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MANAGEMENT

Welcome to the Jungle Playing it Safe Conference Review



volume **24**

AUGUST - SEPTEMBER 2000

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Green Speed - Can you tell?

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Australian Turfgrass MANAGEMENT

Welcome to the Jungle
Playing it Safe
Conference Review



Thatch Control
Green Speed - Can you tell?

Green Speed, What do Golfers Know? 30

This study, conducted by Douglas Karcher from the University of Arkansas, evaluates the ability of golfers to detect variations in green speed. It will give strength to Superintendents who feel responsible for the putting stroke of members as well as the quality of the greens.

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Preparations for next years' conference at the Darling Harbour Convention Centre in Sydney are already in full swing. The last time a national Turfgrass Conference was held in Sydney was 1990 so support from the locals will be huge.

Reports from the various industry groups and those companies that participated in the Trade Show at the Millennium Turfgrass Conference confirm that it was a fantastic success. Congratulations to all involved.

In this, the tenth edition of Australian Turfgrass Management (ATM) Course Designer Nigel Douglas highlights the dangers of 'errant golf balls' and discusses how good design can minimise or eliminate potential problems.

Course Superintendent Brett Morris welcomes us to the Jungle where rainfall is measured in meters and Gary Beehag investigates the influence that sand shape and size can have on physical behaviour.

In 'Research', David Nickson presents results of a trial that will be invaluable to any turf manager who finds the war against thatch accumulation to be a constant battle. Still with 'Research', Douglas Karcher from the University of Arkansas puts golfers to the test in a study designed to measure their ability to perceive differences in green speed.

The AGCSA's John Neylan brings you up to date with the latest in 'digital diagnosis' and announces the procurement of turf trial sites in Queensland and Victoria. In 'News' we cover IMG's push into golf course management and see how 'thinking outside the square' is often the key to solving logistical nightmares.

Best of luck to those involved with renovations or preparations for the Olympic Games.



PHIL GEORGE
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Phil George

Editor

An aerial photograph showing a golf course nestled within a dense, lush green jungle. The fairways and greens are visible as lighter patches of grass, winding through the thick forest. In the distance, a small cluster of buildings, likely the clubhouse or maintenance area, is visible. The overall scene conveys a sense of isolation and natural beauty.

*"The worlds most remote
championship golf course"*

welcome to the

jungle

By Brett Morris

"Build one of the best golf courses in the world, and provide the golfer with a truly unique playing experience" – this was the simple brief given to Ben Crenshaw and partner Bill Coore when in 1992, PT. Freeport Indonesia decided to build a golf course as a recreational facility for its employees whilst working here at Grasberg, the worlds largest copper and gold mine.

After two years of exhaustive environmental impact studies and site evaluation and another two years of construction, the world's most remote championship golf course was finally opened for play in July 1996.

Managing a golf course in such a remote

location (5 degrees South of the Equator near a town called Tamika), where annual average rainfall is somewhere between 9 and 10 meters (just over an inch / day) is an exciting challenge that requires persistence and innovation.

What follows is a summary of my maintenance practices and management challenges.

Without the assistance of any subsurface drainage at all, the greens and bunkers have been constructed much like a large sump in that they have been excavated down to the alluvial gravel, backfilled with 10mm gravel then capped with sand.

The fairways on the other hand are serviced by approximately 150km of drainage coil, which does a tremendous job in ensuring that

our members can enjoy relatively dry conditions under circumstances that might close most other courses in the country.

Management under such intense conditions requires a very aggressive maintenance program, which applies to the greens in particular. Due to the height of the surrounding jungle and limited air circulation, the greens have to be 'pushed' pretty hard to ensure that they can cope with wear and don't get ravaged by disease. Aside from applications made at renovation, greens are fed every 14 days with liquid fertilisers to maximise plant absorption and minimise nutrient loss through leaching. Each application represents approximately 0.125kg of actual N / m², which I am sure sounds excessive to most turf managers in Australia but quite simply, that is

what is required here to keep our greens healthy and in good condition.

Under such vigorous growth conditions the greens are lightly verti-cut every 14 days and are dusted once per month. In addition to this, the greens are verti-drained every 8 weeks with 8mm needle tines and are hollow tined three times per year.

Keeping the greens healthy and growing strongly is the key to keeping chemical use to a minimum but fungicides are applied when required and fipronil is used for long-term control of mole crickets.

All tees are grassed with Zoysia Japonica which we have found stands up extremely well to the wet weather and low light intensity. In fact we have been so impressed with its performance that we have decided to replace the Bermuda 419, which has a tendency to lose density during wet weather, with Zoysia on the fairways and bunker faces. The grass replacement program was started at the beginning of July and by the time you read this in August, we should have completed the front nine. The technique used to re-grass the fairways was simple: Firstly, the 419 fairways were scarified then 'scalped' down to half their normal mowing height then sown with Zoysia sprigs much the same way as you would sprig a warm season golf green. Once covered, the sprigs are forced down into the soil by a slicing machine and when completed, the whole fairway is rolled. The Zoysia is very slow to establish and we didn't see any result at all until about four weeks later but, once it was up and fertilised it covered the fairway surprisingly quickly and provided a great

surface for golf. The Zoysia also provides a great contrast and definition with the Bermuda 419 in the rough.

Sod (Zoysia) from our nursery was used to turf the bunker faces. The bunkers here have been modelled on the traditional Scottish rough-hewn type, which look fantastic but do require a lot of hand edging to maintain a consistent shape. As Zoysia is much less vigorous than the 419 our reliance on growth regulators and edging has been reduced.

Trinexapac-ethyl (Primo), is only applied through our wet season to bunker faces, fairways and rough. It is not applied to greens as constant vigorous growth is required to help combat disease infestation.

The wet season here (June, July and August) is a tough time for everyone but when the monthly rainfall hovers up around 1000mm, there is a limit to how much you can get done out on the course and how often you can grease and clean the machinery. For this reason keeping my team of 56 motivated is a difficult task. This year we are building new tee markers and doing renovations to the maintenance shed.

One thing I have learnt is that staff recognition and training are essential to the successful running of the golf course and here at Rimba Irian we are fortunate to be associated with the Sheraton Hotel who have a professional training department which ensures the staff are subjected to regular training sessions. For many on my crew, this is their first job and they are not accustomed to working for a large company that has rules and

▶ Hole #7 - Rimba Irian's signature hole. Tractor at base of tree gives you some perspective of scale.



▶ Zoysia Japonica on fairway
Bermuda 419 on rough



▶ Re-sodding bunker faces
using Zoysia Japonica



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regulations. Whilst some find this difficult, most adapt well and have an excellent work ethic.

As far as staff training is concerned, I have had great results with sending key staff members to work on another golf course for a couple of weeks. I first did this when I was at Denarau, Fiji where I sent my mechanic to Paradise Palms Golf Club to work for three weeks under Paul Earnshaw. It proves to be a great experience for the staff who, may never have seen another golf course and it gives them exposure to other

skills and maintenance techniques.

The site of Klub Golf Rimba Irian is simply awesome and preservation of the environment here is our primary objective. Millions of dollars have been spent on waste management programs that include the recycling of sewage, oils, scrap metals, batteries and tyres. There is an environmental laboratory on site where water and tissue samples are constantly checked and monitored. Also, we have joined the Audubon

Co-operative Sanctuary Program for Golf Courses and hope to become the first course in Indonesia to achieve certification. We anticipate that by creating an awareness of the environment amongst the local community will help preserve and enhance this very special area for a lifetime to come.

Brett Morris is an AGCSA member and is the Golf Course Superintendent at Klub Golf Rimba Irian.

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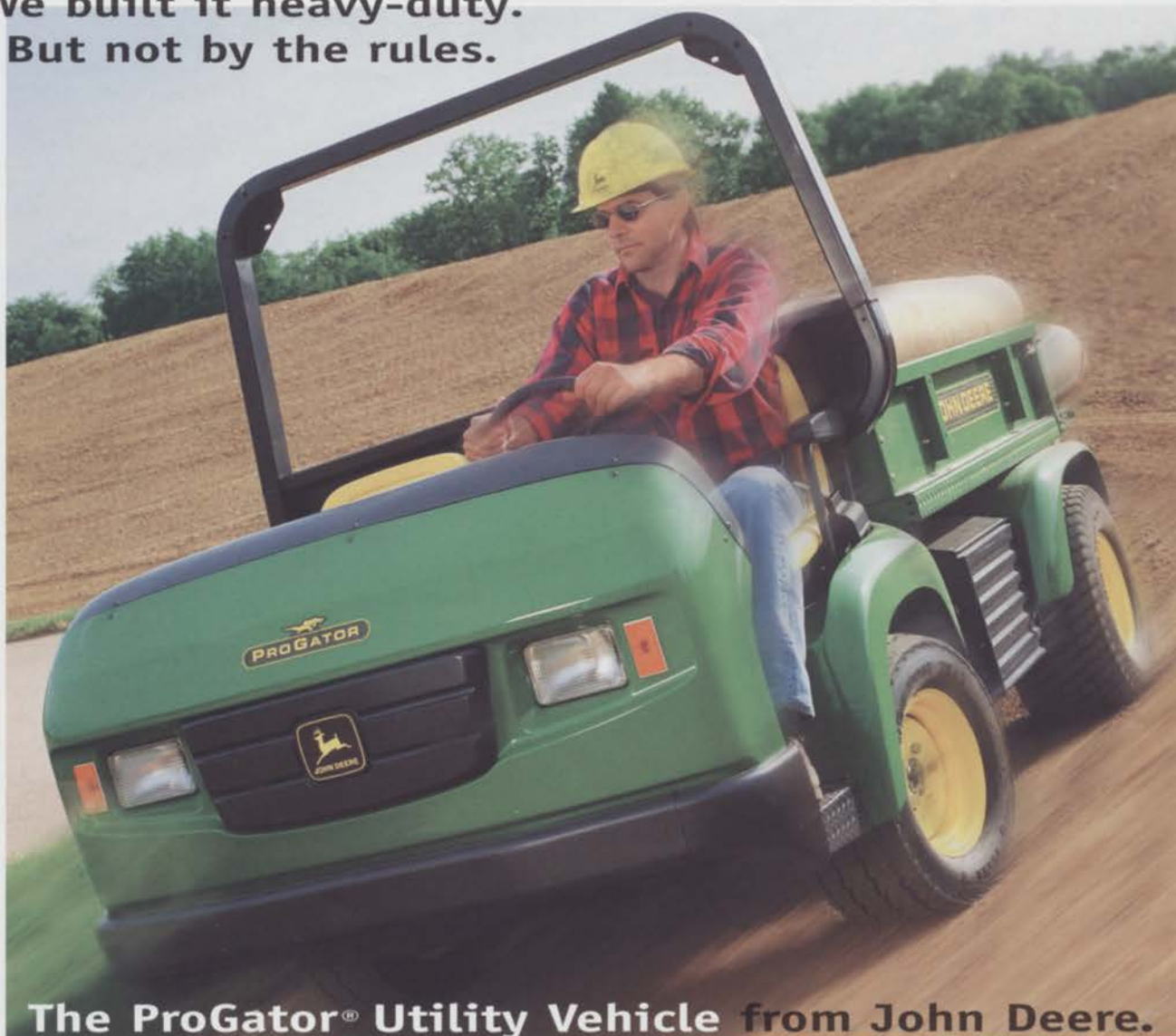
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How Do Plants Absorb

Soils usually contain the essential mineral elements at concentrations much lower than is required in plant tissues. In addition, some soils contain high concentrations of mineral elements not needed by plants. The mechanisms by which plant roots take up nutrients must therefore be selective and enable the accumulation of nutrients against a steep concentration gradient. Selectivity of uptake enables plants to regulate the composition of elements in their tissues.

ROOTS - THE PRIMARY SITE OF NUTRIENT ACQUISITION BY PLANTS

Plant roots can penetrate to significant depths and are branched so that they can explore large volumes of soil. Some nutrients (eg. Nitrate) are only "weakly bound" in the soil, and can flow towards the root surface when a plant uses water. Other nutrients (eg. Phosphate) can be tightly bound in some soils, thus, continued uptake by plants relies

on growth of roots into new areas of the soil. Root hairs, which greatly increase the volume of soil explored adjacent to the main root and also increase the root's surface area, may be particularly active in nutrient absorption. The degree of phosphate adsorption by soil particles depends on the soil type; sands adsorb phosphate only weakly whereas clays rich in iron oxides absorb it very strongly.

Generally, grasses have extensive root systems with many fine branches and sub-branches. These features contribute to good soil exploration for nutrients. Other plants, such as several legume species, have a thick tap-root and relatively fewer fine roots. Legumes form symbiotic relationships (both partners benefit) with selected species of soil bacteria and fungi. The bacteria (*Rhizobia*) form root nodules and fix nitrogen gas from the atmosphere and provide it in a form suitable for plants. Mycorrhizal fungi form a network

of hyphae extending into the soil to facilitate phosphorus uptake. In return the host plant supplies the nodule bacteria and mycorrhizal fungi with sugars fixed via photosynthesis.

HOW IS SELECTIVITY OF NUTRIENT UPTAKE ACHIEVED?

Mineral nutrients are absorbed by plants from the soil solution as ions (eg. K^+ , NO_3^- , HPO_4^{2-} , SO_4^{2-}). An ion is the charged particle formed by the removal or addition of electrons to any particular atom. The ions have two possible pathways for root uptake: (i) through the apoplast (cell walls and intercellular spaces) and/or (ii) movement cell-to-cell in the symplast (through the living cells) (Figure 1). The apoplastic pathway is blocked at the endodermis by "casparian bands" (deposits of hydrophobic materials) in the cell walls. These apoplastic barriers force the water and ions to move through cellular membranes if they are to be absorbed by the root.

