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Turfgrass
MANAGEMENT
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THE INDUSTRY GATHERS!

19th Australian Turfgrass Conference Review

Sellar Tailors Third Red Jacket!

2003 AGCSA Awards

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volume 5.4
August - September 2003

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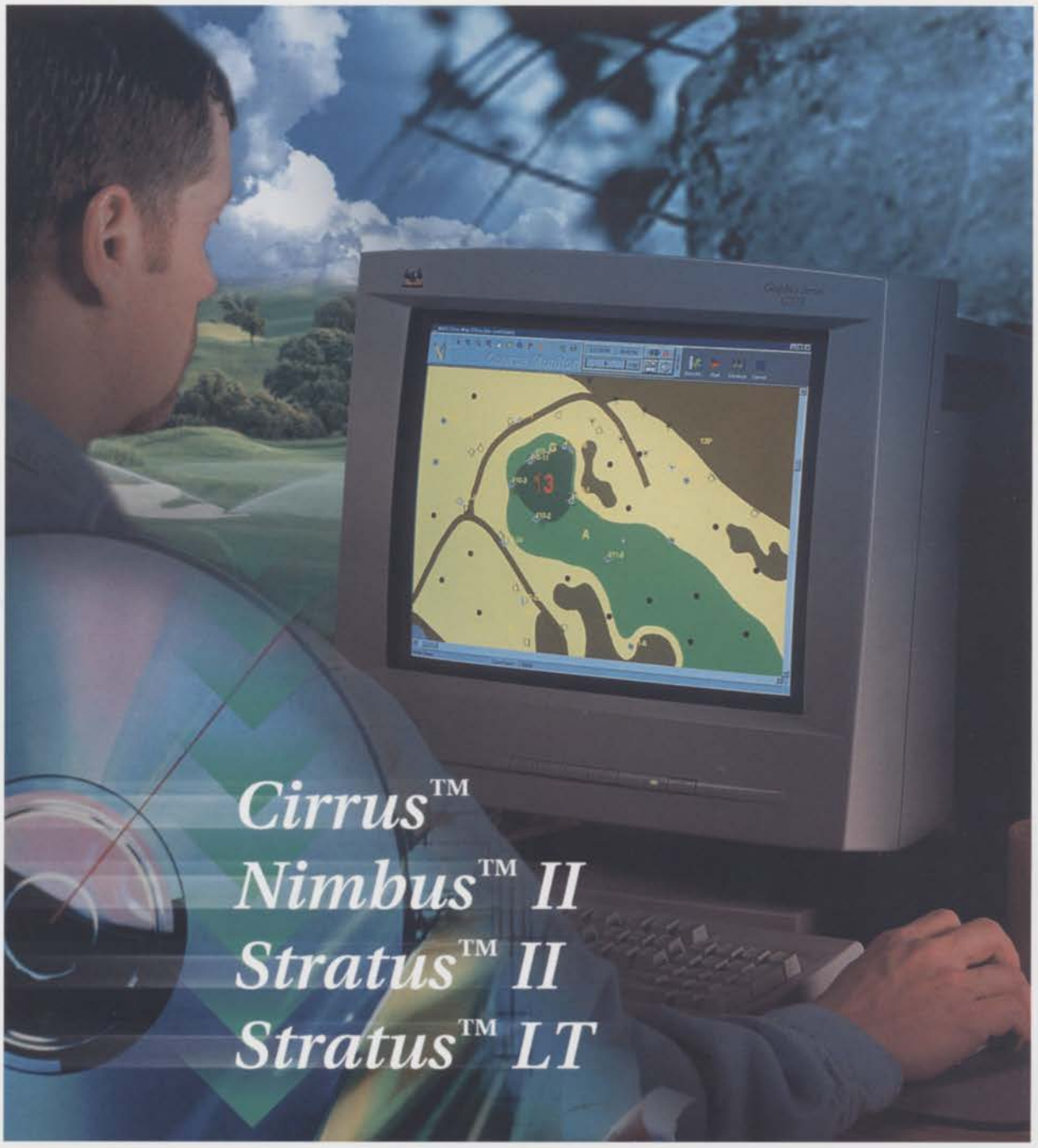




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Images from the 19th Australian Turfgrass Conference held in Adelaide
Photos: *Brett Robinson*

special features

research

in every edition

The good, the brilliant, and Freddie Mercury

BRETT ROBINSON
EDITOR

Welcome all to this edition of Australian Turfgrass Management. I trust those who attended the Adelaide conference have fully recovered and no doubt a few delegates are still staring at their latest credit card statements in abject horror.

Following tradition, this edition provides a comprehensive wrap of the 19th Australian Turfgrass Conference, including a full review of the AGCSA Awards and Golf Championships. A hearty congratulations must go to all award winners who joined an exalted list of previous recipients. Respect must also go the way of unassuming Glenelg Superintendent Daryl Sellar who collected a Third consecutive AGCSA Golf Championship. An amazing feat, although through the grapevine I hear that meetings have already been convened in Melbourne to discuss Daryl's demise come 2004.

On a personal note, it was great to meet a good number of you in Adelaide and put faces to names. You can be rest assured I now know who to stay well clear of come next year, and which of you not to place a wager with!

I jest. It was a great week for both delegates and tradeshow exhibitors, highly educational and a wonderful forum to share ideas and experiences. Big thanks must go to Freddie Mercury for making a guest appearance during the Venture Corporate Recharge day. I see he took to the ropes and harnesses like a true pro! Also, was that Dennis Lillee I saw floating around?

IAN CHIVERS
RACING SOLUTIONS

On a more serious note, just as this edition was about to go to press, it was announced that Stage Two water restrictions would come into force for the Melbourne metropolitan region as of August 1. In this edition's news section we talk to VGCSA President Michael Picken and former AGCSA President and Barwon Heads superintendent Peter Frewin about the restrictions and what implications they are likely to have.

JOHN NEYLAN
AGCSA

Also in the news section we examine John Neylan's appointment to the Telstra Dome Arena Surface Working Group following the uproar over the Melbourne stadium's much-maligned playing surface. John, who recently attended a special meeting of the International Turfgrass Society in Wales, also provides us with an update on the treated effluent irrigation trials being conducted at Barwon Heads Golf Club.

LES BURDETT
S.A.C.A

Finally, and rather regrettably, the AGCSA would like to apologise to the family and friends of Shane Foley for the photo published in Volume 5.3 of ATM. Shane appeared in a photo in the article "Improving the Environmental Management of NSW Golf Courses". Tragically, Shane was killed in the Bali bombings of 2002, and the ACGSA wishes to express its sincere condolences and hopes no unnecessary grief was caused as a result of the photo being published.

Best regards,

Brett Robinson
Editor

WARREN WILLIAMS
DOOMBEN RACING CLUB

President's Pen

Mark Couchman, AGCSA President

Well, another conference has passed us by and I would like to kick off this edition's column by thanking both delegates and sponsors who travelled to Adelaide to attend the 19th Australian Turfgrass Conference. I hope that those who attended the educational seminars and workshops found the content fulfilling and of great benefit.

There were certainly plenty of things that could be taken back to the workplace and shared with all members of staff and management, not to mention the great social interaction and sharing of experiences that is so much a part of the week together.

Conference week got off to an excellent start with the ACGSA Awards breakfast and I would personally like to congratulate all award winners. Western Australian Golf Club superintendent Idris Evans deservedly collected the Excellence in Golf Course Management Award, while the prestigious Claude Crockford Environmental Award was shared between Darren Watson (Horizons Golf Club) and Spiros Skaftouros (City of Whittlesea).

James Dalton staved off a strong field of nominees to win the AGCSA Graduate of the Year Award, while former Blackwood Golf Club superintendent Dene Goldsack had his impressive achievements recognised in winning the Distinguished Service Award. All worthy winners I am sure you will agree, and I am confident that they will benefit greatly from their awards.

Following the AGCSA AGM - and thank you to all those who took the time to attend - I would like to take the opportunity to welcome Martyn Black (Castle Hill Country Club) and Martin Greenwood (Kingston Heath Golf Club) to the AGCSA Board. I am sure that their contribution will be of great benefit to the Association. They replace outgoing members David Warwick (Avondale Golf Club) and Rob Macdonald (Joondalup Golf Resort).

The next 12 months will see the AGCSA focus on its new strategic plan and while the Association is not out to set records, it is certainly about servicing its members and continuing to achieve its objectives.

The first of these will see a major upgrade of the AGCSA website. This will be of great benefit to members, with member-only portals, forum sections and the like that will make the site a certain favourite with all members. Needless to say, with this upgrade presently underway, the existing website will only have minimal inputs to it in order to maximise the investment in the new one.

Strategically, the conference in Melbourne in June next year will present challenges for the AGCSA to bring together all aspects of the turf industry as well as the golfing industry. The AGCSA has, and will continue to, make every effort to bring this event together for the greater benefit of everyone involved in these great industries. We will certainly be relying on the support of members to ensure the success of this conference.

Of course, there are many other issues that will face our Association over the next 12 months and I ask everyone to be supportive of all the endeavours of the Association, as it is your national body. Please continue to support those who support our Association.

Enjoy the magazine.

Mark K. Couchman
AGCSA President
Golf Course Superintendent –
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Tradeshow/Conference Overview

19th Australian Turfgrass Conference Review

Peter Harfield gets to grips with the Tower during the team building day. Or is that Freddie Mercury...

AGU chief Colin Phillips was part of a panel discussion on future industry trends

International guest speaker Dr Joe Neal from NC State University

A new-look AGCSA Board and the formation of a turf education working committee were among some of the major developments to come out of the 19th Australian Turfgrass Conference held in Adelaide during the final week of June.

While numbers were down on Brisbane, upwards of 400 delegates converged on the City of Churches for the first time since 1994 and were treated to a stellar cast of international speakers, a hectic schedule of functions and the latest products available to the turf market.

The conference opened with the AGCSA Awards presentation breakfast, with this year's Claude Crockford Environmental Award being shared between Darren Watson (Horizons Golf Resort) and Spiros Skaftouros (City of Whittlesea). Home-town boy Dene Goldsack had his 30 years of service to the industry recognised when he received the Distinguished Service Award, Idris Evans (Western Australian Golf Club) scooped the Excellence in Golf Course Management Award, while James Dalton (Thirteenth Beach) was named 2003 Graduate of the Year.

This year's educational seminars covered a whole gamut of topics with delegates attending sessions conducted by a host of international and local speakers.

Terri Clementson's panel discussion "*The Golfing Experience 2020*" brought together the likes of AGU chief executive Colin Phillips, David Raggat (IMG), Ian Robilliard (PGA), golf course architect Neil Crafter, AGCSATech's John Neylan and Kooyonga superintendent Stephen Newell, and provided a thought-provoking look into what future trends may affect the industry.

Bob Taylor from the Sports Turf Research Institute in the UK and Audobon's Joellen Zeh presented talks of golf course ecology, while Drs Leah Brilman and Joe Neal presented sessions across both the golf course and general turf management streams.

Syngenta's global technical manager Dr Mark Zajac flew out from Switzerland for the conference, presenting seminars on global perspectives on pest control product development and the fate and behaviour of pesticides in turfgrass ecosystems.

Stan Kostka, director of research and development at the Aquatrols Corporation of America, employed some rather novel props during his workshops. Not just content with handing out assorted chocolates during his irrigation workshop, Stan resorted to whipping off his belt in a bid to demonstrate the difference between hydrophobic and hydrophilic soils in his afternoon session.

Norm Ashlin (Collier Park Golf Club), Craig Easton (Carnarvon Golf Club) and Daryl Sellar (Glenelg Golf Club) teamed up to gave an insight into the running of their respective courses, while John Neylan provided an update on the latest results to emerge from the various AGCSA-Tech trials being conducted around Australia.

Daryl Sellar was also the centre of attention on the Friday as he collected his third consecutive AGCSA Golf Championship Red Jacket by two shots, ensuring he will be a prime target for sabotage come 2004. History was also made at Royal Adelaide when the Victorian team led by Anglesea Golf Club's Brett Balloch won its first ever teams championship, much to the chagrin of defending champs NSW.

The products and services of 49 companies were on display at this year's tradeshow held over two days, and despite the expected reduction in delegate numbers from Brisbane, most exhibitors reported solid business. The Nuturf Café in particular had a high turnover while the masseuses at the AGCSA stand toiled feverishly to soothe the aches and pains of many a conference delegate.

Many exhibitors commented that the smaller turnout meant company reps could spend more quality time with clients and overall the show had a more "feelgood" atmosphere. Planning for next year's conference in Melbourne is now well underway and already a number of companies who weren't present in Adelaide have expressed their interest in attending.

