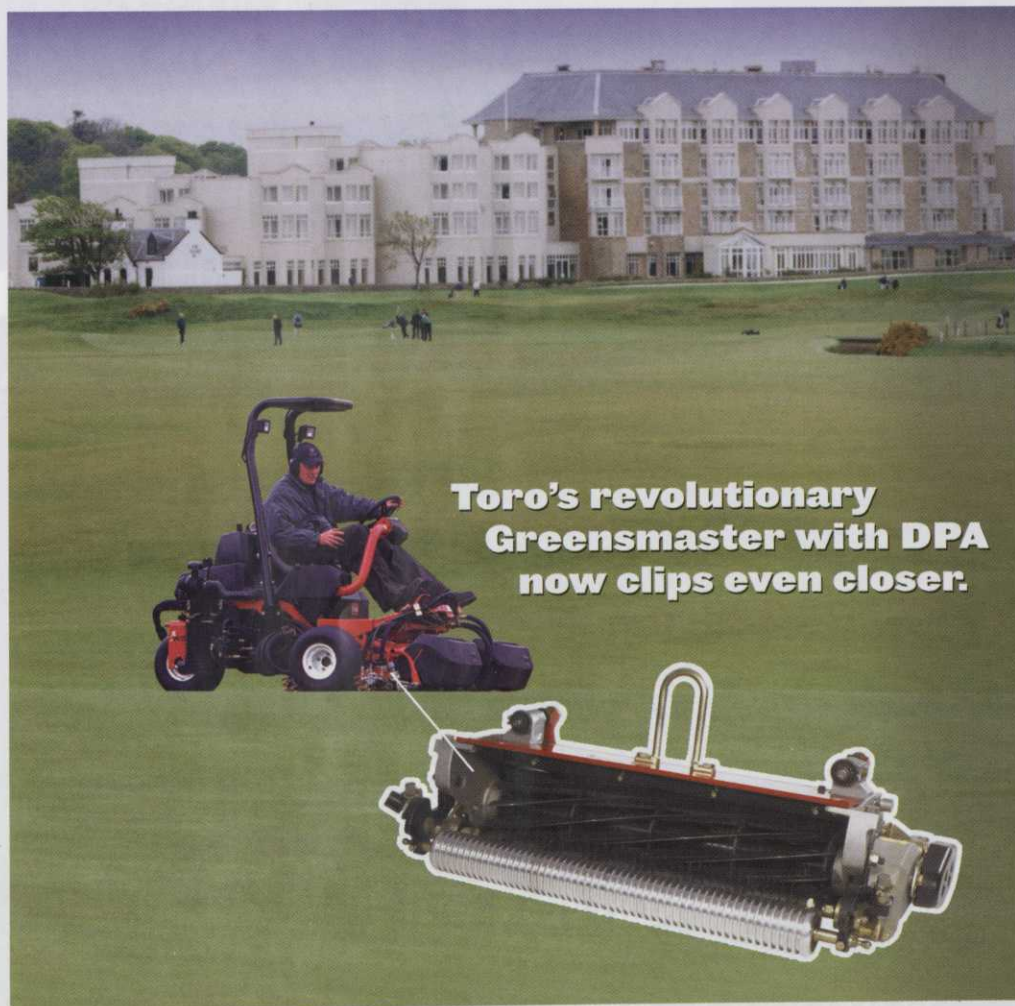
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