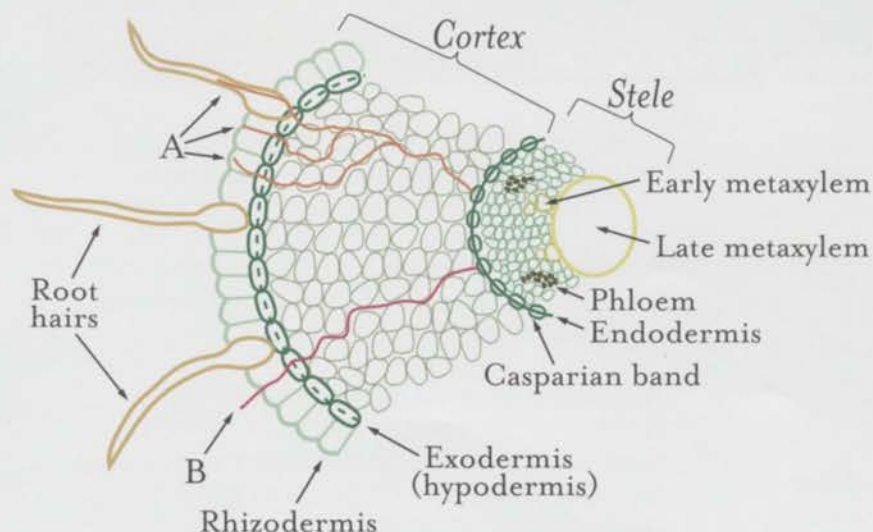


Figure 1. Schematic illustration of a cross section of a grass root showing the symplastic (A) and apoplastic (B) pathways for ion transport. The internal structures of the root are also shown. A key feature is the "casparian bands" which block the apoplastic pathway forcing ions to be absorbed by the root to be transported across cellular membranes. Redrawn from Marschner (1995) in *Mineral Nutrition of Higher Plants*, Academic Press.

Figure 2. Schematic illustration of membrane structure. Membranes consist of a lipid bilayer and a series of transporter proteins (A = ion channel; B = ion carrier) embedded in the membrane. Membranes enable compartmentation of chemicals and reactions within cells (eg. organelles such as chloroplasts and mitochondria are membrane-bound), and also enable the internal environment of a cell to be regulated. Selectivity and rates of nutrient uptake by plant roots are both controlled via regulation of transporter proteins for the specific ions.

Mineral Nutrients?

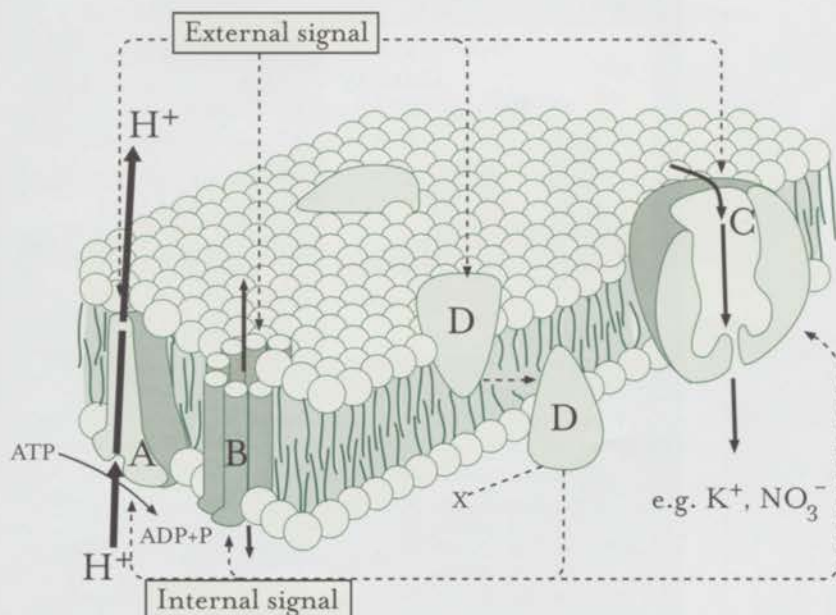
The "casparian band" that block apoplastic movement of ions are essential to selectivity since this is achieved by specific ion transporter proteins embedded in the membranes of plant cells. Membranes are composed of a lipid bilayer which prevents the free movement of substances in and out of cells (Figure 2). The transporter proteins are highly specific for the transfer of different ions across the membrane. So, for any given nutrient ion to be accumulated by a plant it must be transported across root cell membranes. Regulation of these transporters enables control of internal nutrient composition (ie. selectivity) and concentrations.

Ions absorbed by the roots are then loaded into the xylem (conducting vessels in the roots, stems, and leaves) and transported with water up to the leaves when the plant transpires (see TECH TALK, Volume 1.6 on water transport in plants).

FACTORS AFFECTING NUTRIENT UPTAKE

Several soil and plant factors influence the rates of nutrient uptake by roots. Soil factors such as low water availability, low nutrient availability, low temperature, and low (acidic) or high (alkaline) pH can all decrease rates of nutrient uptake. Soil pH is an important parameter since pH affects the solubility and ionic form of particular nutrients (Figure 3). In addition, any soil constraints to root growth (eg. compaction, disease, waterlogging, etc.) can also diminish rates of nutrient uptake by plants. Many of the soil factors listed above can, to some degree, be controlled by the turf manager.

Plant factors, as determined by genotype, that influence nutrient uptake rates include: rooting patterns, ability to form symbiotic relationships, rhizosphere chemistry, and sensitivity of roots to several environmental constraints. Selection of the most appropriate



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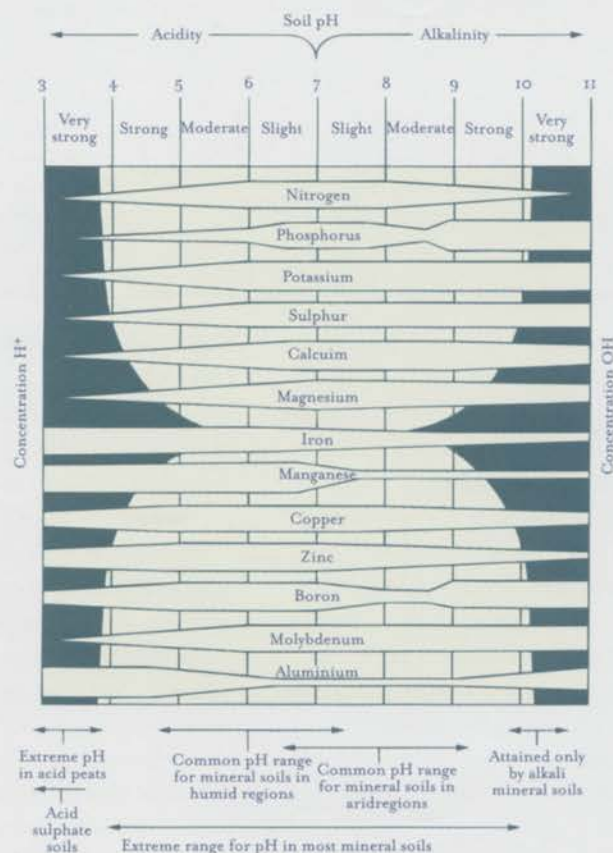
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TECH TALK

genotypes, especially for tolerance to soil constraints such as high or low pH, can benefit turf culture and nutrient management on soils with these problems.

► **Figure 3. Diagram of the effect of soil pH on nutrient availability (and element toxicity).** The width of the horizontal bars represents the availability of elements at any given pH. Most agricultural soils will be slightly acidic (pH 5.5 to 6.5). Redrawn from Atwell et al. (1999) in *Plants in Action: adaptation in nature, performance in cultivation*, Macmillan. Highly acidic soils may have adverse effects on plant growth due to aluminium toxicity. Alkaline soils may result in iron and manganese deficiency. Sources of iron and manganese applied to alkaline soils may rapidly become unavailable to plants, therefore foliar sprays are often used to correct these deficiencies in turf grown on alkaline soils.

Dr. Tim Colmer is a lecturer in Plant Sciences at the University of Western Australia. Dr. Colmer co-ordinates the Turfgrass Research at UWA, a program in collaboration with industry.



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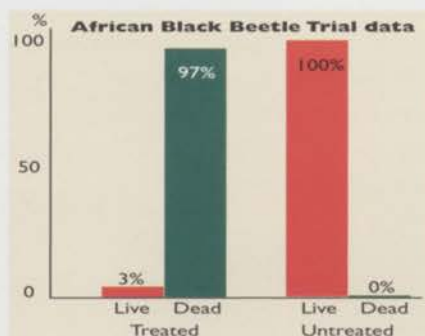
WHITE GRUBS

AFRICAN BLACK BEETLE

ARGENTINE SCARAB - BILLBUGS



A scarab beetle which has been invaded by nematodes. Once inside, the nematode release a bacterium which kills the insect rapidly.



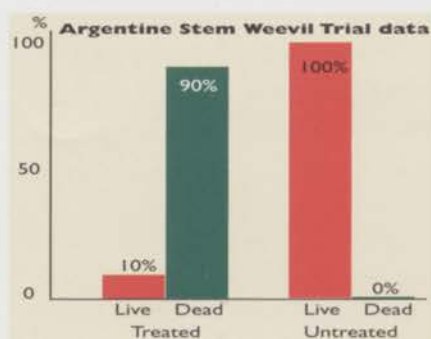
Trial work conducted at Peninsula Golf Club, Feb - March 1999, supervised by CSIRO and the VGA.

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Dr Robbin Bedding and Karen Butler inspecting turf damage beneath a playing field.

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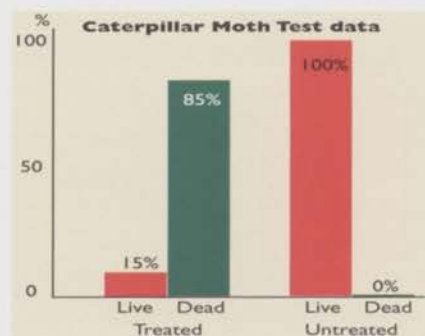


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With over 800 fully registered Conference delegates and over 3,500 through the largest display of turf maintenance equipment and products this country has ever seen, the Millennium Conference and Trade Show was a huge success for everyone involved.

Exhibitors were kept busy with a steady stream of enquiries from a bustling trade show floor and delegates from all sectors of the industry were treated with an excellent program of lectures and workshops, highlights of which included presentations by Dr Michael Hurdzan, Dr. Richard Cooper, Keith McAuliffe and Dr. Robin Bedding.

The welcoming cocktail reception gave an indication of what was to come and the opening ceremony 'kick-started' the business end of the week that concluded at the

Conference Dinner with a hilarious routine by comedian Rachel Berger and a 'show stopping' rendition of 'The Day I Wore My Inside Thongs Outside!' by Course Superintendent / Pop Star, Martyn Black.

It was a busy week for Martyn who also took out the prestigious AGCSA Golf Championships sponsored by Toro Australia and held at the beautifully prepared Dunes Golf Links on Victorias Mornington Peninsula. The Stableford event was won by Michael Love and NSWGCSA won the teams event.

Setting the theme for the conference on the first morning was a Keynote Address given by Gil Landry from the University of Georgia. Gil presented a forward-looking paper outlining the challenges facing modern turf managers and the ways in which the industry can

prepare for changes that include a population of 12 billion by 2100 and a doubling in the demand for potable water every 20 years. Gil drew on the experience of other industries to conclude that meeting challenges such as these depend on 'Education' and 'Professionalism' that is best delivered by professional associations that have a certification process in place that maintains professional competency through continuing education programs.

AFL Coach David Parkin and Professor Peter Martin from the University of Sydney colluded in an inspiring final session with Prof Martin facilitating a perceptive and entertaining summation of the week, the general consensus being that the way forward is through research, education and carefully considered adoption of technology.



Opening Ceremony



Jim Porter with delegates at RMGC



Martyn Black - AGCSA Golf Champion - sponsored by Toro Australia

Around the show...



View from above

Merv Haywood presents International speaker David Howard with a personalised putter supplied by Dint Australia.



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YEAR 2000 AGCSA Award Winners

A highlight of the recent Millennium Turfgrass Conference was the presentation of awards recognising outstanding achievement within the turf industry. Peter McMaugh was bestowed with the AGCSA Distinguished Service Award, Allan Devlin won the AGCSA Fellowship Award, Ben Tilley won the Claude Crockford Environmental Award and Brett Barsby was recognised as Apprentice of the Year.

Scotts

2000 AGCSA Distinguished Service Award

Peter McMaugh



Rae and Peter McMaugh.

Proudly supported by and presented in partnership with Scotts Australia, the award recognises an individual who has made such a contribution to the Australian Golf Turf Industry that they have left an indelible mark on the industry.

Peter began his career in the turf industry in 1964 as the director of what was the Australian Turf Research Institute before going it alone as a turf consultant and farmer four years later.

Peter's career includes several 'world firsts' that includes the introduction of single strain grasses to the Australian Industry and has been involved with major construction projects in virtually every part of the country.

A well-known sceptic and colourful presenter at numerous seminars and conferences, those people lucky enough to have spent time with Peter will attest to his prowess as an educator.



2000 AGCSA Fellowship Award

Allan Devlin



L-R, Peter Frewin, Alan Devlin, Trevor Shinnars - John Deere.

Proudly supported by and presented in partnership with the John Deere Company, the award recognises all round contribution to the golf turf industry from a practicing Golf Course Superintendent.

Allan has served on the Executive Committee of the GCSAWA for the last two years, presents turf management lectures at TAFE (Peel Campus), is an active contributor to environmental and water use trials and is tirelessly committed to the local community.