On a more light-hearted note there were, of course, moments of comic genius including Norm Ashlin's valiant attempts to extract a chirping mobile phone – reportedly not his – from his coat pocket in the middle of his talk during the "thinking superintendents session". Not to be outdone was Craig Easton who delivered his part of the presentation quickerthanaMarkPhillipoussisserve.

Yours truly was mercilessly heckled during one of Terri Clementson's lectures for a minor cellphone misdemeanour, and although somewhat predictable, Merv Hayward's pink wig made a few cameo appearances. Full marks to incoming AGCSA board member Martyn Black for his stirring rendition of "Inside Thongs Outside" and putting the members of Chunky Custard to shame with some expert gyrations on stage at the end-of-conference dinner.

No doubt a few expense accounts would have taken a hammering from a number of Hindley Street establishments, with the State of Origin bash leaving a number of punters either in a barrel, over a barrel or totally skint.

The team building day with Venture Corporate Recharge was, for those that managed to turn up, a superb day. I'm sure the site of delegates bumbling around Adelaide in white vans, harassing BP service station attendants, diffusing "bombs" in public parks, and finding out just how many bunkers the sixth hole at Mt Lofty Golf Club had, would have left the locals scratching their brows in bemusement.

Of course, all participants involved professed to being "brilliant", but at the end of the day it was the combined team whipped into shape by Jeff "Rambo" Gambin and Peter "Freddie Mercury" Harfield that walked away with the spoils from The Greatest Race. Wonders never cease. – **Brett Robinson**

AGCSA

Black, Greenwood Elected to AGCSA Board

19th Australian Turfgrass Conference Review

BRETT ROBINSON

New AGCSA Board members Martyn Black (left) and Martin Greenwood

The AGCSA enters the next two year period with a new-look Board of Directors following the election of two new members at the AGM held during the Adelaide conference.

Charismatic Castle Hill Country Club superintendent and outgoing NSWGCSA president Martyn Black joins namesake Martin Greenwood (Kingston Heath Golf Club) in replacing outgoing board members David Warwick (Avondale Golf Club) and Rob Macdonald (Joondalup Golf Resort).

In line with the new constitution, which was also endorsed at the AGM, both new members will hold their post for two years and join existing Board member Jeff Gambin (Gold Coast Burleigh Golf Club) and re-elected President Mark Couchman (Tewantin-Noosa Golf Club).

For Martin Greenwood, the appointment comes in his fourth year as superintendent at Kingston Heath Golf Club in Melbourne. Martin's career has previously seen him spend five years in Asia during which time he became the founding president of the Malaysian Superintendents' Association. Upon his return to Australia, he was construction superintendent at Sanctuary Lakes.

"I'm looking forward to getting actively involved and trying to make some changes," said Greenwood on his election.

"The Board faces some major issues. Contracting is obviously a big one at the moment. Not so much as looking at it in a negative view, but more that we have got to live with them. Membership at both the state and national level is another important issue as are the old thorny knobs of education and participation."

For Martyn Black, the AGCSA board posting comes after eight years of service on the NSWGCSA Board, the last three of which he was president. Martyn began his career at Pennant Hills under the auspices of the legendary Vince Church, and after a couple of years as a golf club salesman took up postings at the Asquith and Gordon golf clubs. He then joined Castle Hill as a "rank and file" member progressing to assistant superintendent and then superintendent, a position he has held for the past 11 years.

Martyn believes the board will have to work hard to ensure the future of the superintendent and be alert to the changes that are of a detriment to the industry, of which the contracting issue is a big part. He also feels there is a need to bring together the different sectors of the broader golf and turf industries and build upon existing relationships.

Aside from the new members, a proposal to update the AGCSA constitution to bring it more in line with modern day business practices was also approved at the AGM, while it was agreed that the Association's financial year be moved from the end of May to the end of March.

AGCSA

Déjà-vu at Royal Adelaide as Sellar Tailors Third Red Jacket

19th Australian Turfgrass Conference Review

Daryl Sellar's mortgage on the AGCSA Golf Championship continued for a third year at Royal Adelaide

For those supers backing up from last year's AGCSA Golf Championships at Royal Queensland, the events of Adelaide a few weeks back must have been pretty familiar.

Just as it had bucketed down the night before the big occasion in Brisbane, so it did in Adelaide. In fact, 27mls fell on Royal Adelaide Golf Club the night before the 2003 tournament, while just a few kilometres south, the suburb of Glenelg bore the brunt of the worst floods to hit Adelaide in over a decade.

However, it was one other minor detail from the day that was reminiscent of Brisbane – the winner!

Whether it was local knowledge, the torrential downpour, the lure of acquiring another striking Red Jacket or just the fact that he plays almost off scratch, Glenelg Golf Club superintendent Daryl Sellar walked away with his third consecutive AGCSA Golf Championship.

While failing to emulate last year's sub-par winning total, Sellar achieved the unprecedented feat by fashioning a three-over-par 76 on a soggy Royal Adelaide course to finish two shots clear of the pack, saving tournament sponsors Toro the trouble of tailoring another of its prestigious Red Jackets. Gary Chatfield, now based out of Thailand, claimed the runner's-up prize on a countback from Andy Hugill (Mona Vale Golf Club) after shooting 78.

"No doubt local knowledge helped a bit," says Sellar, whose round included one birdie and four bogeys.

"Royal Adelaide is a great golf course but you need to play it a couple of times to understand its intricacies. It seems relatively innocuous the first time, but you quickly realise there are places you don't want to be hitting to.

"It was a bit of a slog. The course was playing a lot longer due to the rain the night before, but Royal Adelaide was its usual good test of golf.

"It's an absolute thrill and an honour to win it again and to be honest it came as quite a surprise."

Despite the dump the night before, Royal Adelaide superintendent Jeff Kaines and his crew had the course in sublime condition. The weather too came to the party, staying clear of Seaton Park for the event before bucketing down during the presentations.

Sellar will no doubt be a marked man when he crosses the border into Victoria for next year's tournament and already a few Victorian hopefuls have started the mind games.

"I hope to defend it next year although a few of the Vic boys seem pretty intent on doing something to prevent me from doing so," laughs Sellar. "I'll need eyes in the back of my head."

Victorians on top

While Sellar collected the stroke title on behalf of South Australia, Victorians triumphed elsewhere. Sanctuary Lakes superintendent Peter Jans burgled his way around to post 38 stableford points, and together with Brett Balloch (Anglesea Golf Club), Colin Cowden (Rossdale Golf Club) and Stephen Lo Iacono (Cowes Golf Club) helped secure Victoria's first ever teams championship victory. The Vics scored 142 points to finish ahead of defending champs New South Wales and Western Australia.

Meanwhile, down the road at The Grange Golf Club, a Kiwi by the name of Andrew Combe posted 35 stableford points to get his name engraved as the inaugural winner of the AGCSA Corporate Cup. Hailing from Nelson Bays Golf Club, Andrew finished one point ahead of up and coming NSW apprentice Wes Giddings from Dubbo Golf Club.

At the other end of the field, Hayden Skelton (Kogarah Golf Club) had the dubious honour of collecting the NAGA Trophy for his meagre 11 points. Rumour has it Hayden scored two points on the first and four on the last, but as for the other 16 holes...

Sincere thanks must go to Toro Australia for sponsoring the AGCSA Golf Championships, David Golf Engineering, and the superintendents and staff at Royal Adelaide and The Grange for what was a superb day.

AGCSA Championships

Stroke

1 Daryl Sellar *(Glenelg Golf Club)* 76
2 Gary Chatfield *(on a countback)* 78
3 Andy Hugill *(Mona Vale Golf Club)* 78

Stableford

1 Peter Jans *(Sanctuary Lakes Golf Club)* 38pts

Teams

1 Victoria: *Brett Balloch (Anglesea Golf Club)*, Colin Cowden *(Rossdale Golf Club)*, Peter Jans *(Sanctuary Golf Club)*, Steve Lo Iacono *(Cowes Golf Club)*

2 New South Wales
3 Western Australia
4 Queensland
5 South Australia

AGCSA Corporate Cup

1 Andrew Combe *(Nelson Bays Golf Club)* 35pts
2 Wes Giddings *(Dubbo Golf Club)* 34pts

NAGA Trophy

Hayden Skelton *(Kogarah Golf Club)* 11pts

The Successful Victorian Team (from left) Brett Balloch, Colin Cowden, Peter Jans and Steve Lo Iacono

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Turf Tour - Glenelg, Kooyonga, The Grange

19th Australian Turfgrass Conference Review

While superintendents hacked their way around Royal Adelaide in the AGCSA Golf Championships, a group of 30 conference delegates took part in a post-conference turf tour on the final day of the Adelaide conference. Led by the indefatigable Jeff Gambin, the tour took in three courses – Glenelg, The Grange and Kooyonga.

With Glenelg superintendent Daryl Sellar busy shooting his way to his third Red Jacket in the AGCSA Golf Championships, the group began its tour by inspecting the $1.3 million major works project at Glenelg with golf course architect Neil Crafter.

Currently in the fourth year of a five-year plan, the project encompasses the conversion of all greens from Poa annua to bentgrass, while a number of fairways and surrounds containing a couch/kikuyu mix are being replaced with santa ana couch.

Drainage issues, due to a fairly shallow ground water table, are also being addressed, while a number of bunkers have been remodelled and an outdated irrigation system upgraded. Overall, the plan aims to improve the playability and general interest of the course while retaining the intrinsic characteristics which Glenelg is known for.

The group inspected the finished works including the newly grassed 4th and 6th greens, and the 11th, 12th and 18th holes which were completed in October last year. Work in 2003 has focused on the 1st, 7th and 8th holes, while the 10th green is in the process of being resurfaced.

From Glenelg, the tour moved on to The Grange, a 36-hole course under the stewardship of Chris Klei. The group, particularly those from Queensland, were impressed with the quality of the Penn Cross and Penn Eagle greens.

The group also heard of Chris' differing approach to *Poa annua* control. Unhappy with the results obtained from the use of herbicides to control *Poa* year after year, Chris has, with the blessing of the club, instituted a new chemical-free control regime. This consists of regular and severe mowing and the results seem to be coming.

The final stop on the tour was Kooyonga, with resident superintendent Steven Newell presenting the course in excellent shape. Steven commented how difficult it was to get approval to make any changes to the course and showed some of the new freeform style bunkers that have been added to the course.

Golf course architect Neil Crafter outlines the reconstruction projects at Glenelg

Conference delegates inspect the major works at Glenelg

Reconstruction work at Glenelg

Turf Industry Census - *Preliminary Results*

19th Australian Turfgrass Conference Review

Preliminary results from the National Turf Industry Census were presented during the Adelaide conference with Jeff Blunden from external consultants Ernst & Young presenting a snapshot of the first 100 surveys received.

The initial results showed;

- Annual maintenance budgets – by course type and state.
- Green grass types - by state.
- Average green areas – by region and course type.
- Average fairway areas – by region and course type.
- Equipment (owned/leased) – by course type.
- Timing of clubs with plans to upgrade irrigation systems – by state.
- Staffing levels – by annual maintenance budgets.
- Superintendent salary bands – by club member numbers.

Jeff noted there had been a strong response from South Australian clubs, while there had been a comparably slower response from Queensland clubs.

The information derived from the census will be cross referenced with the AGU's Australian Golf Industry Report completed last year. Once all surveys have been processed a report will be published providing a state-by-state breakdown.

The accompanying tables provide a quick snapshot of some of the main feedback received from the surveys. Please note that these figures will change.

Table 1. Annual maintenance budgets – by state

BUDGET	VIC	NSW	QLD	SA	WA
<$250,000	50%	9%	8%		18%
$250,000 - $500,000	27%	31%	42%	11%	27%
$500,000 - $750,000	19%	22%	42%	22%	27%
$750,000 - $1M	4%	16%			
$1M - $1.5M		22%	8%	22%	27%

Table 2. Equipment ownership

COURSE TYPE	OWNED	LEASE
Public	85%	15%
Private	71%	29%
Resort	90%	10%
TOTAL	81%	19%

Table 3. Superintendent salaries – by number of club members

MEMBERS	<40K	40K-50K	50K-60K	60K-70K	70K-80K	80K-90K	90K-110K	>120K
0-300			50%	50%				
301-700	29%	43%	7%	14%	7%			
701+		10%	30%	10%	20%	20%	3%	7%
TOTAL	9%	22%	24%	11%	15%	13%	2%	4%

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2003 AGCSA Awards

19th Australian Turfgrass Conference Review

AGCSA DISTINGUISHED SERVICE AWARD – Dene Goldsack

Distinguished Service Award winner Dene Goldsack (right) with Martin Morgan (Scotts)

When Dene Goldsack joined South Australia's Blackwood Golf Club on June 26, 1970, the word 'superintendent' was non-existent, a turf manager probably had something to do with the bookies, while the AGCSA was a mere figment of the imagination.