With a management style that revolves around proven, uncomplicated turf management principals, Alan is also Course Superintendent at the Secret Harbour Golf Course that was this year rated number 38 in Australian Golf Digests "Top 100 golf courses ranking". Allan is a most worthy recipient of this prestigious award.



Aventis

2000 AGCSA Claude Crockford Environmental Award

Ben Tilley



L-R, Ben Tilley, Greg Fraser - Aventis.

Proudly supported by and presented in partnership with Aventis Environmental Sciences, the award recognises excellence in environmental stewardship in Australian Golf Clubs.

Employed at Beewah Golf Club in 1996, Ben quickly assessed member's expectations and feelings that the course lacked 'character' and

immediately began to reinstate zones of 'native vegetation' and started a tree-planting program.

Members have grown to appreciate the more definitive layout and in consultation with the Caloundra City Council and Land for Wildlife, the club is now registered on the Land for Wildlife Program.

Extensive surveying and mapping of the indigenous flora and fauna has been undertaken as part of an overall management plan that includes 'Integrated Pest Management (IPM)' and frugal use of water and fertilisers

Award selection criteria include the demonstration of a commitment to sustainable land management, long term planning, community involvement and overall environmental stewardship of the golf course landscape and Ben Tilley is a very worthy winner.



2000 AGCSA Graduate of the Year Award

Brett Barsby



L-R, Peter Frewin, Brett Barsby

Proudly supported by the Australian Golf Course Superintendents Association, the award recognises academic achievement, career aspirations and ambassadorial skills.

Employed by the Royal Queensland Golf Club as a second year apprentice in 1997, Brett graduated from Grovelly TAFE in 1999 with outstanding results.

Brett has been involved in a number of major projects undertaken by the club over the past three years and to quote Kelly Hyland, Golf Course Superintendent at RQGC, he is "passionate about his chosen profession and is a young person bound for great things in the turf industry".

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PLAYING IT SAFE

By Nigel Douglas

As the populations of our cities and towns continue to grow, safety on and around golf courses is fast becoming one of the hottest issues facing golf course management and maintenance teams. Litigation has already become one of the biggest potential pitfalls for clubs and golfers alike with several legal precedents already in place and if the American legal climate is any indication, Australia is likely to follow a similar path.

A recent report by Jeff Wilks published in the Australian Law Society Journal highlights a number of cases where members of the public had taken action against clubs over safety issues but it seems clear that the greatest danger exists where a club is made

aware of a dangerous situation, but fails to act in an attempt to ease, if not rectify the problem. This danger could include; slippery pathways, dangerous road crossings or risks posed by 'errant golf balls'. Whatever the case, clubs need to at least acknowledge that such situations exist, and be responsible enough to take some action.

TYPES OF HAZARDS

Safety issues can be classified as one of two general types; those that are caused by errant golf balls and those which are not. Of the non-errant ball type, most can be rectified or at least moderated by the use of situation specific measures such as resurfacing a slippery path, relocating a beehive or erecting a warning sign.

The errant ball(s) hazard, is much more difficult to predict and has the potential to result in significant expense and legal headaches. Of these there are two basic varieties; those that effect external parties (typically golf course boundary issues) and those that effect golfer safety (internal issues). Both types hold equal weight when considering design issues, although golfers

tend to be better informed and a little more aware of the dangers and therefore generally more considerate, motivated and proactive in combating them. The "gentleman's game" aspect of golf is definitely a factor, but not one which can be relied upon to withstand the test of time.

In golf course design, there is rarely a decision made that does not in some way require consideration of safety.

One would think that most safety issues could be solved by the simple application of a few basic design rules, such as allowing adequate buffer zones around play areas, and minimising ground based problem areas such as steep grades and slippery surfaces.

In a perfect world this is indeed the case, but in reality the space allocations and terrain that we have to play with are rarely ideal. In the design of a new course, most if not all of these considerations can be incorporated, but it is on our existing golf courses where these safety issues are becoming more and more prevalent.

The progression in technology of golf equipment and the larger physical stature of the average golfer, coupled with 'urban squeeze' around many of our golf courses, means that greater pressure is being put on safety buffers both internally and on golf course boundaries.

The Society of Australian Golf Course Architects has a set of safety guidelines which are generally to be observed. I say generally because the art of golf course design is knowing when to break the rules and as such these are very much case specific.

One of the most obvious applicable guidelines is the space allowance on the slice side of the golf hole. Ideally there should be 60m clearance between the "normal line of play" and the boundary fence on any hole. In addition effort should be made to angle the line of play away from the boundary as far as possible.

In reality, 60 m is a buffer that is rarely achievable on existing courses and as golf course architects we are regularly confronted with such issues which at first glance, often appear to have no answer. There are however a number of saving graces enabling us, in 95% of cases through careful planning, to develop a solution without compromising interest, strategy, challenge or the environment, whilst usually finding more length (if desired) and easing maintenance practices in the process.

1. Golfer Conditioning

Although some would argue, most golfers actually think about a shot before they play it. However rigorous, this thought process will influence the way a golf hole or golf course is played. For example, if a course is generally tight with penalties for missing play zones, members will tend to hit the ball more accurately. On wide courses that have open, forgiving fairways, the exact opposite is usually the case. If such a course has safety issues, tightening the course forces the members to play with greater accuracy which tends to reduce the number of errant balls. Conversely, as with many old courses, "re-shuffling" the layout can redistribute space to the play zones and the buffer zones between holes and along boundaries.

2. Mature Trees

The positioning of important play zones in relation to existing vegetation is also an effective tool in combating errant balls. Bushy areas close to tees can help "smother" errant balls before they travel too far, and any cover on a boundary is of assistance. Intelligent use of trees is an artform in itself and a fine balance must be struck in implementation as well as ongoing maintenance to ensure cover remains as intended.

3. Sliced Balls

Since errant balls predominately come on the slice side, and considering the majority of golfers are right handed, it is amazing

how many courses have the majority of the out of bounds on the right side of many holes. Often these holes are also angled towards the out of bounds! Re-routing and improving the angle of such golf holes can improve dangers and "buy" extra space.

4. Use of Hazards

Rough grassy humps and hollows, bunkers and water can all be strategically placed to serve several purposes. Locating these hazards close to a danger zone will generally force play away from that area, thereby acting as a visual deterrent. When worked into a general risk-reward strategic system, the better players (who are generally less errant and whom understand the strategy) can be challenged to flirt with the hazard to set up an ideal line for the next shot. Using this setup, only the most accurate golfers will endeavor to utilise these spaces close to danger zones.

Regardless of the problem, the key to combating safety issues is communication. Golfers must be made aware of safety concerns where they exist and an open line of communication between the club and nearby residents will ensure that problems can be addressed before they escalate. It is important also to anticipate and plan for safety issues before they arise. This should always be done in consultation with a golf course architect to ensure that all available options are explored thoroughly. These types

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of problems tend not to go away by themselves and in fact, they will only continue to worsen both in frequency of occurrence and in the weight of their outcome unless those in control bring the issues to an early and amicable conclusion.

What follows is a case study designed to illustrate how a few different situations were treated, and accepted by members and residents alike as improvements, if not total cures to safety concerns.

CASE STUDY

Ryde Parramatta Golf Club

The sketch shows a section of the masterplan completed for Ryde Parramatta. Now fully constructed, Ryde Parramatta is situated on a fairly long, narrow piece of land that holds a now comfortable, but by no means spacious layout.

Of particular interest is holes 10 (par 4, 387m), hole 17 (par 3, 170m) and hole 18 (par 5, 525m). Originally, these holes played to similar lengths, in approximately the same locations, but in the opposite direction.

The major benefit of reversing these holes was to remove the danger to the slice side of hole 18 (housing) and the slice side of hole 17 (11th tee). Due to a lack of available land near the 18th hole, the result is by no means a perfect fix, but the

reduction in balls going out of bounds along the western boundary has been quite significant and deemed very successful.

Other design factors which have strengthened the effect of the new layout include;

1. Tee angle on hole 18

Line of play off the tee directs play away from the out of bounds line as much as possible.

2. Use of existing mature trees

Mature trees along the boundary of hole 18 and between holes 10 and 18 assist in strengthening the safety buffers between 18 and the boundary, and holes 10 and 18. Having the occasional sliced ball landing on an adjacent fairway is better than on the land of an irate neighbor.

3. Fairway bunkers

On the right side of landing zone one (hole 18) and on the left side of landing zone two (hole 18) the bunkers act as a visual deterrent to help push general play on to the fairway, and away from adjacent danger zones. In addition, the bunkers at the 2nd landing zone are quite strategic, in that better golfers will endeavor to hit close to them in order to gain the best line to the green, particularly if the pin is cut in the rear section of the green.

4. Use of additional plantings

New planting has been used close to the right side of tees 10 and 11 to assist in "smothering" powerful wood shots which may otherwise find trouble and potentially cause danger on adjacent fairways.

The end result has been 3 holes that are much safer and which have had an injection of interest through the incorporation of more defined doglegs, a water's edge green and some strategic (and protective) bunkering, and planting. No challenge has been lost, much variation has been gained, and there has even been enough space left for a practice chipping ground which was previously not in existence.

Nigel Douglas is a member of the Society of Australian Golf Course Architects and works as a Golf Course Architect with Ross. C. Watson P/L



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Villager 4 Electric	4 Seater	7	\$11,288	\$9,278	\$2,010
Villager 6 Electric	6 Seater	2	\$16,857	\$14,407	\$2,450
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Thatch Control

on a Newly Constructed Bentgrass Putting Green Built to a Modified United States Golf Association Specification

By David C. Nickson

The accumulation of thatch on bentgrass putting greens is a natural and inevitable consequence of turf growth. Thatch accumulation becomes a problem when an excessive thatch layer results in inferior putting surfaces that are uneven due to foot printing, retain excess moisture in wet conditions, become hydrophobic when dry and are poorly aerated.

An extensive search of the literature revealed a clear lack of studies that compared a range of thatch control techniques under conditions relevant to Australian turf managers that, from a disruption of play and resources required perspective, were practical to implement.

The objective of this study was to assess the effectiveness and frequency of commonly used procedures for the control of thatch accumulation on newly constructed, sand-based, bentgrass putting greens.

Results of the experiment indicate that the most effective form of thatch control used in

this study was the application of small quantities of sand topdressing at a frequency of every two to three weeks depending on turf growth rates.

MATERIALS AND METHODS

Commencing in October 1994, a field experiment was run for a period of 17 months to monitor the effects of nine thatch control treatments on a newly constructed bentgrass putting green at The Peninsula Country Golf Club located 40 km south of Melbourne.

The trial was a randomised complete block design with three replicates of the nine treatments on plots measuring 4 x 2 meters each.

The nine treatments applied to the trial green were:

1. Hollow tine and topdress twice per year
2. Scarify and topdress twice per year
3. Mini-tine three times per year
4. Hollow tine and topdress twice per year and apply sand dusting every 2-3 weeks.
5. Scarify and topdress twice per year and apply sand dusting every 2-3 weeks.

6. Hollow tine, scarify and topdress twice per year and apply sand dusting every 2-3 weeks.

7. Apply sand dusting every 2-3 weeks

8. Apply a biological thatch control agent ("Thatch X") according to manufacturer's directions.

9. Control

Sand topdressing was applied after scarifying and hollow tining so all voids were filled and the surface was smooth without excessive sand remaining. Sand dusting was applied every 2-3 weeks at a rate of 1 litre/m² and then brushed into the surface. The first series of treatments that involved scarifying and coring commenced in March 1995 and were then performed every 6 months.

Plots were assessed visually for turf quality, disease and wear on a monthly basis and every six months cores 50mm in diameter were taken to a depth of 150mm and the following were measured: Root Depth, Root Mass, Thatch Thickness, Organic Matter Content. Infiltration Rate and Surface Hardness was measured every six months and 12 months after establishment Shoot Density was measured.

Plate 1. Thatch and topdressing Accumulation at the Conclusion of the Experiment



- | | | |
|---|---|--|
| 1. Treatment 7 - Sand Dusting | 4. Treatment 5 - Scarifying, Topdressing and Sand Dusting | 7. Treatment 8 - Thatch control agent "Thatch X" |
| 2. Treatment 2 - scarifying plus topdressing | 5. Treatment 3 - Minitining | 8. Treatment 1 - Hollow Tine and Topdress |
| 3. Treatment 14 - Hollow Tining, Topdressing and Sand Dusting | 6. Treatment 9 - Control | 9. Treatment 6 - Hollow Tine, Scarify, Topdress and Sand Dusting |



Plate 2. Reduced Disease Severity on Plots Receiving Sand Dusting Treatments



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RESULTS AND DISCUSSION

Results of all assessments are too extensive to cover fully in this article but if further detail is required, it can be obtained by contacting the author.

Visual Assessment of Turf Quality, Disease and Wear Resistance

Once established the sand dusting treatments commenced and improved quality ratings quickly became evident. Those treatments that included dusting had a significantly higher quality rating than those that did not. Treatment 2 incorporated scarifying with topdressing twice per year and the disruption to the surface associated with the scarifying and the extra recovery time required, resulted in the lowest quality rating. The mini-tining treatment (treatment 3) gave some reduction in the incidence of water repellency which slightly improved its quality ranking over treatments 8 and 9.

During February and March 1995, quite severe disease symptoms on many plots became obvious. Visual ratings highlighted a dramatic reduction in disease incidence in all plots receiving the sand dusting treatment (refer to Figure 1 and Plate 2). Personal communication with plant pathologists and a search of the literature failed to provide a definitive explanation for this observation but it would seem likely that it is related to the lower water holding capacity and the absence of significant morning dew formation on the treatments receiving sand dusting.

Because of early observations on the improved resistance to foot printing on all plots receiving sand dusting, it was decided to initiate a more formal approach to assessing the influence of wear with the use of a spiked roller that would provide some simulation of the damage caused to golf greens by spiked golf shoes.

Once again, the most significant differences occurred between plots receiving sand dusting, which had far less damage than all other treatments (refer to Figure 2).

Following close examination of the plugs, it became apparent that the applied sand in combination with thatch accumulation was producing a resilient surface layer that was better able to withstand the forces imposed by traffic in the form of simulated wear and foot traffic (refer to Plate 1). Similar observations have been made in the literature.

Figure 1. Average of Means for Quality After Wear

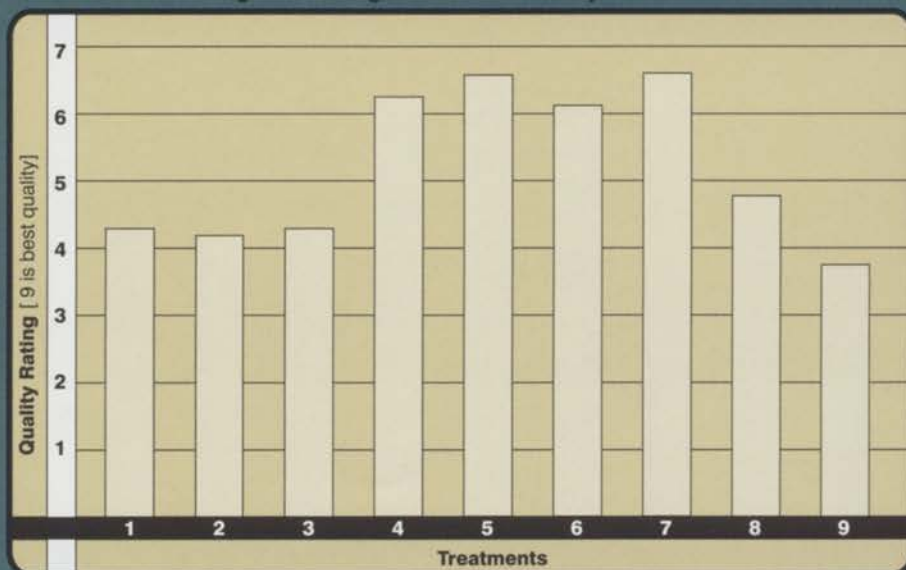


Figure 2. Average of Mean Disease Ratings March 95 - March 96

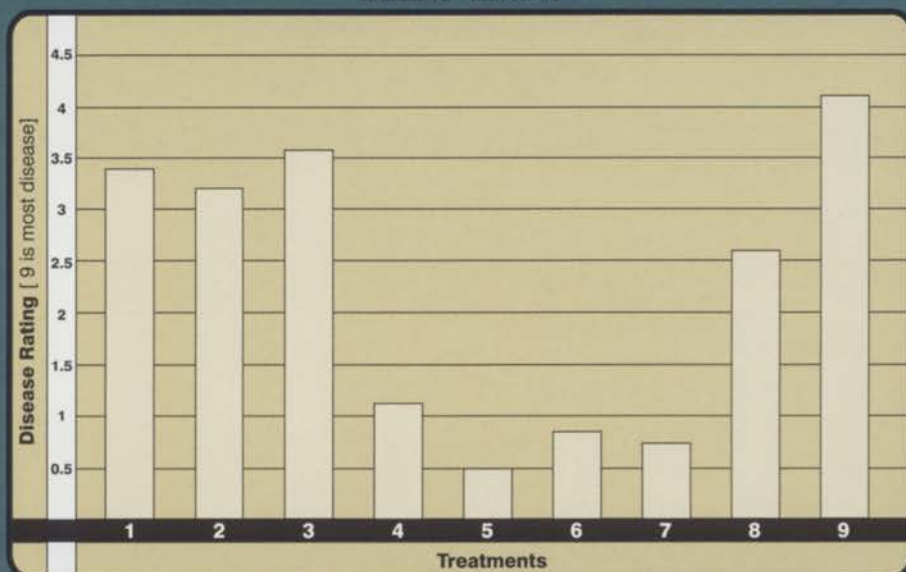
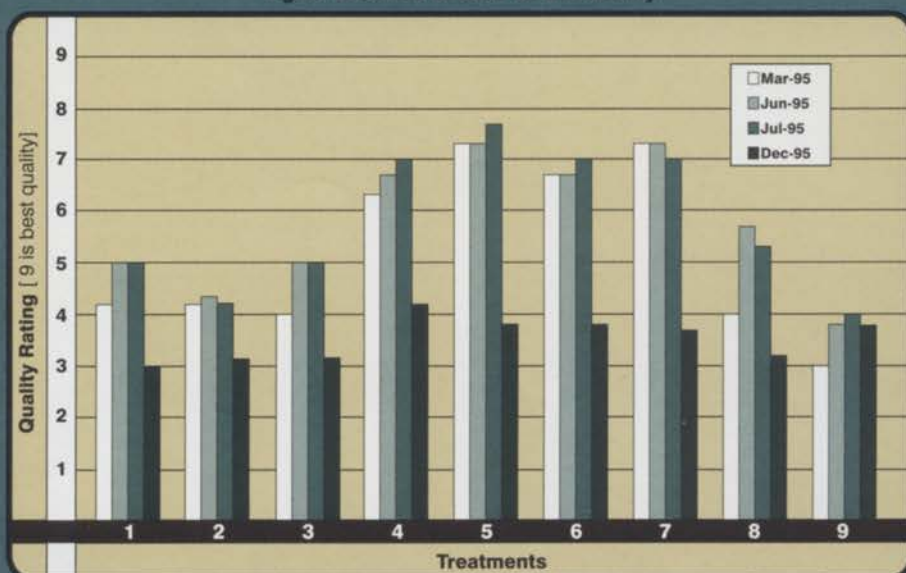


Figure 3. Effects of Wear on Turf Quality



Organic Matter Content

Over the duration of the trial period there was a significant reduction in total organic matter in the thatch layer on treatments 4 – 7 where sand dusting was part of the procedure.

Although the mechanical thatch reduction treatments gave lower total organic matter contents than the mini-tining, Thatch X and control plots, results of this trial indicate that on a schedule normally associated with putting green renovation, scarifying and hollow tining did not reduce the accumulation of thatch (see Plate 1).

Thatch X, a biological product on the turf market claiming to reduce thatch accumulation by increasing microbial breakdown of organic material was ineffective in this trial.

Infiltration Rate

Results collected using the disc permeameter in this trial were generally inconsistent and highly variable. It was impossible therefore to attribute these differences to the various treatments that were applied to the plots. However, there was a distinct reduction in the infiltration rate from March 95 to March 96.



This trend is commonly observed and is attributed in part to root growth and the accumulation of organic matter reducing the porosity of root zone material.

Root Depth and Root Mass

Root depth tended to decrease from the first assessments in March 95 until March 1996 and there were no significant differences between treatments. A much longer trial period is required to build a greater understanding of how thatch reduction

techniques impact on root growth (refer to Figure 4). Although not supported statistically or reinforced by measurement of root organic matter results, there tended to be greater root depth in plots treated with Thatch X.

Surface Hardness

An interesting observation became clear on each occasion when assessments were conducted. The foot printing associated with



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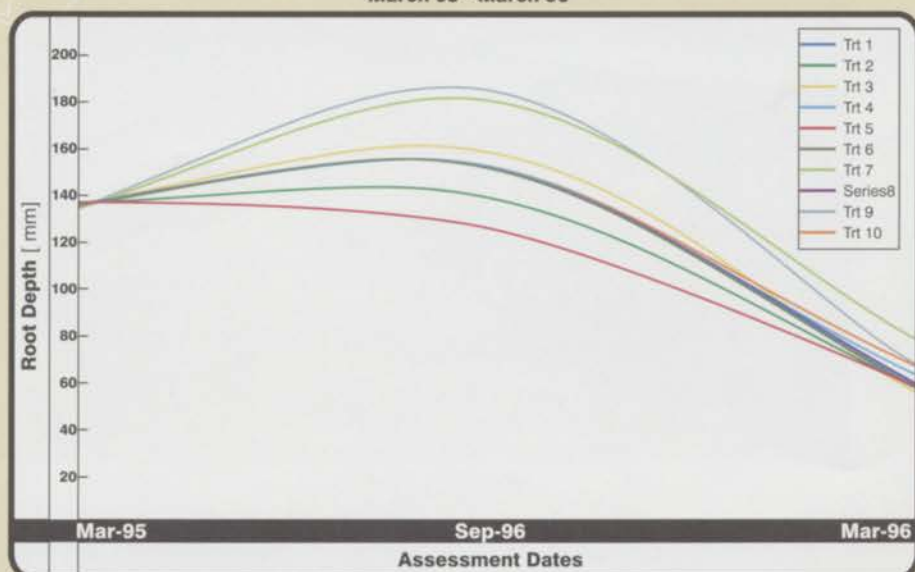
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**Figure 4. Root Depth (mm)
March 95 - March 96**



walking over the plots during assessment was much more pronounced in treatments that did not include dusting. This observation was even more pronounced when associated with rainfall and surface moisture. During irrigation or wet weather in particular, the dusted plots always felt firmer under foot.

Attempts to quantify this observation first using a Penetrometer, then a Clegg Impact Hammer were unsuccessful due to highly variable results.

Concluding Discussion

The results of this trial confirm the necessity for addressing the need for thatch control from the earliest opportunity. It is also important to consider the technique used when establishing a new sand based putting green and not withstanding time and weather

constraints, seeding is the most desirable form of turf establishment with light topdressing started from the earliest opportunity.

Rather than trying to determine the frequency needed for effective thatch reduction, the practical implications of thatch control were assessed in this trial. The results indicated that the procedures usually followed, namely coring and scarifying twice per year or either of these methods performed alone, were not effective for controlling accumulation. Both methods are effective only if performed at frequencies generally not tolerated due to the disruption that it causes to play.

All literature cited for this trial indicated the ineffective reduction of thatch resulting from the process of scarification. The only exception was a NZ study where grooves were created in

the surface measuring 6mm wide and 50mm deep. This experiment confirmed these findings that also highlighted the increase in poa annua spp where scarifying was a part of a thatch reduction process.

All effective treatments in this trial were associated with a regular sand topdressing program applied every two to three weeks. This frequency is determined by the growth rate of the turf, the intention being to apply small quantities of sand to form an even mix of topdressing material with the accumulation of organic matter. The dusting treatment was equally effective regardless of any other treatment associated with it and as well as the direct influence of reducing thatch density, consistently produced superior quality ratings, a smoother and firmer surface, reduced foot-printing, dew formation and disease.

Management considerations are extremely important if a sand dusting program is embraced. The need to continue the program without hesitation is paramount and layering will occur if a 'stop-go' attitude exists. Further, sufficient labor resources and the correct equipment are essential for success. Poor weather, scheduled events or equipment breakdown is likely to result in some layering and for this reason, the combination of sand dusting in combination with coring once or twice per year to break through any layers that may have formed, on the basis of this trial, seem to be the technique of choice.

David Nickson is the Head of Research and Development for Ecogrow and can be contacted by e-mail: NNicksons@aol.com.au



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Green Speed: What do golfers know?



HANCOCK TURFGRASS RESEARCH CENTER

Douglas Karcher,* Thom Nikolai, and Ron Calhoun

After two days of continuous rain during the summer of 1989, I was shoveling sand back onto the face of the green side bunker on the signature 12th hole at Marion C.C. (Marion, Ohio) and wondering why I had chosen golf course maintenance as my first summer job. Meanwhile, a member had hit up to the lush green, which had just been mowed for the first time in three days, and stroked three ugly putts before his ball rested in the cup. "These greens are slow as #%\$^! You need to do something about them!" he shouted, red-faced, before stomping off towards the 13th tee. I remember pondering a couple of thoughts as I continued to repair the bunker: (1) was it the green speed or the three-putt that had caused the golfer's outrage? and (2) I should have bagged groceries that summer.

Over the years those thoughts recurred occasionally, and although I am pretty certain that turf management was the right career choice for me, it is still unclear if the average golfer is truly capable of detecting slight variations in green speed. Golf course superintendents who have shared stories similar to the preceding one, have probably wondered if the golfer's perception of how well the greens are playing is directly related to how well the golfer is. The Michigan State University turfgrass research team addressed this question 1999 by designing a Green Speed Perception Study. This controlled study, the first of its kind, assessed the golfer's ability to determine the relative speeds of several different putting greens.

BACKGROUND INFORMATION

Eddie Stimpson introduced the stimp meter in 1937. Its intended use was to provide uniformity in speed from green to green on individual golf courses. Mr. Stimpson stated, "To the greenskeeper who is harassed by two groups of members, half of whom want the greens faster and half of whom want them slower, it would be of some comfort to know that he was maintaining the standard conditions as measured by the Stimp Meter..." (Stimpson, 1937). In the 1970's, improved mowing technology allowed for the manufacturing of thinner bedknives resulting in tighter cutting heights. Also during this decade, the United States Golf Association redesigned and gave a stimp meter to each of its member clubs (Zontek, 1989). Since then, golfers have become more aware of green speeds, and subsequently, have increased their demands for faster green speeds and uniformity of green speed from golf course to golf course. These unrealistic demands expedited even tighter mowing heights and management practices such as double cutting, rolling and decreased fertility, resulting in more stress on golf course superintendents and their putting surfaces.

Is it worth subjecting a putting green to additional stresses in order to increase its stimp meter speed from 10 to 10.5 feet? Under those conditions, will a golfer really be able to perceive an increase in ball roll during play? How much of a change in green speed must actually occur before the average golfer perceives it? The answers to these questions contain essential information that may enable golf course superintendents to manage putting greens during within a range of stimp meter speeds that: (1) minimize turf stress throughout the growing season and (2)

go undetected by the average golfer. The Green Speed Perception Study was designed to address the above questions.