Conferences too were a novelty. Not the highly organised events of today which comprise educational seminars, international guest speakers and team building days. No, for Dene and his peers a "conference" more likely consisted of visiting a fellow greenkeeper, walking the course and having a chat.

In fact, Adelaide would be the setting for Dene's very first "conference" back in the 1970s, so it was therefore fitting that almost three decades later in his home state he receive the AGCSA Distinguished Service Award for his many years dedicated to the superintendent cause.

As they say, the only constant in life is change and Dene has been privy to many of those changes throughout his 30 years as a superintendent.

"The most startling thing I can remember over the years was the formation of the Association," recalls Dene. "We had some great times and we also had some great arguments, but it is amazing to see where it has come in those years.

"I also can't get over how professional the industry has become. Watching the 2003 AGCSA Graduate of the Year winner James Dalton giving his presentation, I was just blown away with his knowledge."

Dene's formative years were spent working as a fruit grower with his father, and after the business was sold Dene was approached by the Blackwood Golf Club, beginning what would turn out to be a 30 year association with the Adelaide club.

As head greenkeeper, Dene presided over many important changes to the Blackwood course. During his time the layout of the course was altered a number of times, with the addition of a new back nine being among the biggest changes.

Dene retired from his post at Blackwood in August 2000 and one month later was awarded the Australian Sports Medal for services to the industry.

AGCSA CLAUDE CROCKFORD ENVIRONMENTAL AWARD

Darren Watson *(Horizons Golf Resort)*
& Spiros Skaftouros *(City of Whittlesea)*

Bayer's Kevin Harris (left) with Claude Crockford Environment Award winners Spiros Skaftouros (centre) and Darren Watson

Just as the 2002 Distinguished Service Award went two recipients, the 2003 Claude Crockford Environmental Award was shared between Darren Watson (Horizons Golf Resort) and Spiros Skaftouros (City of Whittlesea).

Darren Watson

Ever since the initial development of the Horizons Golf Resort in 1990, Darren has played a key role in making sure that this par-72 championship course in NSW has operated in harmony with its unique natural surroundings.

The club's main flow-on catchment is the protected wetlands of the Mambo Creek whose tidal flats are of the utmost importance for the spawning of the renowned Port Stephens oyster.

The course and bushland surrounds provide sanctuary habitat for a diverse range of native animals and most notably the site encompasses the home-range of healthy breeding koalas.

Australian Bird Atlas recently discovered 52 species of native bird resident at Horizons, while a frog study is currently underway which is expected to find the threatened Wallum Froglet species. Some of the environmental management initiatives instituted at Horizons include;

- Assessment of all chemicals, herbicides, pesticides and fertilisers used in the upkeep of the course for their environmental impact, with similar, "friendlier" alternatives used and investigated.
- Construction of boardwalks through the natural wetlands with plans to construct more.
- A koala colony monitoring program.
- The introduction of an aeration "fountain" system into the main lakes.
- Implementation of a designated 'GreenWaste' area for the decomposition of lawn and tree clippings and cuttings.
- Development of its own nursery located onsite where plant species native to the area are propagated.
- A Bush Regeneration Management Plan undertaking Bitou Bush and Lantana eradication.

Spiros Skaftouros

As construction supervisor at the City of Whittlesea's new 27-hole public golf course – due to open in 2004 - Spiros has played a major role in ensuring the protection of the site's environmental values.

The site purchased by the Whittlesea council is typical of the remnant grassy red gum woodland ecosystem which was prominent throughout Melbourne's northern and western basalt plains, but is now scarce due to clearing and grazing. The land parcel was dotted with ancient red gums, many more than 200 years old, which have become important habitat for a range of marsupials and avifauna.

Prior to construction, a full environmental and archaeological assessment of the site was commissioned in recognition of the importance of the land for its remnant vegetation and environmental values.

The council has also entered into a long-term arrangement with the local sewerage authority to use reclaimed effluent from the treatment plant for irrigation.

During this major project, Spiros has made a significant contribution to delivering the high environmental outcomes aspired to by;

- Ensuring that council utilised the latest methods for the protection of significant areas. No-go zones were created to protect significant sites and remnant vegetation.
- Providing supervision and coordination of contractors involved to ensure that environmental outcomes were adhered to. This included convincing the designers of the course to alter their plans to better protect mature red gum trees and ensuring that only indigenous plant materials were used.
- Championing the concept of sustainable maintenance principles.

AGCSA EXCELLENCE IN GOLF COURSE MANAGEMENT AWARD

Idris Evans
(Western Australian Golf Club)

Idris Evans, winner of the Excellence in Golf Course Management Award

For Idris Evans, being a superintendent is not just a job but a way of life. If you need any proof of that, just visit the Western Australian Golf Club, his home away from home for the past 11 years.

Over the past two years, the former abattoir worker-cum-superintendent has managed $2.2 million in capital expenditure and course improvements, and such are the results that at this year's conference he walked away with the AGCSA Excellence in Golf Course Management Award.

It has been a rapid rise for Idris, who before his appointment as assistant superintendent in 1992 spent 18 years working in abattoirs. In 1999 he moved into the top job and wasted no time embarking on some major works, including the construction of a new 800sqm maintenance facility to replace the existing 40-year-old shed.

The biggest project Idris helped oversee, however, was the design and installation of a new irrigation system and water storage facility. Built over half a hectare and holding six million litres, the lake doubles as an idyllic water feature between the 1st and 9th holes which underwent major reconstruction to accommodate the lake.

At the same time, Idris oversaw the installation of a new Toro SitePro Network LTC system, a pump station capable of up to 90 litres per/sec, and a weather station.

During the installation of the irrigation system, four holes were reconstructed. Aside from the 1st and 9th, the 2nd and 12th holes were remodelled. Changes to both holes were made for safety reasons. In both cases, fairways were widened, new fairway bunkers built to encourage golfers to hit away from residential properties, and both greens were completely relocated.

Some of Idris' other achievements include the;

- Eradication of *Poa annua* in putting surfaces from 45 per cent to 5 per cent in three years.
- Improvement of bent collars to pure bent and eradication of couch infestation.
- Implementation of a native revegetation program.
- Construction of 20 new fairway bunkers
- Resurfacing and reshaping of 14 tees from kikuyu to santa ana couch.

Finalist:
Michael Riordan *(Patterson River Country Club)*

AGCSA GRADUATE OF THE YEAR

James Dalton
(Thirteenth Beach Golf Links)

2003 AGCSA Graduate of the Year
James Dalton

James Dalton from Thirteenth Beach Golf Links is used to success. Whether it's in the field of academia or on the Aussie Rules oval, James has proved himself to be an all-rounder. Now he can add the prestigious AGCSA Graduate of the Year award to an already burgeoning list of achievements.

Following the completion of his VCE, James undertook a course at the Gordon Institute of Technology, studying advanced horticulture which resulted in a 12-month placement at the Queenscliff Golf Club.

Deciding that the turf industry would provide him with long-term career challenges, he then began a three-year apprenticeship in Turf Management with the support of and employment at Ocean Grove Bowling Club. He later transferred to Thirteenth Beach Golf Links to complete his Trade Certificate.

James' studies at NMIT have been celebrated with excellent academic results which have been reflected in numerous awards, including the Best Bowling Greenkeeper Apprentice Award in 2000. He followed that up by winning the Best Second Year and Third Year Apprentice.

During his time at Thirteenth Beach James has become an integral staff member, becoming involved in major works projects including tee construction, the resurfacing of aprons and high traffic areas, and the construction of the adjacent Tony Cashmore-designed Creek Course which is due to open in March 2004.

To further enhance his career, James is continuing his formal training at NMIT, studying for his Diploma in Horticulture (Turf Management) which he hopes to complete by the end of 2004.

As a further demonstration of his drive for continued career development, James has obtained a six-week placement at Moonah Links leading up to and throughout the 2003 Australian Open. James is also looking into establishing a working arrangement with the Royal and Ancient Golf Club of St Andrews in 2005, a year in which the club plays host to the British Open and Dunhill Cup.

Finalists:
Craig Birrell *(Royal Adelaide Golf Club)*,
Nick Kinley *(Wembley Golf Club)*

2003 AGCSA Conference Photo Gallery

19th Australian Turfgrass Conference Review


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2003 AGCSA Conference Photo Gallery

Photo Captions

1: The usual suspects at the AGCSA Golf Championships
2: Winners, finalists and sponsors from the 2003 AGCSA Awards
3: The Sellar, er AGCSA Trophy
4: Three old men and one big Royal Adelaide bunker
5: A bomb is successfully de-fused
6: Martyn and Merv in perfect harmony
7: Martin Bradbery gets to grips with the Tower
8: The very palatable Chunky Custard
9: Martyn Black dishes out a his own serving of Chunky Custard
10: Syngenta's Mark Zajac
11: Aquatrol's Stan Kostka
12: Pitching together
13: I'll have one of those...
14: And a café latte to go, please
15: Colourful

Photos by Brett Robinson and Shane Reid

research

Soil Microbial Characteristics of Aging Golf Greens

ROCH GAUSSOIN AND ROBERT SHEARMAN

Fig 1: The accumulation of organic matter in the rootzone of greens as they mature creates an environment critical for microbial colonisation. From left - age of greens ranging from one year through to four years.

In recent years, research at the University of Nebraska and other locations in America has concentrated on trying to better understand the microbial ecology of sand-based golf greens as they mature. Although this research has created new and academically interesting challenges for future research, fundamental questions have been answered and common perceptions or conventional wisdom have been found to be untrue, or at least, suspect.

This article will attempt to summarise these studies and indicate implications relevant to golf course operations. Additionally, we will make assumptions from the microbial data concerning the use of microbial inoculants for turfgrass management. The following are common perceptions about the microbial relationships in turfgrass soils;

- Excessive pesticide applications adversely affect soil microbiology.
- Sand-based rootzones are relatively sterile.
- Soil inoculums/additives can alter soil microbiology.
- Turfgrass soils are lower in microbial biomass diversity than other soils.

From 1996 to 1998, golf course greens located on 16 golf courses in eastern Nebraska were sampled for microbial properties in a project funded by the United States Golf Association (USGA) and the O.J. Noer Turfgrass research program (5). The 16 courses were separated into three distinctly different management groups based on pesticide and fertility inputs and other pertinent management practices. All greens had sand-based rootzones and ranged in age from one to 28 years. Results indicated that;

- The age of the green was the most significant factor in microbial biomass/diversity.
- Management level did not influence microbiology, indicating that higher levels of management, including relatively high pesticide inputs, did not adversely affect soil microbiology. These findings are similar to data reported from Florida and New York (6).
- Significant microorganism levels and stability occurred within 18-24 months after establishment.
- Microbial biomass of sand-based turfgrass soils 18-24 months after establishment was less than native undisturbed soils, but greater than traditional row crop soils.

This work also indicated that as a golf green matures, the microbial population is more associated with particulate organic matter (POM) than the mineral fraction. POM is the residue produced from the turnover of the plant root system as it matures and dies, sloughing off roots, root hairs, etc. into the rhizosphere. The rhizosphere is the region in the rootzone that is immediately adjacent to the root system. This region is critical for nutrient transfer and plant uptake, pathogen competition, and ultimately plant health.

Similar results concerning microbial levels and stability were reported in work conducted in North Carolina (1, 2). Data indicated that sand-based turfgrass rootzones reached significant microorganism levels and stability relatively quickly (within 12-18 months), and these levels were equal to native soils in the region. They also reported the temporal effects of microbial populations, with the largest populations being associated with the periods of greatest plant growth, i.e., spring and autumn, which also agrees with work conducted in Nebraska (3).

It is interesting to note that the period associated with the lowest microbial numbers

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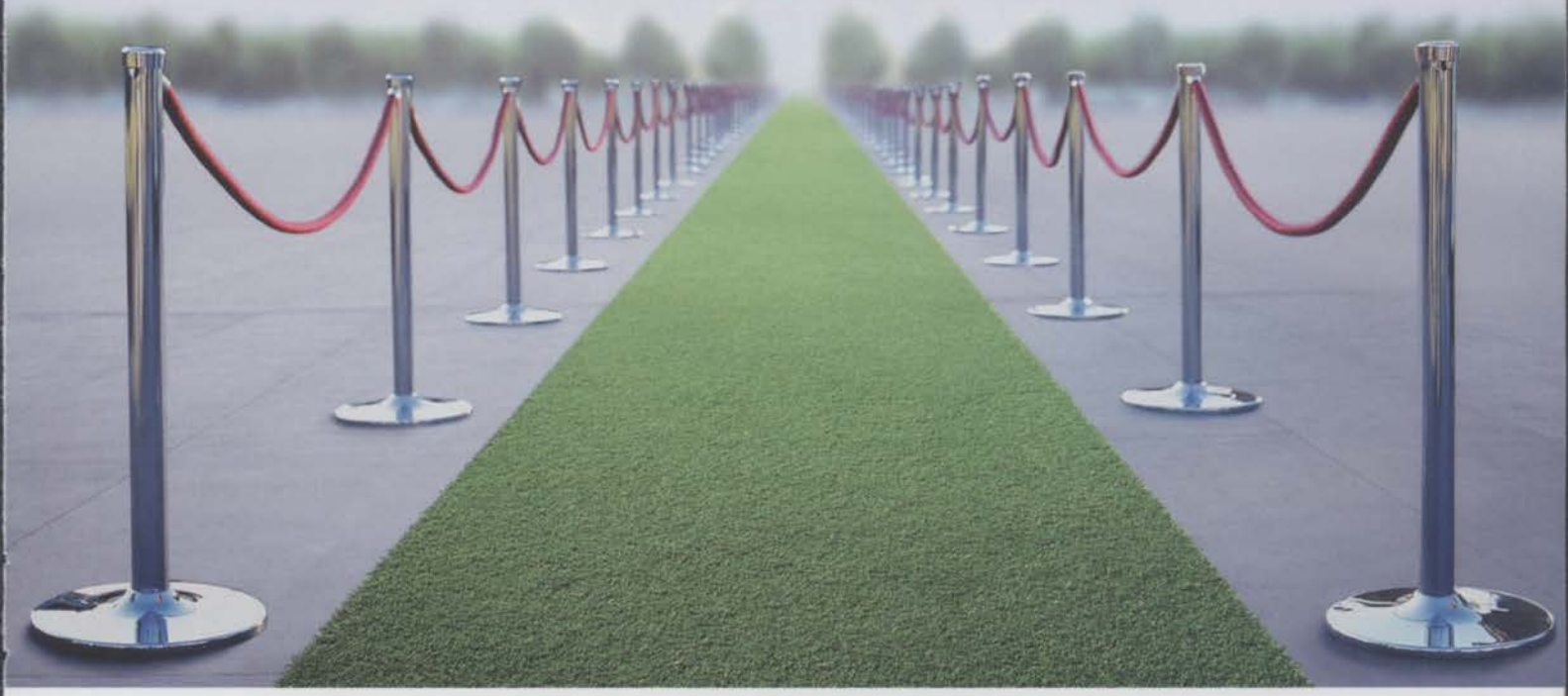

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Soil Microbial Characteristics of Aging Golf Greens

also coincides with the period of greatest root pathogen activity and other stresses, i.e., summer. Obviously, these other stresses such as heat and drought are contributing to the grass decline during the summer, but the soils microbial "health" should not be overlooked.

The research at Nebraska and North Carolina indicated that in a relatively short time sand-based turfgrass rootzones reach microbial levels comparable to other "native" soils. This information can be used to develop a theoretical scenario for the use of microbial inoculants. These are products that are packaged and marketed to turfgrass managers as tools to improve the microbiology of the soil. These are often beneficial organisms packaged with other ingredients such as iron or biostimulants, or in some cases packaged as spores of the desired microbe.

These products may contain up to 109 organisms per milliliter of product, and application rates range from 30 - 180 grams per 100m². The soil contains 108 bacteria per gram of soil. The relative quantity of actinomycetes is approximately 100 times less than the bacteria and fungi 100 times less than the actinomycetes, but for our theoretical example, we will disregard both the native fungi and actinomycetes. Realising that many soil microorganisms are sensitive to UV light and/or heat instability, and therefore survival from purchase to application is suspect, let us assume that all applied microorganisms survive and that the maximum use rates of the product are applied - the ratio of applied vs. native bacteria is approximately 6000 native:

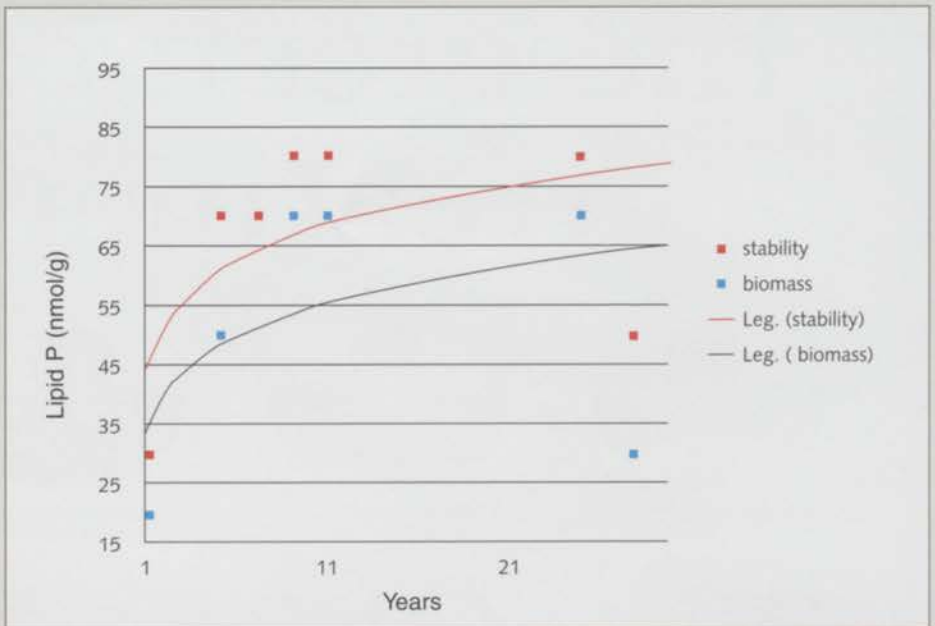

Fig 2: As sand-based greens mature, microbial biomass and stability increase rapidly in the first one to two years and then stabilises in both number and type of microorganisms.

1 applied, or the applied represent 0.02 percent of the total bacterial population.

When one considers the total microbial population, this ratio is even more unbalanced. The applied microbes are being introduced into a hostile environment at levels significantly lower than the indigenous microbial population. It appears that the applied microorganisms have little or no chance of effectively competing with the already established population. Further, work at Ohio State University (7) showed that at approximately two years post-construction in a soil/sand/compost vs. sand/peat green, microbial diversity was not different, even though the former green was significantly higher at establishment. While the compost increased microbial taxa initially, a natural equilibrium ultimately occurred.

Do microbial inoculants therefore have no merit? Other research has shown the benefits of the addition of biological pest control products, such as nematodes for grub control,

Fig 3: Four experimental putting greens were built at the Seaton Turfgrass Research Facility at the University of Nebraska to study changes in green rootzone mixes.

where the goal is control of a specific pest as opposed to increasing beneficial microorganisms in the soil. Structured research is limited, but scientific work in this area is increasing. Since it appears that new sand-based rootzones take one to two years to reach equilibrium, perhaps the use of microbial-based products has merit during establishment of turf on sand rootzones.

A study was conducted in 2000 at the University of Nebraska with the Emerald Isle (EI) products GrowIn and Optimil for the establishment of creeping bentgrass. Product information can be found at the Emerald Isle web site *www.emeraldisleltd.com/index.html*. The EI grow-in resulted in faster establishment than traditional grow-in procedures, and after the growing season, the EI plots had higher fungi and bacterium levels (4). Work in this area continues, and perhaps future research will shed more light on the use of microbial inoculants in turfgrass management.

In summary, it appears that some common perceptions about turfgrass soils were not true;

- Relatively high pesticide applications do not appear to adversely affect soil microbiology.
- Sand-based greens are not sterile, but in fact, reach levels of native soils in a short time.
- Soil inoculums/additives may alter soil microbiology in the short term, but their use on established turfgrass soils is questionable.

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By John Neylan

BENTGRASS TRIALS AT CHISHOLM TAFE – ROSEBUD

Bentgrass trial plots planted in June at Chisholm TAFE Rosebud

As part of our bentgrass selection and evaluation program we have now selected our "top 100" selections for planting into a putting green trial. The "top 100" have been selected primarily on density and quality, however, seed head production and other growth characteristics have also been considered.

The staff and students at Chisholm TAFE Rosebud have constructed a sand profile with a gravel drainage blanket for establishing the selected bentgrass. The green represents a typical sand golf/bowling green construction and will provide the ideal situation for establishing, maintaining and evaluating the bentgrasses.

The green has been planted with vegetative plugs from the "top 100" selections. There are two replicates for each selection and 50 plugs per plot. The plots were planted in early June by harvesting half of the plant in the spaced plant nursery and then cut into 100 plugs. Over a period of four days and with the help of AGSCATech's Andrew Peart and the staff and students of Chisholm TAFE, the plots were planted and we are happy to report there has been excellent establishment with an almost 100 per cent success rate for the plug establishment. They are now starting to produce new stolons and to cover the plots.

The putting green will be maintained at a cutting height of 3-3.5mm and then the plots will be evaluated for quality, density, disease, root growth and wear tolerance.

The AGCSA would like to thank the staff at Rosebud and in particular Barry Fraser and Bruce McPhee and the students that assisted us.

WA Bentgrass Trials

Bentgrass trials have been established at the Lake Karrinyup Country Club and now provide the AGCSA with a national focus for its bentgrass variety evaluation trials.

Trevor Strachan and his staff have established the trials and include varieties such as Cato, Crenshaw, the Penn-A and Penn-G varieties and Putter. In addition to being maintained at a height of 3mm, they will also be maintained at surrounds height of 6-8mm.

Our bentgrass trials to date have demonstrated varietal differences at various locations and we now have;

- Hot/humid (Sydney)
- Warm/dry and temperate (Melbourne)
- Hot/dry and high salinity water (Adelaide)
- Hot/dry (Perth)

With the trials at Barwon Heads Golf Club using treated effluent, we will now have an extensive database of information for most situations.

Winter Fusarium

This winter has seemingly produced ideal conditions in many states for the onset of winter fusarium *(Microdochium nivale)*. This pathogen can affect nearly all turfgrass species and in cool, humid regions and can persist all year round.

Prolonged periods of cool, wet weather are the catalyst for small circular watersoaked spots of usually less than 5cm in diameter to appear. They tend to rapidly change in colour from

Winter has produced ideal conditions in many states for the onset of winter fusarium

Damage to a bowling green caused by winter fusarium

orange-brown to dark brown and then finally light grey as the disease symptom spreads. Mature patches do not usually exceed 20cm in diameter.

Grasses tend to become susceptible when they are heavily thatched and growing slowly due to low temperatures. Infection tends to spread rapidly when temperatures are between 0-16°C and the turf remains moist. The disease becomes inactive as the turf canopy dries during warm and sunny conditions.

Cultural practices that can reduce the severity of winter fusarium are minimising nitrogen applications leading into winter, maintaining adequate potassium, phosphorus and a low pH. The turf surface should be kept as dry as possible by minimising the affects of shade, increasing air circulation and physically removing dew.

If winter fusarium has been an annual disease at your course and the implementation of altered cultural practices have not reduced the disease severity, then the use of a well-timed preventative fungicide program may be money well spent.

New Zealand Conference

Following on from the 19th Australian Turfgrass Conference in Adelaide, I was privileged to be part of the New Zealand Sports Turf Conference held in Auckland and enjoyed presenting three topics to Kiwi golf course superintendents - maintenance of *Poa annua*, use of recycled water and turf nutrition. It was good to see familiar faces and reacquaint myself with the good work that the Kiwis are doing.

The conference had close to 600 delegates representing golf, bowls, racing, cricket and sportsfields, having a choice of various concurrent sessions. Both Jim Porter *(Royal Melbourne Golf Club)* and Peter Frewin *(Barwon Heads Golf Club)* made presentations based on their recent experiences. It is always interesting to note the keen interest that superintendents have in the experiences of other superintendents. Sharing experiences is a big part of what conferences are all about.

While in New Zealand I was also able to meet up with Stephen Marsden, the previous superintendent at Lakelands Golf Club on the Gold Coast. Stephen is involved with the construction of the new Jack Nicklaus golf course, near Lake Taupo (central North Island). The site is completely different to the Gold Coast with a combination of steep hills, rocky outcrops and rolling ground reminiscent of "links-type" country. The site boasts well drained volcanic soils and native browntop bentgrass is the predominant grass species.

The project managers and superintendents office is a shearing shed and was used as such a week prior to my visit. ▲

Horticulture Australia

research

Localised Drought on Sloped Putting Greens with Sand-based Rootzones

Ohio State University researchers constructed putting greens in elevated tables to investigate the effect of slope, rootzone profile and rootzone mix in the drainage characteristics of water applied at high rates.