EXPERIMENTAL METHODS

In the spring of 1999, an experimental area was established on a 'Penncross' creeping bentgrass green at the Hancock Turfgrass Research Center at Michigan State University. The area was divided into several pairs of greens, with the greens in each pair managed so that there was either a 6 or 12 inch difference in stimp meter speed between them. Differences in speed were created by rolling and/or double cutting the green designated to be faster. In addition, pairs of greens were mowed at either a 3/16, 5/32, or 1/8 inch height, which created differences across a range of stimp meter speeds. Individual greens measured approximately 3 by 15 feet. Because of variable slope on the greens mowed at a 1/8 inch height, we were unable to produce pairs of greens differing in green speed by 12 inches at that mowing height. Instead, pairs of greens mowed at a 1/8 inch height ended up with differences in green speed of 3, 6, or 30 inches.

Turfgrass industry professionals attending research field days at the Hancock Turfgrass Research Center volunteered to participate in the Green Speed Perception Study. Cups were cut approximately three feet from one end of each green and putting areas were designated at one foot from the opposite end of the green. Over thirty golfers, ranging in handicap from nil to 30+, attempted three putts on each green within a pair and were immediately asked to select the faster green. Each golfer putted on all greens in the experiment. Since no correlations were present between golfer experience or

handicap and the ability to detect the faster green, the following results were averaged across all participants of the study.

RESULTS AND DISCUSSION

For any given pair of greens, if no golfer was able to detect the faster green while putting, we would still expect 50% of the golfers to choose the faster green, purely from guessing. Therefore, percentages of 50% or less reveal an inability of the golfers to correctly choose the faster green. From a statistical point of view, when greater than 70% of the golfers correctly choose the faster green, we accept that they truly possess the ability to detect the faster green while putting. The percentages of golfers who correctly chose the faster greens in our study are summarized in Figures 1 and 2.

Regardless of mowing height, golfers were not able to detect the faster green when the difference in green speed was 6 inches or less. Therefore, increasing putting green speeds by 6 inches or less may go unnoticed by the golfing clientele and may cause undue stress to the turf, especially during mid-summer months.

Conversely, the ability of golfers to detect 12 inch differences in speed between the greens depended on the mowing height. At a relatively high mowing height (3/16 inch), 81% of the golfers correctly chose the faster green, while only 68% chose correctly at a lower mowing height (5/32 inch). Unfortunately, we were unable to detect if this trend continued at the 1/8 inch mowing height since we were unable to produce a pair of greens at this mowing height that had a 12 inch difference in speed. However, it is quite apparent that golfers can detect a variation in green speed of 30 inches at the 1/8 inch mowing height as 97% of the golfers correctly chose the faster green in that case.

From these experiments it is evident that a golfer's ability to detect variations in green speed depends not only on the difference in green speeds, but also the magnitude of the original green speed. The average golfer seems unable to detect a 6 inch variation in green speed, regardless of the original speed. However, a variation of 12 inches can be detected when the original green speed is relatively slow, but is less likely to be detected as the original green speed increases. The golfer's sporadic ability to detect variations in green speed while putting is probably the result of the inherent variation in the putting stroke, and the resultant variation in ball roll caused by slightly off-center putts.

What does all of this mean? Well, if you find yourself being reprimanded for having slow greens (and you happen to know for a fact that they are only a few inches slower than normal) just nod and sympathize with the frustrated golfer who just three-putted. After all, he will probably play well next



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Figure 1. Percentage of Golfers Correctly Choosing the Faster Green

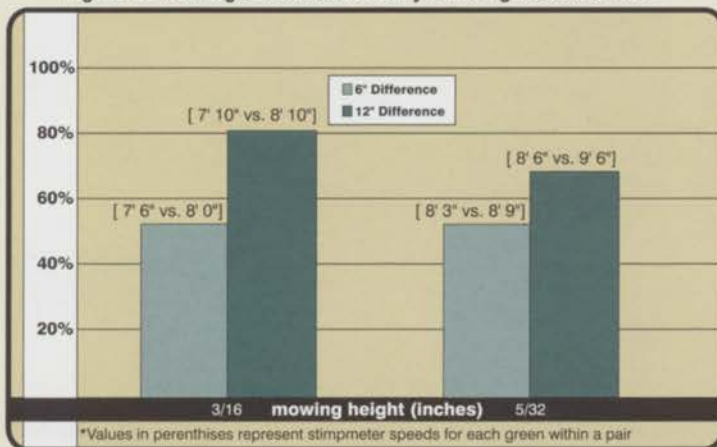


Figure 2. Percentage of Golfers Correctly Choosing the Faster Green



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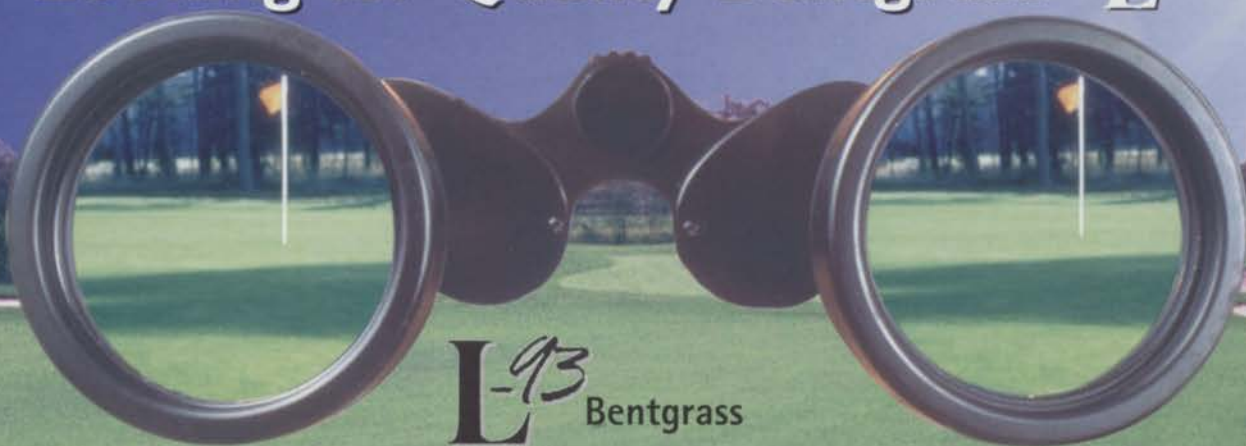
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Complete Fert 8:2:6

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RESEARCH PROJECTS AND TRIAL SITES

The fostering of turf research is the principal objective in the establishment of AGCSATech. The establishment of well maintained research facilities is a critical aspect of undertaking any research and we are pleased to announce that we have secured trial sites in Queensland and Victoria.

Under the expert care of Stephen Marsden and Martin Greenwood the trial sites will be located at the Lakelands Golf Club in

Queensland and at Kingston Heath Golf Club in Victoria. Both sites are ideal and turf plots will be established this spring.

Three research proposals are currently under consideration:

1. Evaluation of local bentgrass ecotypes with imported varieties.
2. Comparison of maintenance requirements between the new bentgrass varieties and *Poa annua* swards
3. Couchgrass collection from existing greens in Queensland to evaluate the local ecotypes that have 'reverted' from the original 328 and Tifdwarf varieties.

A broad selection of turf species and varieties will be established at both sites, and in addition to turf research, the plots will be used to test and evaluate a range of turf products before they are released on to market.



Trial site at Lakelands Golf Club in Queensland

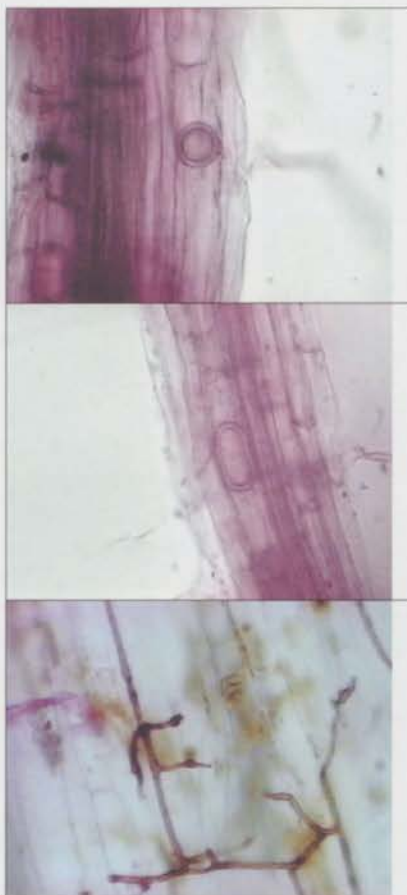
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Images like these are an excellent diagnostic tool and become valuable records.

ENVIRONMENTAL MANAGEMENT PLANS (EMP)

A key service offered by AGCSATech is the preparation of Environmental Management Plans (EMP) for golf courses. It is increasingly important for golf courses to benchmark conditions for future monitoring and reference and EMP's are particularly valuable where a golf course is situated in an environmentally sensitive area or where the use of recycled waste water makes it essential to monitor soil and water conditions.

Prepared in accordance with principals developed in the "Environmental Strategy for Australian Golf Courses", an EMP provides a comprehensive, integrated management plan that combines environmental and golfing objectives.

AGCSATech is currently undertaking the preparation of EMP's at Port Kembla G. C., Glenelg G. C. and Barwon Heads G. C. Details will follow in future editions of 'AGCSATech Update'.



Sand Research *Shaping Up*

by Gary W. Beehag

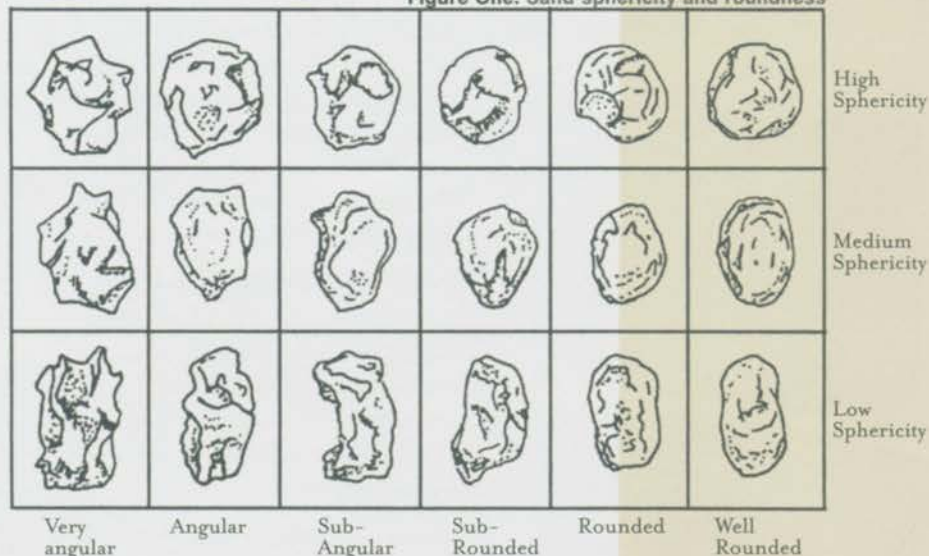
Ever examined different sand types using a hand lens or microscope? If so, you may have observed some organic material, partial coating of the sand grains by clay particles or even the presence of secondary minerals, like muscovite. However, the most obvious feature would have been the variation between the sand grains in their colour, size and shape.

Various physical indices like particle size distribution, hydraulic conductivity and bulk density have been developed to predict the performance of sportsturf mixtures. Sand grain shape has not been extensively studied but research currently underway will result in a greater understanding about the interaction of sands that vary in shape and size.

The origin and formation of sand grains

Originating from rocks composed of either calcium carbonate (limestone), aluminum silicate (feldspar) or silicon dioxide (quartz), sand is one of the most common materials on earth. Soil scientists classify sand as sedimentary particles ranging in diameter from 0.02 to 2.00 millimeters but to most people the word sand is normally taken to mean quartz sand. Quartz sands are extracted from either floodplain deposits adjacent to freshwater rivers (water-borne or fluvial sands) or dredged marine and estuarine deposits from coastal dunes and due to greater resistance against weathering, quartz sands are used for construction purposes.

Figure One: Sand sphericity and roundness



The Kurnell peninsula (Sydney) and Stockton Bight (Newcastle) have long been important extraction sites of dune sand for the concrete industry. Other sources of sand around Sydney have been the soft (friable) weathered sandstone from the Southern Highlands, at Somersby and on the Newnes Plateau. Sands from desert dunes (wind-blown or aeolian sands) have been extracted from inland locations.

Sand shape is governed by material composition, age, and the distance and mechanism by which it is transported. Younger sands tend to be irregular and angular in shape. Bunker sand produced artificially from the crushing of friable sandstone is very angular or "sharp" to the feel. Early studies have shown that water-borne deposition causes the downstream decrease in grain size with a general increase in their roundness. Rivers are known to deposit grains that are of a similar size close together and as they are deposited further downstream, particles become smaller and more rounded. Considered to be the result of chemical action, many rivers contain glossy, highly polished sand grains.

Deserts are known to have a wide assortment of grain sizes and tend to be rounded. However, Folk (1987), was quite "puzzled" by

his observation that sands from the Simpson Desert were mostly sub-angular. Goudie and Watson (1981) after studying numerous sand grains collected from deserts from many countries concluded that most desert quartz sands were sub-rounded in shape but the smaller grains more angular. Many desert sands are also known to possess opaque, frosted surfaces. Wind-blown, coastal dune sands typically produce particles of uniform grading and are more rounded. By comparison, sands produced by glacial action have sharp edges. In his discussion paper Kuenen (1960) states that in the absence of evidence to the contrary it appears that wind is the principal agent in the rounding of sand grains. Wind is considered to have a greater influence in the rounding of sand grains because of (1) greater velocity of wind-blown sands (2) greater distances achieved during transport of grains (3) absence of a protective film of water.

Categorizing sand shape

Wadell (1932) was the first person to demonstrate that particle shape was actually comprised of two independent geometric concepts. Geologists now define two indices termed Roundness and Sphericity to quantitatively describe the shape of sedimentary particles.

Roundness (or smoothness) is a measure of the angularity of the corners regardless of particle shape. Sphericity is a measure of the degree to which the shape of a particle approaches that of a sphere. Several methods are used but normally photomicrographs of actual sand grains are compared for roundness using a Krumbein roundness chart and for their sphericity using the Riley sphericity index (Krumbein and Sloss 1951). Whilst the theoretical maximum value of sphericity is 1.0 (a perfect sphere) most grains have a sphericity value of 0.7. The larger sand grains are, the more rounded they tend to be. As a result, coarse sands, particularly if the sand grain size is uniform, have a tendency to be unstable.

Another laboratory procedure used to assess particle shape involves measuring the behavior of a mass of soil particles, called the Dense Soil Angle of Repose or DSAR. The DSAR measures "surface roughness" of particles which represents the combined effects of both sphericity and roundness (Vepraskas and Cassel, 1987). In the field, angle of repose of sands can be observed by noting the angle from the horizontal that various sands produce when on the ground. Uniformly graded,

rounded sands produce a much lower angle compared to widely graded, angular sands. Similarly, if the angle of a bunker face exceeds that of the angle of repose of the bunker sand, shifting of the sands occurs.

Significance of current research about the influence of sand shape

Previous work has shown that particle size, sphericity, roundness and surface roughness all affect the packing and compressibility of sands. Apart from with bunker sands, particle shape has not previously been considered an important selection criteria in sportsturf applications.

In The Golf Journal (1974), the United States Golf Association (USGA) first stated that an angular shape is preferred for bunker sands. Work conducted in the early 1970's (Adams, et. al. 1971) acknowledged the interpacking properties of rounded and sub-angular sands finding that rounded sands readily adopt their closest packing whilst angular sands interlock. Later work conducted by the Sports Turf Research Institute (STRI) at Bingley (Baker, 1983; 1990; Zhang and Baker, 1999) demonstrated the resultant effects of sands of varying particle grading and grain shape on

the physical properties of rootzones. This work indicated that less pore space was associated with more rounded and less spherical sand grains.

Acknowledging the lack of detailed scientific information concerning the interaction of sand grain shape on their putting green specifications the USGA in 1997 commenced funding of a research program at Pennsylvania State University (USA). Under the guidance of Dr. Charles Mancino, the primary objective of the work is to study the combined effects various sand shapes in the presence of organic matter have on the physical properties of the USGA specifications. Preliminary results indicate that with increasing amounts of organic matter, the round sands show a greater decrease in bulk density than do the angular sands but that total porosity increased because of an increase in capillary porosity (Mancino, et. al. 1997). One initial suggestion has been that the addition of amendments to round sands was more likely to lower bulk density and cause less of an increase in capillary porosity than would be the case with an angular sand. Further work will elucidate

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***As seen at the Millenium Turfgrass Conference Melbourne, June 2000**



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Pictured: 400Lt. Side Mount Turf Sprayer*

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Microscopic images of sand grains indicating variability in sphericity and roundness. (try matching them up with the chart on page 36).

the interactions of the combinations of sand shape, sand size and organic matter.

For sportsturf applications, sand selection is primarily driven by availability. In Australia sands are extracted from numerous quarries resulting in sands of varying grain shape. Based on previous work funded by the Australian Golf Union (AGU) quartz sands collected from eighteen locations around Australia and from St. Andrews Old Course (Scotland) clearly showed considerable variation in the shape of the predominate fractions from sub-angular to sub-rounded (Beehag, et. al 1994).

Off-site mixing of more than one sand type is commonplace in order to fulfill a specification nominated by landscape architect or turfgrass consultant, thus, research aimed at understanding the interactions between sands of different size and shape will be important. Numerous Australian golf course superintendents have reported surface instability of golf greens built with sands of uniform grading with rounded particles. Golf course superintendents will soon be able to

make an informed decision about what type and quantity of an amendment is required to improve the performance of unstable sands. Appropriate selection of sand types for sand slitting of golf course fairways and playing fields will be also be aided by the results of current research.

The practice among bowling greenkeepers of rotary hoeing coarse sand into an existing green constructed with sandy loam soil, in an attempt to create greater porosity, remains in question unless the correct sand type and amount is used. Work by Spomer (1997) has already shown that there is a minimum amount of sand required called the "threshold proportion" an amount below which no additional porosity is created. Increased resistance to compaction when mixing small additions of angular particles to coarser, smooth particles does occur, in fact, bulk densities as high as 1.9g/cm³ have been reported for some sandy loam soils.

Ultimately, the information gained from this research work will determine which sand shape can deliver an appropriate combination



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of stability and compaction resistance. This work will have significant ramifications in the future for suppliers of sportsturf construction sands, turfgrass consultants and sportsturf managers, especially when blending organic matter with more than one sand type that varies particle shape and size.

Gary Beehag is the Sportsturf Products Manager for M. Collins & Sons (Contractors) Pty Ltd (Sydney)

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Links Golf - The Inside Story

By Paul Daley

Links Land is sacred and ancient - and the golf played on this precious terrain is a time-honored and noble sport. Links Golf - The Inside Story captures and explains the passion surrounding the playing of this game. Exploring the history, characteristics and likely future of oinks golf, this book takes the reader on a fascinating journey around the many links courses in Great Britain and Ireland.

'This truly is the inside story of links golf. Encompassing the history, tradition, and images of the great links, this book is a worthy traveling companion, and guide, on your golfing journey.' - Ian Baker Finch

From the world-famous St Andrews, Ballybunion and Royal St Georges to the lesser known courses of Aberdovey and Machrie, Paul Daley has conferred with the people behind the scenes and had brought to light the unique features of links golf. The thrill of braving the elements, cunning bunkers and natural hazards such as the roaming sheep on Brora links, are just part of the links

experience recounted here with great enjoyment. Entertaining rounds with unimpressed caddies and superintendents' personal missions to keep their fairways in true links condition are also recorded.

'Links are the soul of the game - the greatest places on which to play, and they teach us much about the way the game ought to be. So does this book.' Michael Clayton

Yet despite the pleasures of the game, links golf is in very real danger. As the golfing fraternity awakens to its rich contribution to the world of golf, there are stakeholders who understand only too well that many links exist on the endangered list. Nature does out a terrific beating to these seaside courses and due to coastal erosion links land must be carefully preserved against advancing oceans and elemental attacks. In this exposé, leaders in the golfing world have been called upon for their opinions on links fragility and management.

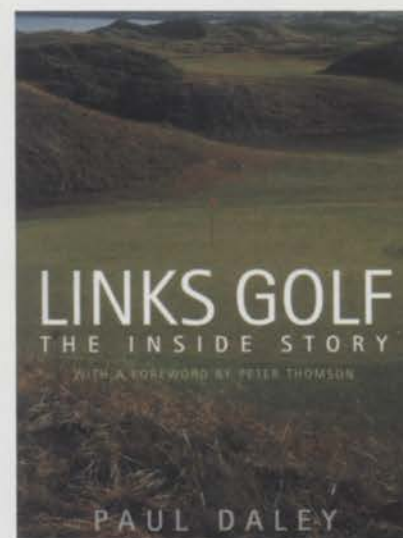
This is an authoritative and enthralling read for all golf enthusiasts.

Author Details

Paul Daley has an abiding respect for the origins of golf and embarks upon regular links pilgrimages to Great Britain and

Ireland. When asked of his biggest golfing thrill he answers, 'touring the Old Course at St Andrews in seventy strokes.' Paul is a member of Huntingdale and The National Golf Club in Melbourne, Australia, has played pennant and remains a single-figured handicap golfer. Apart from playing the game, he harbors a special interest in golf course architecture.

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Rain Bird

From July 1st 2000, Rain Bird Asia Pacific has formed a sales team dedicated to servicing the golf sector.

The team is headed by Wayne Brown, Regional Manager Asia Pacific. Based in Brisbane, Wayne has been with Rain Bird for 5 years.

Brad Fawcett, Golf Area Manager for Vic, SA, WA and NZ, having spent 3 years with Rain Bird in the Middle East, has gained extensive industry experience.

The new team also includes David Paterson who is based in Singapore and services South East Asia and China and newly appointed Greg Smith who will begin with the company in September as Golf Sales Manager in NSW. Greg has been the Superintendent at Pambula-Merimbula G C for the last 13 years and brings a wealth of industry experience to the NSW team.

This experienced and focused team will allow Rain Bird to continue its growth and success throughout the region. Providing increased service and support in conjunction with Rain One, the Rain Bird distributor for Rain Bird Golf products.

Rain One's Golf team is headed by Greg Powick in Melbourne as National Sales Manager and Kim Dean as General

Manager of Rain One Australia. Both have extensive experience in the Australian Golf Market.

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Focus Group Meeting Provides First Step in the Development of an Eco-Efficiency Manual and Training Course

The AGCSA in partnership with the QGCSA has received funding from the Queensland Environment Protection Agency (QEPA) to produce an Eco-Efficiency manual and training course for Queensland golf courses. This is an initiative of the QEPA to ensure that golf course activities meet environmental best practice standards.

The objective of this project is to bring together the most up-to-date information on the best management practices that will achieve improved environmental management. A user-friendly manual will be developed that details guidelines for best practice environmental management systems. The contents of the manual will be extended via a training course that will be recognised as an AGCSA accredited event. AGCSA members in attendance will receive continuing education points towards the maintenance of their accredited status.

Step one of the project was a focus group meeting held at Sanctuary Cove Golf Course on the 9th of July. The meeting was run by Tanya Lindenberg, Principal Environmental Officer for the Queensland Environmental

Protection Agency (QEPA) and the AGCSA's John Neylan. The objective of the focus group meeting was a member survey that will result in the production of an 'issues paper'.

Stage two involves the research and preparation of a "user-friendly" manual. Stage three will be the development and delivery of a training course based on the manual and the final stage will result in the extension of

principals developed in the manual to the wider turf community by way of Australian Turfgrass Management magazine and other associated publications.

Further information on this project can be obtained by visiting the AGCSA web site at: www.agcsa.com.au



Tanya Lindenberg with QGCSA members



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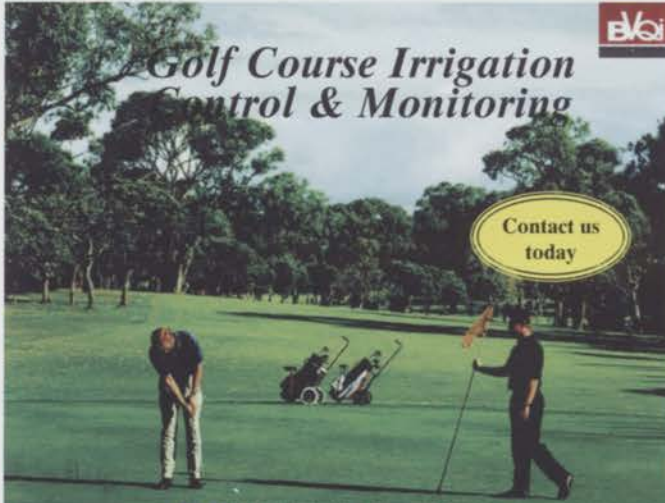
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The Search For New Greens Grasses In The Tropics

The U.S. selection Tifgreen and Tifdwarf have established themselves firmly as varieties of choice for golf greens in Queensland for a number of years. Tifdwarf is generally used on resort courses because it has a higher maintenance requirement, and Tifgreen is the variety of choice for lower budget courses, and shows very little genetic instability in the form of reversion. In tropical parts of the state, long periods of wet, humid and cloudy conditions are very testing of couches. Over the past 4-5 years, Tifgreen in particular has reacted poorly to the weather conditions, fungal diseases have further weakened the plant, and months of very cloudy weather have not allowed recovery. Very frustrated Greenkeepers are spending as much time trying to convince committees of this as they are trying to treat the problem.

Plant breeding and genetic manipulation will no doubt provide us with great new varieties in time but in the short term, an opportunity exists to collect and evaluate ecotypes which are known to exist, most of which can be found on golf greens in the tropics. These occur as patches of different colour or texture than the Tif varieties, and some of them are apparently unaffected by unfavorable environmental conditions and become brilliant in comparison when for instance Tifgreen loses vigour, colour and becomes diseased. Their genetic origins are unknown; DNA testing will no doubt give us some answers.

Over the past four years or so Terry Anderlini from Tropical Lawns has collected a number of these from different golf courses and evaluated them amongst our on farm collection, and kept checks their origin.

According to Terri, two varieties have shown extremely good characteristics.

Mountain green

Named and selected by Townsville Greenkeeper Barry McDonagh, a number of years ago, this variety has existed on golf greens in Townsville, and then spread to Atherton, Tully and ElArish with Tifgreen when distributed. This variety is very dark green, small leafed with a coarser stolon than the Tifs, but have a very much stronger

rhizome system, has great recovery properties, great disease resistance and performs brilliantly in the low light conditions of very wet humid areas like ElArish and Tully. Because of its coarser stolon and mowing heights of 5-6mm, Terri believes its best situation, is golf tees where recovery will be very good. ElArish golf course has three greens in Mountain green, including one in a shaded windless pocket, and its performance is amazing.