Figure 1: Cross-section diagrams of the soil profile for a one-tier and two-tier putting green.

Gentle contouring and sloping surfaces are common features of putting greens. These slopes in conjunction with a high sand content rootzone lead to lateral, subsurface flow of water (1, 2). This lateral subsurface flow, approximately one day after a heavy rain, can result in upwards of 10 per cent difference in soil water content across a 20ft distance within the green.

There is also an interaction of slope-induced water contents with putting green profile design early in the drainage process. In this case, a one-tier (not containing a gravel drainage layer, Fig. 1) green design shows a greater lateral difference, and a two-tier (with a gravel layer, Fig. 1) green design shows a reduced lateral difference in water content.

These effects of green slope, rootzone composition and profile design were observed over two days following a simulated, heavy rain. Even with these differences, however, the overall soil water status of the green remained adequate, during this period, to avoid turf drought. Thus, even though treatment differences were observed, there appeared to be little short-term detrimental consequences from these differences.

Yet the questions remain; will these differences persist over longer periods and how may these differences impact turf water relations after longer periods of time? Thus we conducted a longer duration study employing many of the factors of our previous work to help address these questions. We also sought any lessons to be learned that may help refine putting green construction steps.

The Experimental Greens

This research employed the experimental putting greens described in detail by Prettyman and McCoy (1, 2). Briefly, the study employed four soil profile and rootzone mix treatment combinations consisting of;

- A one-tier soil profile containing a 9:1 (by volume) sand/sphagnum rootzone.
- A one-tier profile containing a 6:2:2 (by volume) sand/biosolids compost/topsoil rootzone.
- A two-tier soil profile containing the 9:1 sand/sphagnum rootzone.
- A two-tier soil profile containing the 6:2:2 sand/compost/topsoil mix.

Both rootzones met the particle size and physical property criteria for a USGA putting green (3). The 9:1 sand/sphagnum rootzone had an initial permeability of 20.8in h^{-1} and the 6:2:2 sand/compost/topsoil rootzone had a permeability of 12.6in h^{-1}. Hereafter, these rootzones will be referred to as the higher permeability (HP) and lower permeability (LP) rootzones, respectively.

Gravel selection for the drainage layer of the two-tier greens and for the drainpipe trenches of the one-tier greens were based on the particle sizes of the respective rootzones corresponding to USGA guidelines for two-tier greens construction (3). The four profile design/rootzone mix treatment combinations were replicated three times for a total of 12 experimental greens.

The profile design/rootzone treatments were housed in experimental greens that consisted of 4x24ft wooden boxes supported by a legged, metal framework. This allowed for slope

adjustment by simply jacking and blocking one end of each experimental green to the desired height. Subsurface drainage was through drainpipe trenches placed into each unit at 2ft and 17ft from the downslope end, for an effective drain spacing of 15ft. The experimental greens were seeded to Penncross creeping bentgrass in July 1996 and thereafter maintained at a mowing height of 3/16ths of an inch.

The Research Approach

Our research on the effect of slope and greens construction method on soil water status and turf drought was conducted during the summer months of 1998 and 2000. In 1998, all greens were randomly adjusted to either 0 or 4 per cent slope and in 2000 this ordering of slopes was reversed so all greens were tested at both slopes. In each year following slope adjustment, the greens were given sufficient irrigation to completely fill the soil pore space. The greens were then allowed to drain for two days.

From Day 3 to Day 10, drainage outflow from the down slope drainpipe was measured daily. The outflow data was used to determine daily drainage rates from the experimental greens. Soil water content at three depths (3, 6 and 9in) and five locations (2, 7, 12, 17 and 22ft from the downslope end) were also measured daily for each green. Finally, a photographic record of turf drought stress was collected throughout the study period. The greens did not receive any rainfall or irrigation throughout the experimental period.

Only a portion of the data collected in the study will be presented here. Specifically, we will present drainage rate and the soil moisture data for Day 4 and Day 10. Turf response will also be shown for times later in the study where treatment effects were visually apparent.

Extended Duration Greens Drainage Rates

Throughout the study period, all the experimental greens continued to drain from the downslope drainpipes (Table 1). Although, these drainage rates were much less that those observed by Prettyman and McCoy (1), they were sufficient to yield treatment differences.

Table 1. Mean drainage rates from the experimental greens after four and 10 days without irrigation.

Profile	Rootzone	Slope %	Drainage rates 4 days	10 days
			liter day^{-1}	
One tier	Higher perm.	0	1.4	0.10
		4	1.7	0.12
	Lower perm.	0	1.9	0.52
		4	5.1	1.41
Two tier	Higher perm.	0	0.4	0.04
		4	1.6	0.13
	Lower perm.	0	1.1	0.14
		4	4.0	0.27
Mean s.e.			0.4	0.10

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As expected, drainage rates declined through the study period with values for Day 10 almost four times less than those at Day 4. Yet, both the 4- and 10-day drainage rates showed similar treatment effects. The slope and rootzone permeability contrasts equally contributed to drainage rates such that the LP rootzones at 4 per cent slope consistently exhibited higher drainage rates. Both the increased driving force for water flow at 4 per cent slope and the overall increased water contents of the lower permeability rootzones are used to explain this result. Also, the one-tier greens had higher drainage rates than the two-tier greens, again due to the overall larger water contents of the one-tier greens.

Finally, drainage losses for all greens on Day 4 were estimated to range from 0.1 to 0.8mm day^{-1}, so that in some cases, drainage losses may contribute with ET to yield a measurable water loss from these soils for nearly a week after rainfall.

Rootzone Water Contents after Progressive Drying

Green slope, rootzone permeability and profile design effects on soil water contents (% by volume) for Day 4 and Day 10 are shown in Figures 2-5. In the individual figures, isobands of soil moisture are shown as a function of distance upslope (ft) and rootzone depth (in) for each of the profile design and rootzone permeability treatments. It is important to remember that although the plots are nearly square, the axis scales are different, such that if drawn to scale the plots would be about 20 times long as they are high.

Many treatment effects were apparent from the soil water content data after four days of drainage (Figs. 2 and 3). Profile design and rootzone permeability both contributed to retaining more or less water within the rootzone such that the one-tier, LP green overall had the wettest rootzone (water contents up to 40 per cent) and the two-tier, HP greens had the driest (water contents from 10 to 20 per cent). Also interesting were the similarity in soil moistures (particularly near the soil surface) for the one-tier HP and the two-tier LP greens, even though the permeability of these systems, when constructed, differed by about 10in h^{-1}.

The greens at 4 per cent slope (Fig. 3) showed some similarity but also strong contrasts to those at 0 per cent slope. Particularly noticeable was the strong downslope to upslope gradient in soil water content yielding wetter soils downslope and drier soils upslope. This yielded water contents in both HP greens ranging from 10 to 15 per cent at the furthest upslope locations. Water contents exceeding 40 per cent were seen deep in the profile and downslope for the one-tier LP green.

Figure 2: Mean water content (% by volume) of the experimental putting greens after four days drainage and oriented at 0 per cent slope.

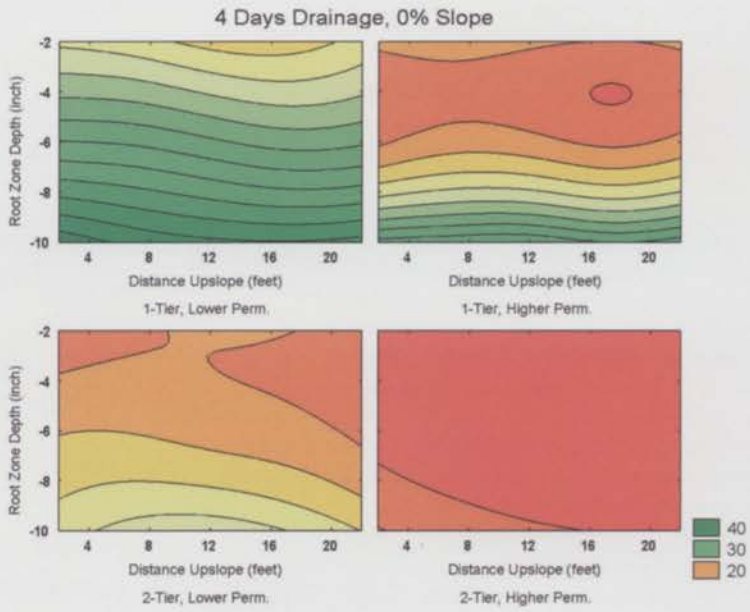
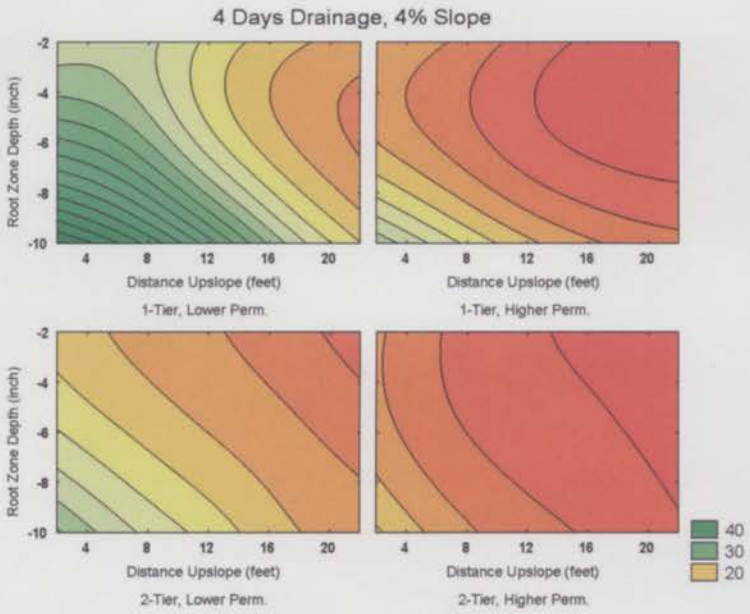


Figure 3: Mean water content (% by volume) of the experimental putting greens after four days drainage and oriented at 4 per cent slope.



After four days of drainage, drainpipes located at 2ft and 17ft did not show a large effect in the soil moisture patterns for any of the greens at 0 per cent slope. This contrasts with the results from earlier drainage times (2). Also in contrast with earlier drainage findings was the greater effect of slope (Fig. 3) at these later times. The overall patterns of water content observed after 10 days with no rain or irrigation (Figs. 4 and 5) were similar to that observed after four days. The principal difference between these dates was the progressive rootzone drying. Thus, within both HP greens at 4 per cent slope, soil moistures less than 10 per cent were observed throughout a substantial depth of the rootzone in the upslope locations.






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Figure 4: Mean water content (% by volume) of the experimental putting greens after 10 days drainage and oriented at 0 per cent slope.

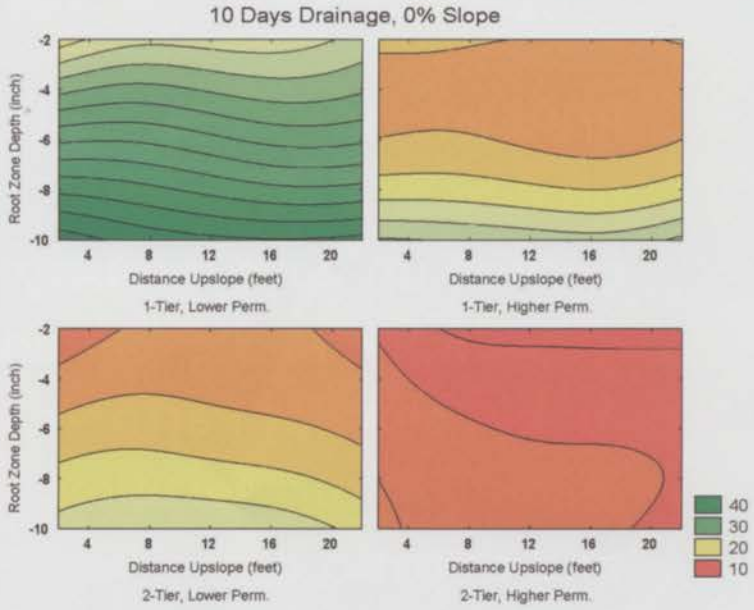
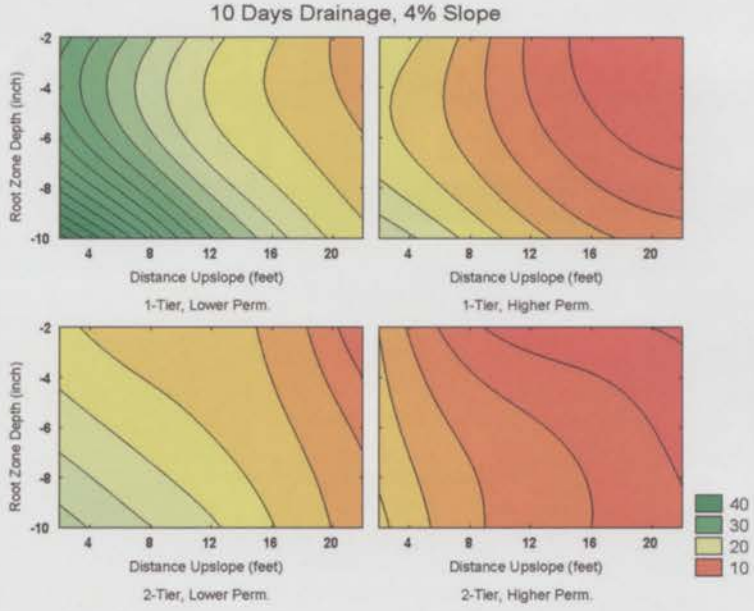


Figure 5: Mean water content (% by volume) of the experimental putting greens after 10 days drainage and oriented at 4 per cent slope.