Turf X

Another variety, which has come to notice, is a selection taken from greens 4 and 15 at Novotel golf course, Palm Cove. Patches of this variety are much tighter and darker than normal Tifgreen, and remain unaffected by weather and disease pressures when Tifgreen folds. Propagation on Terri's farm shows it to have finer leaves and stolons than the Tif grasses, and has all the desirable features of a golf green turf.

The selection process used by Terry will be similar in style to that being presently administered by AGCSATech, the AGCSA's new research division. AGCSATech is presently rounding off preparations for a National Couchgrass and National Bentgrass Collection, both set to start this spring. Further information on these projects can be obtained by phoning John Neylan at the AGCSA office on (03) 9886 6200.



Terry Anderlini with Kevin Foster

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Colonial Stadium Casts Shadow on Turf Management

Melbourne's newest all purpose venue, Colonial Stadium hit the headlines again in late June with the Melbourne media pack describing the venue as a 'beach', and resembling the infamous "Death Valley". The venue has faced constant criticism since it first opened, over issues ranging from ticketing to ownership rights. Maintaining a turf cover on Colonial was always going to be a difficult task through a Melbourne winter, with heavy wear and severe shading. The surface became yet another target for attacks against the venue when the round 14 clash between Hawthorn and Saint Kilda was played on a substandard surface.

In winning the contract for the design, construction and maintenance of the surface, Melbourne based company StrathAyr engaged their wear management system, aptly called ShAyr the WAyr. This system involves replacing blocks of worn turf with turf blocks from either off-site or from less worn areas on the ground.

Generally speaking this concept is sound and has proven itself in less extensive applications on other major sporting venues. StrathAyr won the contract on the basis that this system would deliver a quality surface throughout Melbourne's winter. However, for reasons that remain unknown, prior to the clash between St. Kilda and Hawthorn, the poor turf cover on the eastern side of Colonial was replaced with Kentucky Bluegrass sod, grown on a heavy soil type. This area was then topdressed, resulting in the "beach" appearance, quoted by the Melbourne media, which were by this time calling for blood. Within a week, the entire troubled area had been removed and replaced with the StrathAyr SquAyr's and over the ensuing weeks the media's focus was diverted to the players and not the venue itself. The overall impact of the difficulties at Colonial were felt by the entire industry. Was the industry capable of providing solutions to the problems being experienced at Colonial?

We all know the answer is yes, but in the rush to find a quick fix and a scapegoat, the industry suffered. Who ultimately decided to lay the Kentucky bluegrass sod and topdress it with sand immediately prior to an AFL match is unknown, and to some extent is irrelevant. What does matter is what the Colonial Stadium experience demonstrates.

It clearly shows that the general public, and the media as conduits of information, do not, (and should not be expected to) understand the difficulties of providing turf surfaces. It also further demonstrates that Stadium managers and developers continue to rank the playing surface as a low priority during the development planning process. Also, it reminds us that there is a fine balance to achieve between marketing our expertise to such an extent that it provides unreal expectations.

Wouldn't the turf industry be better served if all the facts regarding the Colonial Stadium episode be made public so that the industry as a whole can learn from the experience?

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Colonial Stadium, 12:30pm. Note shade pattern.



Olympic Turf Challenge

The 2000 Olympic Games in Sydney are providing a challenge to the skills and ingenuity of Australian turf managers. Several of the Olympic venues, particularly those used for soccer will be used for Rugby and Australian Rules Football up until a few weeks out from the tournament. For example, the Melbourne Cricket Ground will have just days between the AFL Grand Final and the first Olympic soccer game.

Because of the tight time frames and the exacting requirements set by FIFA for soccer pitches, some venues are preparing for a complete surface replacement. The MCG will resurface after the Grand Final, the Sydney Football Stadium and Bruce Stadium are likely to be doing the same. Stadium Australia faces the challenge of being re-surfaced immediately after the Olympic Opening Ceremony to ensure the surface is in pristine condition for

the field events during the athletics competition.

One of the most impressive complexes is the Baseball/Softball venue at Aquilina Reserve. As a dedicated venue, there has been sufficient time to groom and prepare a high quality surface. This venue has already been put to the test during the Continental Cup (baseball) and came through with rave reviews.

Another multi-use facility is the Sydney Showgrounds main arena, which is to be used for Baseball and the Modern Pentathlon. The Easter Show activities caused

considerable damage to the surface, which has necessitated re-leveling and turfing.

The moment of truth for many turf managers is almost here. To see how they fared, the next edition of Australian Turfgrass Management will profile a number of these massive projects.



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IMG moves into Golf Course Management in Australia.

A global leader in the field of sports management and marketing, IMG has established a Golf Course Management division in Australia. For many years, IMG has managed golf properties and sports academies overseas, including the Bali Nirwana Resort, the Callaway Golf Centre in Las Vegas, and the management of David Leadbetter Golf Academies. With this background, it was seen as a natural extension to establish the division in Australia, and James Cooper was appointed to oversee its development.

As Australian Operations Manager, Cooper has the huge challenge of developing all aspects of a division that specialises in the management and marketing of golf facilities as well as IMG's golf course design division.

Prior to joining IMG in March this year, James served as Golf Club Manager at the prestigious Hyatt Regency Coolumb, where he had been based since 1997. Prior to his move to the Sunshine Coast he was the Country Club Manager at Novotel Palm Cove Resort in Tropical North Queensland.

Cooper said he was excited at the prospect of developing a new division in a company such as IMG.

"I am confident that with the right approach, IMG Golf Course Management can be a major force in the Australian golf industry in the very near future," said Cooper. "As a large international, we are able to draw on experience from around the world and create some unique synergies which greatly benefit all facets of an IMG managed facility," he said.

IMG has already signed two Victorian courses – The Dunes Golf Links and Moonah Links – and has aspirations to add to this with courses in every State. "We have set ourselves some ambitious growth targets, with a particular type of course in mind," said Cooper. "We intend to set a high standard at all of our facilities, giving them a distinct feel. This is not achieved through IMG branding, but through meticulous grooming and stringent maintenance programs to ensure we consistently present a superior golf course. This combined with a level of service and a

quality of experience so that the golfer will come away knowing that he or she has played at an IMG managed facility and will want to come back," he said.

The Dunes Golf Links on Victoria's Mornington Peninsula was the first course to

be added to IMG's course portfolio. This 27-hole facility has been rated No. 1 public access course in Victoria, a tremendous accolade given its relative short history.

The Moonah Links project is also on the Mornington Peninsula and is to become the new home of the AGU. "We are extremely excited about the Moonah Links project as we believe it will be the show case facility for Australian Golf," said Cooper.

An important ingredient to the success of IMG in its golf course management division is its philosophy on course maintenance and presentation. Cooper said "We will strive daily to ensure golfers have a totally enjoyable experience at all of our facilities, an important part of that is the presentation of the Golf Course.

Cooper believes that to consistently achieve the high quality of presentation required, IMG needs to acquire the services of highly skilled and experienced superintendents. "We have the services of one of Australia's most experienced superintendents, Phillip Knight at our Nirwana Bali Golf Course. Phillip will play an important part of our growth into Australia as our regional Golf Course Superintendent. This will provide a strong support base for the superintendents of our properties in this country, making helpful and important technical support only a phone call away.

James Cooper is based in Melbourne and can be contacted at IMG on (03) 9639 2333.



The Dunes Golf Links



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ALL CLEAR!

When it comes to preserving turf quality, installing the biggest rugby goal posts in the southern hemisphere (800 kg and 30m high) will always pose a challenge. Having seen the goal posts being installed with a 7.5-ton truck and a 10-ton crane, the potential for turf and subsurface damage was far too high. Given the busy schedule for the early spring, which consisted of 6 alternate weeks of rugby and soccer, we needed to come up with a more efficient way of installing and removing these posts.

Installing the posts this way was very much dependent on weather and took approximately 1 truck, 1 crane, 5 men, 30 sheets of plywood and about 4 hours. What we needed was a method of changing goal posts quickly with the least amount of risk to the playing surface regardless of the under-foot conditions.

The obvious choice was a helicopter! Whether or not it was possible from a logistical and cost point of view were questions that needed researching. I approached local helicopter operators SKYWORK who seemed confident that the task could be achieved within our budget and sometimes limited time frames (overnight). The main concern for the pilot was the weight of each post. At approximately 800kgs (plus friction), the chopper was looking at a lift of about 1000kgs to get the posts out of the ground. This was at the very edge of the helicopters capability.

The inaugural lift involved someone standing on the helicopter skids trying to lasso the top

of the post and needless to say our methods have been refined since then.

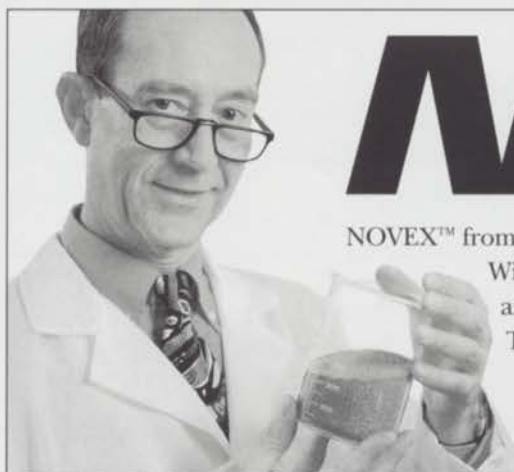
After the posts were removed the team from SKYWORK went through various possibilities to make the job more efficient. They came up with the idea of attaching a cable two-thirds of the way up the post, giving the posts a fixed lifting point. This is a 10mm stainless steel cable 15 meters in length, permanently attached to the post with a D shackle at both ends. A chain attached to the helicopter then attaches to the unfixed end of the stainless strop, making the total length from helicopter to the base of the posts approximately 50 metres.

After about 15 successful lifts in the first year the initial costs in the set-up are beginning to pay off. The operation now takes 30 minutes of working time, 1 pilot, 1 ground staff in radio contact with pilot giving him guide lines on the height of post from ground etc, myself and an assistant to control and guide the base of the post to either the in-ground sleeve or brackets at end of the field used for storage.

Having the infrastructure in place I can now confidently take on the challenges of maintaining a multi-purpose arena knowing that we can remove/install the rugby posts within hours of an event finishing, regardless of the ground conditions. Thus making the window of opportunity larger for the removal of one codes lines and logos and applying the others, which in itself has its own time and weather limitations especially when you have to change codes within 24 hours.

With the high demands currently placed on multi event stadia, lateral thinking has to be a skill utilized by the modern day turf manager.

By Nick Redmond
Turf Manager, North Harbour Stadium
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Toro Australia has announced the introduction of the new Workman mid-duty utility vehicle, a 16 hp, versatile, multi-purpose unit providing extraordinary traction and ride.

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President's Pen

After all the planning and organising it is hard to believe that the Millennium Turfgrass Conference has been and gone. The week was a huge success for all those involved. The feedback I have received from delegates, sponsors and exhibitors has been excellent. Although I took the opportunity at the event to thank all concerned, it would be remiss of me not to once again thank the organising committee for their input. The Association staff also deserves special mention for the extra hours and effort that they contributed in the lead up to and during the event.

The Conference also saw the official launch of AGCSATech. We are now "ready willing and able" to serve the membership with this new initiative for all those who were not at the AGM this new service was the focus of discussion and I feel as a Board we were able to answer all questions and concerns that were raised. As an elected member of the Board I was delighted by the united stand that was made in relation to AGCSATech. As a

representative of the members I am proud to put in place sections of the Association business plan that were conceived and planned many years ago. The eventual success of AGCSATech and what it can provide in the future will be determined by the support of the membership. If you are in the need of the services that your Association can now provide, give us a go - I know you will be pleased with the results.

Another member benefit gaining momentum within the organisation is the employment service. With the constant stream of situations vacant that have come across my desk many will be aware the association is now becoming a great resource for clubs to turn to when they are looking to employ not only superintendents, but all staff members. This is a great service that we can provide at a realistic cost so if you are looking for staff, give the AGCSA office a call.

If you have not received your membership renewals by now the bad news is that they

will not be far away. The good news is that the fees will remain as they were for the year 1999/2000 with only the dreaded GST to be added. The annual fee for our association is very good compared to many professional associations and I would urge all members to rejoin at their earliest opportunity.

As a reminder to members, some upcoming events include the workshop series and CQO's. More information will be sent in the near future so keep an eye out

As I expressed at the AGM this will be my last year as President and I look forward to serving the membership for the next 12 months. As always I am available to hear from the members, so if you have any concerns or suggestions give me a call on 0418 593 072 or fax on 03 5254 2495.

I look forward to catching up when our paths next cross.

Peter Frewin
President, AGCSA

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FNQGCSEA

The wet season is finally behind us and dry, warm and sunny weather is with us once again. A field day and seminar is planned for the 14th of August at Paradise Palms Golf Course. Chemturf are combining their annual Country Tour with the FNQGCSEA and a good turnout is expected. A buffet lunch will be provided to members at no charge and the day will include golf in the morning and a number of guest speakers.

This month saw the opening of the four new holes at Half Moon Bay. The new holes complete the 18-hole layout and considering the harsh wet season we have just had, the holes were in great shape on open day. The Thompson Wolveridge and Perrot designed "Links" at Port Douglas was also opened this month. The course is very close to full completion with only the finishing touches required for the clubhouse and new maintenance complex. The course looks very impressive and challenging and is a credit to Steve Williams and his team. Its good news for the North – another 18-hole championship course.

Paul Earnshaw

President, FNQGCSEA

GCSAQ

Cold weather has slowed growth around much of Southern Queensland and allowed time for some much needed reconstruction and drainage projects around the courses.