Turf Drought Response

Throughout the study, there was little visual evidence of turf drought in any of the LP rootzones regardless of the green design or slope. Thus, the finer sand rootzone containing both an organic amendment and topsoil served to avoid turf drought.

The HP rootzone, on the other hand, showed turf drought stress for both the one- and two-tier greens, but only at 4 per cent slope and then only at the furthest upslope locations (Pic. 2). Thus, there was a slope-induced gradient of drought stress symptoms with little apparent stress downslope and extreme drought stress upslope. Yet, this occurred only for the coarser sand rootzone containing little amendment addition.

Overall, the experimental greens avoided drought much longer than expected for actual putting greens built to the same design. This may be due to the absence of frequent foot traffic and the higher height of cut allowing deeper rooting. Regardless, the underlying cause for the observed pattern of drought stress was the soil water status that should be similar for both actual and these experimental greens.

Specifically, turf drought stress was associated with soil water contents less than 10 per cent within the upper 4-6in of the rootzone. Only those treatment and location combinations that attained this low level of water content also yielded drought stressed turf, and this same response would be expected for greens on the course.

Discussion and Implications

Many of the features observed by Prettyman and McCoy (1, 2) after two days of drainage were preserved throughout 10 days of drainage. The greens continued to drain, with green slope and wetter rootzones contributing to increased drainage rates. Also, green slope, rootzone composition and profile design all contributed to the distribution of soil water within the rootzone. In contrast to the earlier findings, however, drainpipe spacing effects diminished over time and the lateral gradient in water contents due to slope, strengthened.

After two days of drainage, our earlier findings suggested the absence of water perching at upslope locations when two-tier greens were sloped at 4 per cent (2). This became clearly evident in the present study where water contents were commonly less than 20 per cent deep within the rootzone at upslope locations. Consequently, perched water may not necessarily serve as a reliable reservoir for water uptake by turf in naturally sloped, two-tier greens. Water perching does occur across these greens after rainfall, and there is evidence that the turf can tap this reservoir. However, subsurface, lateral flow in these systems serves to drain this perched water prior to much of its use by the turf. Thus, water perching may not serve equally across the green in supplying the needs of the turf.

Of course, lateral water flow occurred as well in the one-tier greens when sloped at 4 per cent. The result in both coarser sand greens when sloped at 4 per cent was the occurrence of water contents less than 10 per cent by volume, to a depth of 4-6 in, and the associated turf drought stress. Since this occurred only in the higher permeability rootzones, it would lead one to believe that rootzone amendments play an important role in maintaining higher water contents and in drought avoidance, particularly in coarser sands.

This is especially true if perching of water in the rootzone cannot be relied on, then water retention by the rootzone is the only recourse.

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Acknowledgements

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The higher permeability, one- and two-tier putting greens oriented to 4 per cent slope after 10 days without rain or irrigation. Turf in the foreground (downslope) does not show drought stress where turf in the background (upslope) does.

RECYCLED WASTEWATER REUSE PROJECT -
Barwon Heads Golf Club

Treated effluent holding dam at Barwon Heads Golf Club

INTRODUCTION

The Australian Golf Course Superintendents' Association, with funding from the Barwon Heads Golf Club and Horticulture Australia, has established a trial at the Barwon Heads Golf Club to monitor the effects of irrigating with recycled wastewater.

The Barwon Heads Golf Club decided to undertake the $1.45 million project following four years of water restrictions, during which time there was a period of approximately 14 months where irrigation was only permitted using handheld hoses on greens and tees. The reclaimed water project became viable with the development of a new golf facility (Thirteenth Beach Golf Course) on the club's western boundary.

The supply source of the "C" class treated wastewater is the local water authority plant approximately 8km to the west. The entire project was privately funded via the Thirteenth Beach and Barwon Heads golf clubs. The club elected to irrigate greens, tennis courts and sensitive areas with a new potable water supply with reclaimed wastewater used on all other areas.

The project involves monitoring soil and water on the golf course as well as on a purpose built nursery green. This green has half the area irrigated with potable water and the other half with recycled wastewater and has been established with three bentgrass varieties and two *Poa annua* cultivars.

This project provides a unique opportunity to monitor the effects of salts, sodium and nutrients on soils and turf quality, and provides an excellent opportunity to monitor a site that has not previously used recycled wastewater.

MONITORING PROGRAM

To meet the requirements of the EPA and Barwon Water, an extensive site evaluation was undertaken in 2000.

This involved;

- A soil survey of the golf course.
- Sampling representative soil types at 0-100mm, 100-200mm and 200-300mm depths and analysing for a range of elements including: pH, Total soluble salts, Total P, Total N, exchangeable cations and trace elements.
- Sampling all water bodies on the golf course, adjacent wetlands and water table monitoring bores. Water samples are analysed for pH, salinity, cations and nutrients.

The purpose of the site evaluation was to identify the present conditions so as to provide a benchmark document for future monitoring purposes. It also identified any sensitive areas and described the management practices to be employed so as not to alter the existing conditions.

A monitoring program has been implemented including the addition of six watertable monitoring wells. There have been three samplings of soils and waters from the site prior to any effluent being used.

SOIL AND WATER ANALYSIS

Water analysis

In the irrigation season of 2002/2003 water samples were collected weekly for a range of tests and the typical water quality (Table 1) can be described as follows;

- The salinity is consistently around 1100-1300mg/L and considered to be high.
- The average pH is 7.5 with a range of 7.1-8.5.
- Sodium and chloride are high and relate to the high salinity.
- Sodium Adsorption Ratio is marginal due to the high sodium.
- The Residual Sodium Carbonate (RSC) is low and the bicarbonate does not increase the sodium hazard.
- The total nitrogen is moderate.
- The total phosphorus is high.
- The potassium is very high.
- All other elements are low to very low.

The main concern with the effluent is the high salinity, high sodium and high chloride rates.

Table 1: Effluent water analysis - Barwon Heads Golf Club

Chemical Analysis Water Characteristics	Ideal Range	Typical Analysis
pH, units	5 - 8	8.0
Electrical conductivity (microS/cm @25C)	<750	1800
Salinity by calculation (mg/L)	**<450**	**1100**
Total alkalinity, as CaCO3 (calc.)	<150	170
Bicarbonate, as HCO3 (mg/L)	-	210
Carbonate, as CO3 (mg/L)	-	<1
Chloride, as Cl (mg/L)	**<100**	**370**
Sulphur, as SO4 (mg/L)	<100	90
Calcium, as Ca (mg/L)	<100	30
Magnesium, as Mg (mg/L)	<100	25
Hardness, calculated as CaCO3	<150	180
Sodium, as Na (mg/L)	**<70**	**260**
Residual Sodium Carbonate (calc.)	<1.25	-0.14
Sodium Adsorption Ratio - SAR (calc.)	<10	8.5
Nutrients		
Nitrate + Nitrite,as N (mg/L)	*	2.3
Total Kjeldahl Nitrogen, as N (mg/L)	*	3.1
Total Nitrogen, as N (mg/L)	*	5.4
Phosphorus, total as P (mg/L)	*	8.8
Potassium, as K (mg/L)	*	>50
Other		
Iron, as Fe (mg/L)	<1	0.09
Cadmium as Cd (mg/L)	0.01	<0.0002
Chromium as Cr (mg/L)	0.1	0.01
Copper, as Cu (mg/L)	<0.2	0.009
Nickel, as Ni (mg/L)	0.2	0.004
Lead, as Pb(mg/L)	0.2	0.001
Zinc, as Zn (mg/L)	<2.0	0.078
Mercury as Hg (mg/L)	NG	<0.0001
Arsenic as As (mg/L)	0.1	0.002
Boron, as B (mg/L)	i<2.0	0.26

*** = Taken into account in the fertiliser program NG = no guideline**

RECYCLED WASTEWATER REUSE PROJECT -
Barwon Heads Golf Club

Irrigating the fairways at Barwon Heads with treated effluent

Table 2: Soil analysis - Irrigated 9th Fairway (0-100mm)

Element	Apr-02	Nov-02	Apr-03
pH	8.0	7.6	8.1
Total Salts (mg/kg)	446	891	1247
P (Olsen) (mg/kg)	14	16	8
Total P (mg/kg)	740	720	470
%Na	2	2	7
% Ca	90	88	83

Table 3: Soil analysis - Unirrigated 2nd Fairway (0–100mm)

Element	Apr-02	Nov-02	Apr-03
pH	7.5	6.1	5.9
Total Salts (mg/kg)	267	178	475
P (Olsen) (mg/kg)	3	1	<1
Total P (mg/kg)	ND	55	35
%Na	2	7	19
% Ca	82	69	52

= Results at the end of the 1st irrigation season

Soil analysis

A large number of soil samples have been collected over the past three years and some of the representative results are detailed in Tables 2 and 3. As a control area we have established a sampling point in the native soils where there is no irrigation or turf maintained.

The soils on the fairways are naturally alkaline with occasional outcrops of limestone. They are high in calcium, low in sodium and have moderate phosphorus levels. After the first season of irrigation there has been an increase in total salts and sodium and a slight decrease in calcium. There has also been a reduction or no change in the total phosphorus which is unusual given the presence of phosphorus in the effluent. The soil results do not indicate any movement down the profile.

The unirrigated site provides a good indication of the effects of the natural conditions on the golf course where there has been an increase in salinity and sodium and a dramatic decrease in calcium. Being a coastal area it is surmised that the salts and sodium are due to salt-laden winds.

The turf quality on the fairways has been monitored and it consists of an excellent sward of couchgrass with no signs of the effluent affecting the turf.

NURSERY GREEN

Turfgrass trials

The nursery green has been established to the following turf species/varieties;

Turfgrass variety	Turf species
Mariner	Agrostis stolonifera
Seaside II	Agrostis stolonifera
Penn G2	Agrostis stolonifera
Grand Prix	Agrostis stolonifera
Penn-State Poa	Poa annua reptans
BHGC Poa	Poa annua reptans

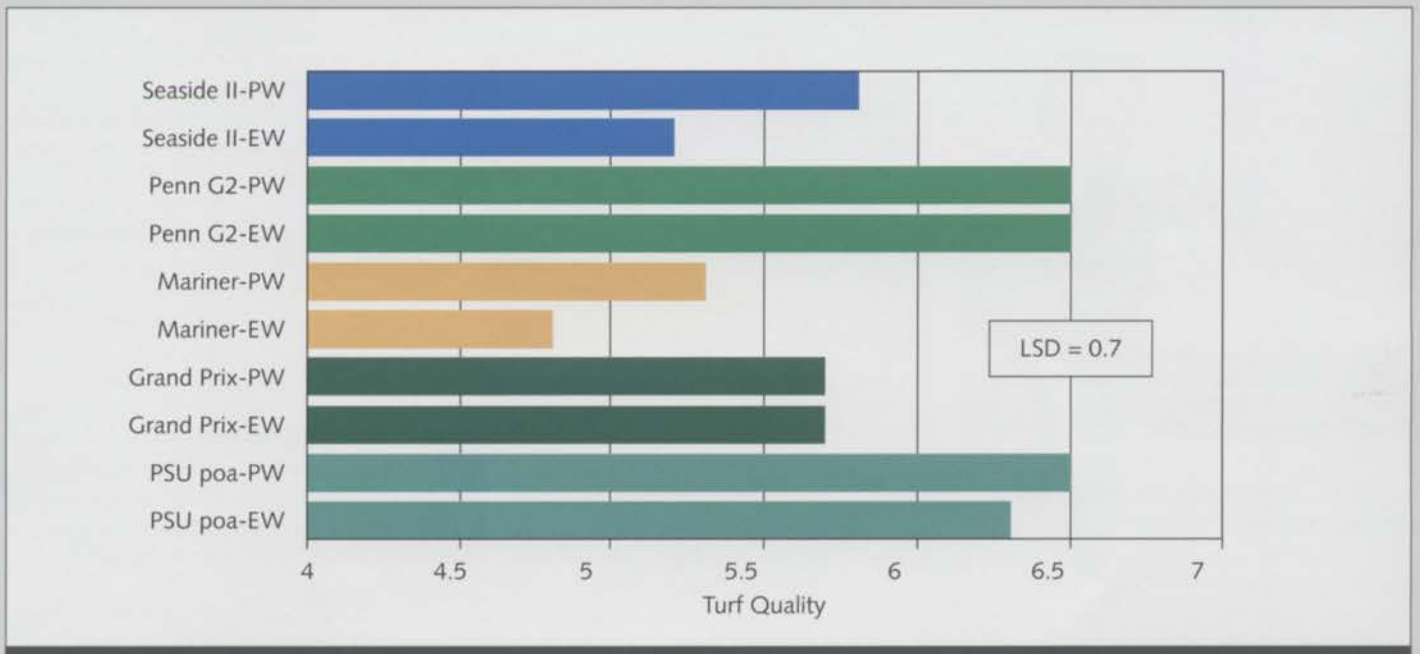

Figure 1: Turf quality for nursery green (0 = worst, 9 = best)
EW = Effluent water, PW = Portable water

Construction of the Nursery Green

Table 4: Soil analysis - Nursery green

	Potable	Effluent
pH water	7.8	8.1
EC (dS/m)	0.12	0.11
Total Soluble Salts (mg/kg)	356	327
Total P (mg/kg)	<20	22
P (Olsen) (mg/kg)	9	15
%Na	7	17
% Ca	68	47
%Mg	15	22
%K	13	15
Copper (Cu) - DTPA	<0.1	<0.1
Zinc (Zn) - DTPA	0.3	0.3
Manganese (Mn) - DTPA	<0.5	<0.5
Iron (Fe) - DTPA	54	66

The *Poa annua* species are a selection from the Penn-State University project being undertaken by Dr. David Huff and the local type that occurs on the greens at Barwon Heads Golf Club (BHGC Poa). The results at the end of the first irrigation season are in Figure 1.

The results from the first irrigation season indicate that there have been no detrimental affects of using the effluent water compared to the use of potable water. The cultivars Penn-G2 and PSU-Poa had the best turf quality.

Soil analysis

Soil samples were taken at the end of the irrigation period and the results are detailed in Table 4. The section that was irrigated with effluent had an increase in sodium and a decrease in calcium compared to the potable water irrigated area. There was also an increase in total and available phosphorus. Salinity and pH were similar for both areas of the green.

CONCLUSION

At the Barwon Heads Golf Club the first irrigation period has been completed using treated effluent that is high in salts, sodium and chloride. On the fairways there has been an increase in sodium and a reduction in calcium, however, there has been no affect on turf quality with an excellent cover of couchgrass being maintained. On the nursery green there has been a similar change in the sodium and calcium levels, however, there is no significant difference in turf quality between the potable water and effluent treatments.

ACKNOWLEDGEMENTS

The Australian Golf Course Superintendents' Association is grateful for the support of Horticulture Australia, Barwon Heads Golf Club and Rain Bird in helping conduct this project.

Horticulture Australia

AGCSATech manager John Neylan who has been appointed to the Telstra Dome Arena Surface Working Group

Heavily shaded areas inside the Telstra Dome have compromised the quality of the playing surface

NEYLAN APPOINTED TO TELSTRA DOME WORKING GROUP

AGCSATech Manager John Neylan has been named on the Telstra Dome Arena Surface Working Group which will investigate options for the improvement of the playing surface following uproar in recent months over its condition and player safety.

The committee is being chaired by Dome boss Ian Collins and includes representatives from contractors HG Turf, the AFL, the AFL Players' Association, the Medical Officers' Association and the AFL Physiotherapy Association.

As this edition of Australian Turfgrass Management goes to print, Collins is heading a contingent that is visiting a number of sporting stadia in the US and Europe. The purpose of the expedition is to compare turf surfaces and look at other possible surface options, including synthetic variations, that could be used to remedy the problems at the Melbourne sporting arena.

The Dome surface has been a major bone of contention since the facility opened in March 2000, with a number of high profile AFL players claiming from the outset the surface was too hard. More recently, senior players from the Richmond and Brisbane clubs lodged official complaints with the AFL over the surface, which they regarded as hard, uneven and in some instances dangerous.

In a report to the AFL following an inspection of the Dome surface, Neylan identified that while the turf did not look good aesthetically – the oversown ryegrass has worn out exposing the couchgrass base which has discoloured due to the cool winter weather – the surface was generally firm, dry and stable and that only a few minor areas needed repair which were indicated to contractors HG Turf.

He highlighted that at the design stage, the Dome was identified as being a difficult environment to maintain turf using conventional techniques. This was due to the high proportion of shade covering the ground as well as poor air circulation.

"It is a simple concept that grass will not grow in the shade and be capable of providing the highest quality playing surface at all times," commented Neylan. "The nature of the stadium is such that there are several micro-climates within it that provide different growing conditions and this then influences the consistency of the surface.

"It was always planned that the playing surface would rely on a turf replacement system because of the expected turf deterioration. Given that the northern end receives no sunlight for several months over winter, the turf has no recovery potential and will progressively deteriorate with each game."

Neylan reiterated that turf replacement was the key to presenting a high quality and consistent playing surface and was critical of the timing of the present replacement regime and maturity of the ryegrass.

"The turf should be replaced well before it has thinned out to the point where there is more bare ground than grass," Neylan said. "While the surface will remain stable and essentially safe, it does present a strong contrast with the well grassed areas in terms of traction and firmness.

"This certainly presents an issue with the consistency of the surface. The northern section of the ground does remain damper and potentially more slippery because of the shade and this effect is increased as the grass cover deteriorates.

"In terms of the replacement turf, the combination of a couchgrass base and over-seeded with ryegrass is the ideal blend. The main issue relates to the maturity of the ryegrass and how quickly it has been worn out in some areas.

"As the ryegrass disappears it exposes the couchgrass, which discolours in winter and consequently it makes the surface appear patchy. The surface integrity is maintained but it looks poor.

"I think if the turf was replaced earlier, most of the current concerns about the surface consistency, hardness and safety would disappear.

Neylan dismisses the notion that the surface's hardness is a result of the field being constructed over the stadium carpark. Over the concrete base there is a 100 mm deep gravel layer and then a 250 mm sand layer. That is, the surface is 350 mm above the concrete base and the gravel and sand profile is very similar to that at the MCG.

"It is most unlikely, if not impossible, that the concrete has any influence on the firmness of the surface," said Neylan. "The "feel" experienced by the players is influenced by the top 50 mm or so of the profile. And of this, the grass cover, grass maturity and thatch depth is going to have a substantial influence on this factor."

Neylan concluded that while the turf appears visually patchy, there wasn't any loose or unstable turf or gaps between the turf, and provided that the new turf was prepared as per the standard contractor's practices, there was nothing obvious to suggest that the surface was unsafe.

He added that while there had been a lot of discussion about the hardness and safety of the surface, the simple answer was to replace the turf well before it deteriorated to bare ground. This would improve the consistency of the surface and eliminate many of the perceived issues.

EDITOR'S NOTE

In an update to this story, a mix of synthetic and natural turf may be used for the boundary areas at the Telstra Dome. The news comes after Telstra Dome chief executive Ian Collins and AFL Grounds Operations Manager Jill Lindsay returned from a trip to the US to examine the playing surfaces at a number of stadiums.

Speaking on radio station Sport 927 in late July, Lindsay said that the synthetic/natural mix was "impressive" and "more cost effective", and that Collins may investigate such an option for the heavy traffic areas around the boundary, but not for the main playing surface.

The synthetic/natural mix has been employed by a number of university soccer pitches in the US, and soccer's governing body FIFA is currently in the process of making it an officially recognised playing surface.

AGCSA

Metropolitan Melbourne golf courses on town water supply face a tough summer following the implementation of Stage Two water restrictions this month

MELBOURNE HIT BY STAGE TWO WATER RESTRICTIONS

The Victorian turfgrass industry has been dealt a major blow with the announcement late last month of further tougher water restrictions.

Just as this edition of Australian Turfgrass Management was going to press, Victoria's Minister for the Environment John Thwaites announced that Stage Two restrictions would come into force for metropolitan Melbourne effective from August 1.

The restrictions directly affect turf growers, golf courses that use town supply water and sportsfields. They are likely to be enforced through until autumn next year with monthly assessments of storage levels.

Under the increased restrictions, no grass sports grounds can be watered except for formal golf and bowling greens, cricket pitches, synthetic hockey grounds and tennis courts. These can be watered by:

- Hand-held hoses at any time.
- Manual watering systems between 5am and 8am and 8pm and 11pm.
- Automatic watering systems between 11pm and 6am.

Australian Turfgrass Management could not determine before deadline whether the restrictions applied to the watering of tees.

Special exemptions will be granted for national and international sporting events and venues, meaning AFL matches and the Spring Racing Carnival won't be affected.

Private and public school sports grounds are subject to the same water restrictions as public/council-owned sports grounds. It is possible if dry weather continues, closure of sports grounds may occur subject to a determination by ground owner/managers as to when the ground's condition makes further use for sport an unacceptable risk to players.

Driest period

It is the first time since 1983 that Melbourne has seen Stage Two water restrictions, coming as water storage levels reach their lowest in 18 years (40.1 per cent). Melbourne Water figures show that the past 12 months have been the driest since records began in 1855. Despite recent rainfall - ironically, just two days after the restrictions were announced Melbourne recorded its wettest July day in 10 years - metropolitan reservoirs had been hovering just above the 40 per cent July trigger level for Stage Two restrictions.

The August trigger for Stage Two restrictions was 42 per cent and Mr Thwaites said there was no realistic likelihood that water storage levels would rise to that level.

Stage One restrictions, which were introduced in November 2002, have proved effective with a 10 per cent reduction in water use recorded over the summer period.
An additional five per cent saving under Stage Two is expected over a 12-month period, the majority of which will be achieved in spring and summer.

Imposition

Victorian Golf Course Superintendents' Association President Michael Picken said that while Stage Two restrictions would hit some courses hard, at least the restrictions had been implemented early.

"It will give clubs the opportunity to make sure that they keep their reserves as full as they can," says Picken. "In saying that though, a number of clubs will really struggle unless they have a natural source of water.

"A lot of clubs will be looking at natural sources and checking to see if their bore water is any good. The bore industry will kick on as a result of these restrictions.

"Clubs will also be placing a greater imposition on their members to help out with the watering of greens."

One superintendent who knows full well the implications of such restrictions is immediate past AGCSA President and Barwon Heads Golf Club superintendent Peter Frewin.

Since 1997, Frewin has had to contend with water restrictions, including a period of 14-months in 1999-2000 where only greens and tees could be watered by hand because of Stage Two restrictions.

"We had 70 members on a volunteer list to help with hand watering greens," recalls Frewin. "Five members were allocated to each green and we had a system set up where the night before members rang in and listened to a recorded message which told them if they were required the following day.

"It worked well and the members really pitched in. It was a very tough period and it was heartbreaking to see the course go backwards. The course is now only starting to come back. Some courses will certainly struggle."

As a result of the restrictions, Barwon Heads has since undertaken a $1.45 million project to trial the use of treated effluent water in conjunction with the AGCSA. An update of this trial can be found on page 34 of this edition of Australian Turfgrass Management.

Industry crisis

Melbourne turf growers have labelled the further restrictions as the biggest crisis the industry has faced, with jobs on the line if the situation does not improve.

Although turf growers will still be able to grow their turf as most use recycled or bore water, customers purchasing the turf will not be able to water it.

The State Government and the water businesses have met with representatives from the Turf Growers Association to discuss the implications for their businesses.

At the end of June, all parties agreed on a temporary exemption option. It allows customers to apply for an exemption to allow limited watering of instant turf for a maximum six-week period, with all exemptions to be complete by 31 October. These applications must be made before 19 September, allowing turf growers some extra time to put contingency plans in place.

Suncorp Stadium, Brisbane
Photo by Nathan Richter

LIFE AIN'T A BEACH AT SUNCORP

While the Telstra Dome has been in the firing line over its playing surface recently, Brisbane's $280 million remodelled Suncorp Stadium (Lang Park) has also had to weather plenty of discontent over the state of its pitch.