Gainsborough Greens has spent some time and money on knocking over some fairway drainage that has been crying out for attention through the wet period last year. Parkwood and the Glades have both been busy in the fairway drainage department with the Glades due to open to the public in late 2000. Brisbane Golf Club has been rebuilding new holes on the course and this work draws ever closer to completion.

After the full and frank discussions at the AGM in Melbourne it will be interesting to see the results of the proposed focus groups.

The Sanctuary Cove field day featured an AGCSA focus group session before golf at the Pines course both educational and interesting parts of the day. The sponsors, Toro, are to be congratulated on their support for our association and this event.

Congratulations are in order for Andrew Smith and Andy Date who are both proud fathers.

More news next time.

Jon Penberthy

President, GCSAQ

GCSAWA

Firstly on behalf of all of our association members that attended the Millennium Conference in Melbourne, we wish to congratulate the AGCSA Executive, AGCSA staff and local host superintendents for all of their tremendous organisation and hospitality throughout this event. We will all be looking forward to Sydney in 2001.

As mentioned in my last ATM report the GCSAWA – Margaret River Seminar is scheduled for the 13th – 15th of August.

Members who will be attending this event will be treated to a host of local and interstate presentations, providing some sound technical advice whilst enjoying some fine Margaret River hospitality.

A chemical safety and calibration training day is being organised for late August. Further details will be sent out to all of our members shortly.

Round 4 of the John Deere Super series golf event was held recently at Secret Harbour Golf Course. Once again a special thanks to Allan Devlin and staff for providing us with a true test of golf (links style).

This year's Toro Cup event will be played at the Manjimup Golf Course on the 26th September. We would like to see as many members as possible supporting this annual event.

Rob MacDonald

President, GCSAWA

NSWGCSEA

Several clubs are planting a recently released Couch variety "Plateau" which is displaying some exciting characteristics such as slow top growth that could have enormous implications on mowing frequency. It will be interesting to monitor its progress over the next growing season.

Congratulations are extended to Martyn Black for his magnificent and quite unexpected winning of the AGCSA Golf Championship. Congratulations also to the NSW team for their victory. A tri-fecta at the MCG would have been nice?

Andy Hugill, formerly Assistant Superintendent at NSW Golf Club has recently started as Superintendent at Eastlakes G. C. who are undertaking a Master Plan to rebuild their course over several years. I am sure Andy will be busy for some time and we wish him well.

Our next field day is the AGM to be held at Monash Country Club on Monday 28th August. This year is an election year with several of the current committee, including myself, not standing.

As such, I urge any NSW members to consider nominating for what is an extremely rewarding and worthwhile position.

Mark Parker

President

NSWGCSEA

VGCSA

Since our last report in the April / May issue of ATM the Victorian Golf Course Superintendents Association has staged two General Meetings. This years Annual General Meeting was held at Royal Melbourne Golf Club on the 8th of May. Thank you to Royal Melbourne Golf Club and in particular Jim Porter who is to be congratulated on the condition of the golf courses. Also, thank you to our sponsors of the day in Toro Australia. This years incoming committee consists of

President, John Geary; **Vice President**, Michael Picken; **Honorary Treasurer**, Michael Riordan; **Honorary Secretary**, Brett Balloch; **General Committee** - Neil Craig, Steve Tuckett, Tim Pierce, Clayton Howell

Many thanks to two stalwarts of the Association in Richard Forsyth and Mick Russell who have stepped down from the committee. Richard has been on committee for eight years, the past two as President, whilst Mick has been on committee for five years, the past two as Honorary Secretary. Both Richard and Mick have been tireless in their efforts and have been the driving forces behind many recent initiatives and their leadership will be sadly missed.

June the 19th saw the V.G.C.S.A. venture to the beautiful Barwon Heads Golf Club for our annual combined Secretary – Managers / Superintendent's day. Terry Wills Cooke was our guest speaker and he gave a provocative talk entitled "Values, Morals and Ethics - The essential tools for Managers". However, the toast of the day was Martin Rose from Traditional Links Construction who aced the par 3, 17th hole. Congratulations Martin. Many thanks to our sponsors Scanos – Club Car and to Peter Frewin who presented the golf course in great condition.

Congratulations to Euan and all the team at the A.G.C.S.A. on the successful staging of the recent Millennium Conference. Most people I have spoken to believe the organisation and planning of the conference was second to none and that on the whole the lectures were informative. Without a doubt one the highlights of the conference week is being able to catch up with friends and associates from interstate and I look forward to renewing old acquaintances in Sydney next year.

SAGCSA

Winter has arrived with lots of snow and ice!

Since the last report we have been on our annual bus trip. This year we went to Whyalla, Port Augusta and Port Pirie Golf Clubs over two days. It never ceases to amaze me what Country Clubs can do with limited resources and very limited staff. We thank our sponsors for the trip, Turf and Irrigation, Metropolitan Machinery and Gnome Turf Service. Last but not least Bill Storer our bus driver.

The Millennium Turfgrass Conference in Melbourne was well attended by S.A. members, who like me, got a lot out of it. The highlight for me was Dr. Michael Hurdzan who gave two outstanding papers.

Congratulations to the Board and Staff for a job well done.

As this is my last report as State President, I wish my successor and his committee all the best for the future. Well may it be as enjoyable and helpful as I found it.

Bob Dellow

President, SAGCSA

TGCSA

I will introduce this report firstly by congratulating the AGCSA on the tremendous efforts that must have gone into presenting the Millennium Conference and Trade Show.

I am sure all delegates would feel proud to be associated members of such a professional outfit, which has produced a product, which is nothing short of world class.

Congratulations must also be expressed for the re-election of the current AGCSA committee and President. Your endeavors most certainly have the respect and support of your members.

By the time this goes to print our next seminar will have just been run at Launceston Golf Club.

It should be a very informative day with quality material.

Terry Woodcock - Sports Turf Consultants

Wayne Sear - Barmac

Mike Cooper - Society of Golf Course Architects

Our AGM will be on 16th August at Mowbray Golf Club. Peter Frewin (President AGCSA) will be attending to enlighten members on the strategy of the AGCSA. I'm sure there are some issues to be discussed at the AGM, but something that must be priority on our agenda will be the strategy of the TGCSA. Although our association is quite viable, we need a vision as to where we need to be in the near future.

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So give this issue some serious thought prior to the AGM. Input from our member base will be used to steer our association forward in the future.

Phil Hill

President, TGCSA

TGAA (Vic)

What a great event the Millennium Turfgrass Conference turned out to be. The feedback from Delegates and Exhibitors has been full of praise for the TGAA.

As a member of the joint steering committee, I know first hand the logistics involved with the event. I would like to thank the other Associations involved, our Speakers, the attendees and trade sponsors for helping make it such a wonderful turf experience.

Those who were on the Victorian Irrigation Party Cruise enjoyed the festivities. Thanks to Geoff Bennell and Ross Maloney for supporting this fine idea.

It was with great pleasure that I inducted our Inaugural Honorary Life Member of the TGAA (Vic). Mr Bill Lawry was awarded the highest honor the TGAA bestows on an individual for his services to the Turf Industry. During his time at the Victorian Cricket Association he helped with organisation of all our annual Cricket Wicket Seminars, established the ground grading system for measuring quality of wickets and outfields and still supports us when ever we require.

The recent Conference gave us the opportunity to meet with representatives from other TGAA Regions. From the dialogue it was obvious that we had common goals to promote the turf industry and improve the knowledge of our members.

We are looking to ratify the Business Plan at the AGM. We would like all members to attend the AGM at Optus Oval on the 6th of September.

Financial members only will be entitled to vote so return your dues ASAP.

Good Luck with your renovations

Robert Savedra

President, TGAA (Vic)

VGA Report

With the Millennium Turfgrass Conference over it's now time to reflect on just what a great job all those involved have done. There were just over 70 Greenkeepers from all over Australia that attended a series of lecture made up by some of the Victorian gurus (Phil Ford, Terry Woodcock) as well as 3 well-noted American speakers.

The VGA announced the Greenkeeper of the year award which was presented to Andrew Rigg from Kew Heights Sports Club or as we call him the 'Prince of Greenkeepers'. Congratulations to Andrew, I can not think of anyone more deserving of this award. We also presented a distinguishing service award to Duncan Knox for all of the hard work and endless hours he has put in to helping the VGA become a successful association.

All feedback from interstate and local Greenkeepers indicates that the Millennium Turfgrass Conference was the most professional conference and successful conference ever run by the VGA.

I would like to thank Peter Barron for all his hard work with organizing the conference as well as all our sponsors and of course the AGCSA for without their help we could never have run such an event.

Matt Scott

IPP, VGA

TGAA

(ACT & Surrounding Regions)

It seems as though the ACT division of the TGAA has managed to deliver another successful mid-year seminar. Those who were

not able to attend missed out on a very informative session based on control of pests, diseases and nematodes. If you missed out, proceedings of the seminar are available from Keith McIntyre; hortengineer@netinfo.com.au. Thanks to all speakers, sponsors and the organising committee.

In an effort to increase our presence in the turf industry, representatives of the TGAA have met with the thought of forming a national body. If it were successful, it would assist the regional associations applying for research funding and support for educational programs.

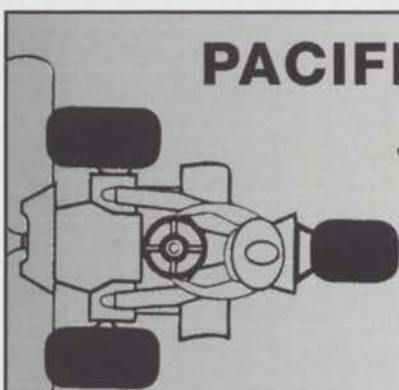
The Canberra Institute of Technology (CIT) has successfully raised enough interest in the Certificate 4 in turf management to be able to commence classes at the beginning of mid semester. This is good news for people wishing to increase their management skills.

Also, its that time of year again so send in your membership applications ASAP and help support the association that strives to deliver quality and up to date information on all things relating to the trade.

Justin A K Haslam Committee, TGAA (ACT)

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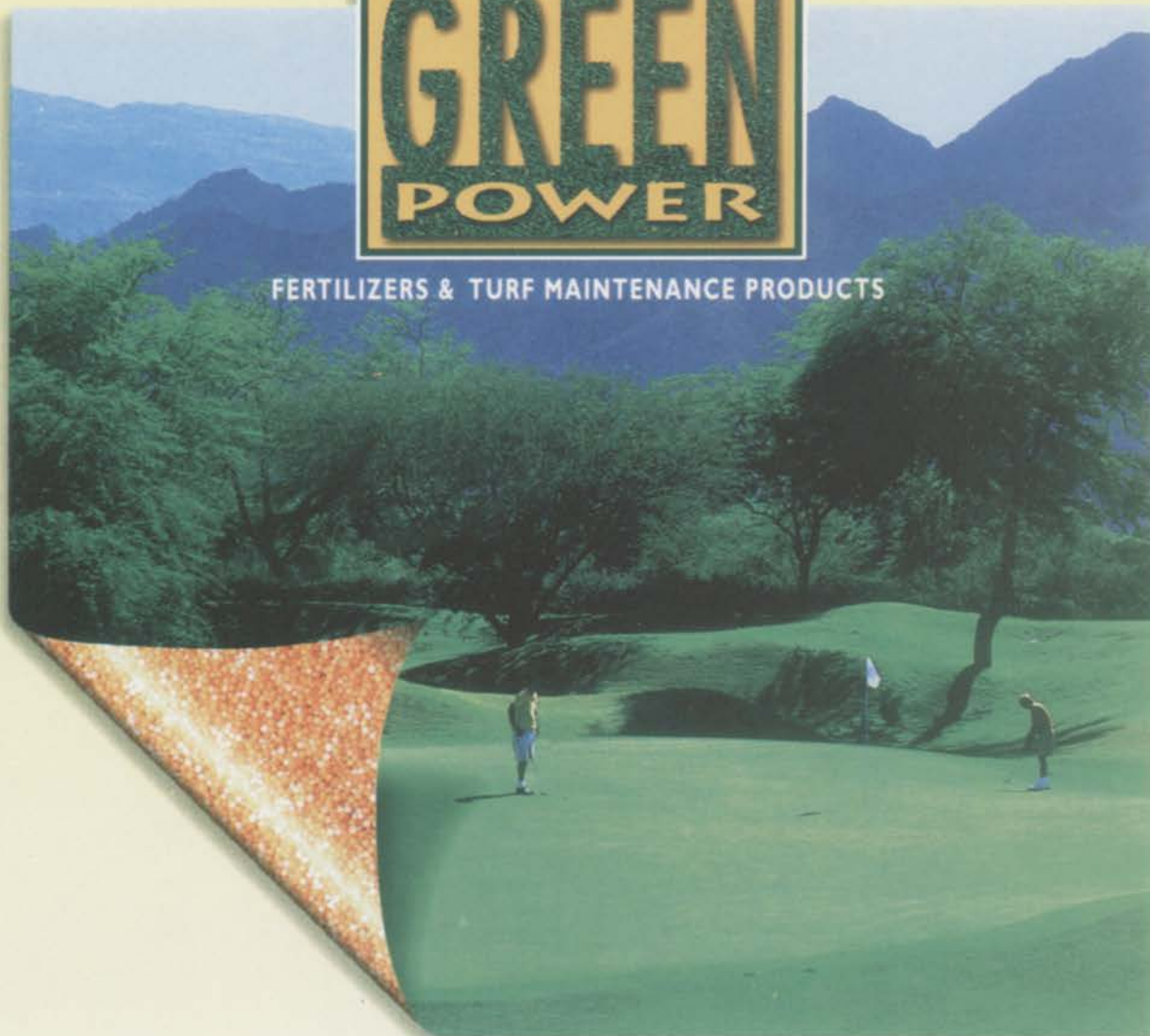
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