Following the new-look stadium's opening game between Brisbane and Newcastle on June 1, a couple of players fired a few bards over the

state of the surface, with Newcastle fullback Robbie O'Davis commenting it resembled "a beach", and that "it may be the best stadium in the world, but in a lot of ways it's the worst field in the world."

Even highly regarded Sydney Morning Herald scribe Roy Masters weighed in, commenting the surface was "more suited for a beach sprint than a rugby league match", while match referee Tim Mander was heard to say after 12 minutes "Geez, the field is terrible".

Anyone watching that game would have seen the vast amount of sand the players were kicking up, the result of heavy topdressing in the weeks leading up to the game. Since then, ground curator Peter Cronin and his team have removed some 20 cubic metres of sand from the surface through a constant regime of raking, spiking and coring.

"During the consulting stages we had no input into the preparation of the surface because of a contract arrangement, so when we got the stadium two days before the game we had turf on one side and sand on the other," a clearly frustrated Cronin told Australian Turfgrass Management.

"There wasn't much we could do and as a result we copped a belting in the press. In time [the surface] will be okay."

Despite the uproar over the condition of the surface, the stadium has received no official complaints, although NSW State of Origin coach Phil Gould has raised concerns over its suitability to host an NRL finals game, adding that the surface was unlikely to improve until it had an off-season.

So, an honest botch up, or another example of the excessive demands being placed on sports turf from commercial interests?

– Brett Robinson

LETTER TO THE EDITOR

Dear Editor,

I read the article by John Neylan, "*Improving the Environmental Management of NSW Golf Courses- A NSW Environment Protection Authority (NSW EPA) and AGCSA Co-operative Project*" in Volume 5.3 of Australian Turfgrass Management with great interest. The issues discussed and the programming directions both have a familiar sound to what we are hearing and doing in the United States.

In the US we are facing the same issues with urban stormwater and pesticides. We also know that well managed turfgrass can provide benefits to the environment, but poorly managed turfgrass can negatively affect its surrounding area. We have put a lot of our efforts into Integrated Pest Management and Best Management Practices. There are numerous programs for wetland rehabilitation, wildlife enhancement, and habitat protection.

My experience has shown the toughest "environmental" challenge is often dealing with the people who live near the course, but are somewhat opposed to golf courses, and of course, committee members. We can discuss the economic value of golf, explain that the dangers of pesticides has been blown way out of proportion, discuss the precise nature of fertilization, and cover all of the concerns people might have, but they are rarely convinced.

If we look at the progress we have made over just the last 10 years with improved cultivars that require less water, fertilizers, and pesticides, then we have a rather remarkable story to tell. Yet our critics persist in their own version of reality that golf course management is wasteful and disruptive to the environment. Some of this mentality is from a comparison to food production in which the use of water and pesticides is necessary because after all, we all need to eat.

A question that begs to be asked is that if we have made significant progress in improving the efficiency in which we manage golf courses over the last 10 years, why are we still criticised? Will the establishment of a new program with a new name pacify our detractors? I think not.

However, that should not deter or cause us to slow our progress in making golf course management as environmentally sound as possible. We should not lose too much sleep over the negatives that certain groups seem bent on spreading.

However, we should make conscious efforts, as individuals and as an organisation to discuss our progress. I think perhaps we've spent too much time in the past being critical of the environmental groups and trying to say that pesticides and fertilizers aren't nearly as bad as people make them out to be. That approach typically hasn't worked too well in the States.

We have often made comparisons with pesticides and other more common products that people have in their homes that are actually more dangerous. However, telling people about something that is more dangerous doesn't necessarily make them feel any better about the first concern.

I think our emphasis should be on presenting our success and discussing the progress that has been made over the past few years. Make sure the pubic understands that golf is going in the right direction and is going there quite quickly. When people begin to understand that adapted cultivars are being used and that irrigation and fertilization is carefully monitored, then they begin to appreciate the direction we are headed. When they learn that the pesticides we are using are much less toxic to people and wildlife, have fewer off target effects, and are applied at much lower use rates, then they appreciate the science involved.

But all of this comes at a price. It requires communication and public relations. Once again, it is a personal and an association responsibility. We are slowly improving our skills in this area and it is paying dividends. Most of us were trained to grow grass, not do public relations. But this job simply isn't as simple as it used to be.

Dr. Rick Brandenburg
Turfgrass Entomologist
North Carolina State University, USA

APPOINTMENTS

Greg Rooke, former construction superintendent at Waterford Valley, has taken up the post of superintendent at Southern Golf Club (Victoria).

***

Strathfield Golf Club superintendent Greg Ford is departing after 12 years to pursue a career in private enterprise.

***

The Eastlake Golf Club will finalise the appointment of a new superintendent this month, following Andy Hugill's departure to Mona Vale Golf Club. Twenty-eight candidates from as far a field as the USA, UK and Indonesia have applied with the club currently conducting second interviews.

***

George Widdowson, former superintendent at Long Yard Golf Club in Tamworth, NSW replaces Paul Dellar at the Portarlington Golf Club (Victoria). Paul has taken the superintendent position at the Ocean Grove Golf Club.

***

Former Capel Golf Club superintendent Michael Dennis replaces Tony Johnston at Royal Perth Golf Club.

***

Andrew Sinel, formerly of Riverside Golf Club, joins Andrew Blacker at Thaxted Park Golf Club (SA) as assistant superintendent.

***

Shaun Cross takes over from Mick Trivett as course manager at Byron Bay Golf Club. Brett Harding has been named as his assistant.

***

Michael Russell, formerly of Werribee Park Golf Club, is the new assistant superintendent at Barwon Heads Golf Club.

Know of any new appointments?
Then contact Brett at the AGCSA on :
(03) 9548 8600

HUNTER INTRODUCES NEW I-90 LONG DISTANCE ROTOR

Hunter Industries introduces the I-90, a new long distance rotor for parks, sports fields and other public areas. The I-90 offers up to 29.3 metres of coverage, and is the latest addition to Hunter's extensive line of rotors for landscape irrigation. The new rotor has the throw power of a golf sprinkler, yet features an exposed diameter of just 9cm for field safety.

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Hunter's I-90 features a new "jar top" body cap that allows easy access to filter the screen, check valve and gear drive assemblies during routine maintenance. Two models are available with colour-coded nozzles - adjustable arc and full-circle opposing nozzles.

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Growing Media for Ornamental Plants and Turf – (Third Edition)

By Kevin Handreck and Neil Black, 2002. *(UNSW Press)*

$55.00

For some 20 years Growing Media for Ornamental Plants and Turf by Handreck and Black has become an established and trusted core reference text for golf course superintendents and designers, turf managers and landscapers.

This third edition, substantially revised from the last edition published in 1994, covers new areas including fertilizers, efficient use of water, drainage, salinity, turf management, soil-borne diseases, and the preparation of soils for landscape planting.

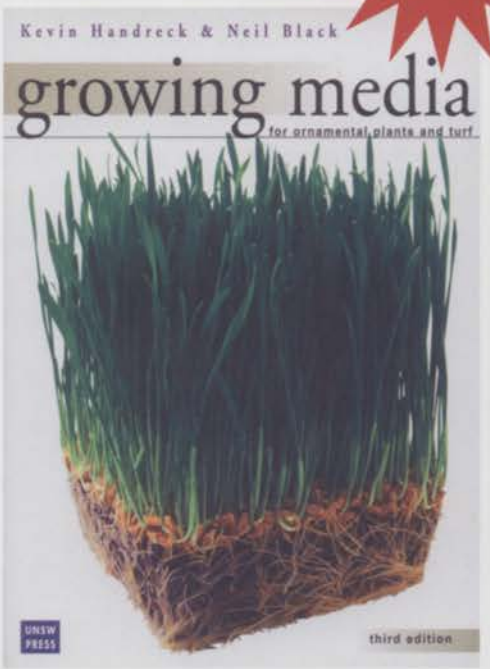
The increasing focus on environmental issues and subsequent legislation over the past seven years is given plenty of air by the authors, including information on alternatives to the use of methyl bromide – which will be banned come 2005 - and other harmful chemicals.

Information on ways of minimising surface and ground water pollution by the run-off of agricultural and horticultural nutrients, including phosphates and nitrates, is also discussed at length. As well, the description of the advances in water management including the use of effluent waters, slow-sand filtration to disinfect water supplies, and sub-irrigation in its various forms, provides interesting reading for turf managers.

This edition also examines the glut of new products that have hit the marketplace in recent years. Many of these products have not undergone independent testing and the authors attempt to offer some guidelines for seeing through the maze of competing claims and counterclaims, and for performing tests on new products.

Also addressed are the increasingly strenuous demands being placed on natural turf by the needs of the corporate and television worlds, highlighted recently by the continuing teething problems associated with the Telstra Dome in Melbourne.

Overall, this 542-page offering is an essential reference tool for anyone in the horticulture industry, as well as a core text for the turf student wanting to gain a greater understanding of growing media.



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state REPORTS

GCSAQ

To begin with, congratulations must go to the AGCSA for a good, meaty, worthwhile 19th Australian Turfgrass Conference in June.
There was certainly plenty of valuable information presented by the various speakers and depending on what grabbed your interest, a good number of workshops on a wide range of subjects.

Apart from a few hiccups at the start, I thought it was a very well run conference which provided delegates with plenty of interesting and valuable ideas to take home.

As I concentrated on the personal development and team building seminars, I now have my team working on becoming balanced individuals, who see work as an exciting challenge, and who enjoy every day as I coach them onwards to greater rewards. I am now looking for a high ropes course to develop some greater trust and team work, although some of the team may not come back from that one!

There were plenty of highlights during the conference including an unforgettable State of Origin bash on the Wednesday. After the game I saw our trusty treasurer re-enacting the South Australian "Bodies in a Barrel" case by rolling a large wooden keg across the dance floor. He then set about wedging a few unsuspecting bods in the keg, upside down.

I saw a pair of legs poking out at one stage and when the Southern Correspondent went and pulled the legs out, it turned out they belonged to Danny Potter, one of many hapless lads to go in the barrel. Pity about the result for us Queensland boys, but what about Game 3 – Maroons 36-6. GO ERIC!

The Corporate Venture Recharge day in the Adelaide hills was a great day experience with some big efforts put in solving problems and getting the buses up to the site. Michael Riordan gave an excellent exhibition of precision parking, sliding sideways into the carpark.

All teams were busy at their various activities and I was thankful we had some gung-ho team members to get us through the ropes and mountain biking, not exactly personal favourites of mine. So to Adam, Al, Col, Rod and team, well done, but no prizes at the end of the day, other than the treasure and the experience.

Following the conference it was straight back to work. Rain has hit the south east corner of Queensland and plenty of courses that were drought-stricken are now soggy and ready to dry out. Inland, the weather has been a little kinder than last year but still pretty dry.

Recent events included the Black Turf Equipment/Jacobsens Tour to Yamba, McLean, Lismore, and Casino, with Nuturf and Country Club International also helping out. Numbers were up and it was a great tour.

Our AGM is in August and should see a tense battle for spots on the committee once again such is the attraction of being involved. The Toro Golf Championships will also be hotly contested on the day.

The Queensland Golf Union is being pressed by the GCSAQ and Queensland Secretary/Managers to put together a workshop next year to focus all involved groups on the future directions of the golf industry in Queensland. Our representative on the organising committee is Rod Cook who will keep us posted as things develop.

Have a good winter.

Jon Penberthy
President, GCSAQ

NSWGCSA

Sadly, I must convey that this will be my last report as president of the NSWGCSA. My three year term will finish on Monday, August 25 when we hold our AGM at Bonnie Doon in Sydney. I believe our Treasurer of the last three years Craig Easton will be elected as new president unopposed, so the Association will be in good hands.

Mid-winter sees little change in the overall weather pattern, with the coast too wet and the inland too dry. As a result, most talk around the Sydney region is about drainage and elsewhere irrigation systems are on the agenda.

Congratulations to all those involved with the staging of the 19th Australian Turfgrass Conference in Adelaide. Once again a great mix of topics and activities. The very dedicated and professional team of the AGCSA lead by Steve Potts made sure everything ran smoothly.

I am looking forward to my time on the AGCSA Board as I know it will be challenging and rewarding. Thanks to all of the Adelaide people who made everyone feel welcome, especially the Three Amigos - Dennis Lillee, Freddy Mercury and Peter Harfield. The idea of serving up Chunky Custard for the conference dinner was a stroke of genius.

The John Deere Team Championship was held at Oatlands Golf Club in July, and host superintendent Scott Lane provided very good putting surfaces, which saw the team from Fox Hills take out first place with 58 net.
The Richmond Golf Club team was second with 59 net. We wish those clubs the best of luck in the National Finals at The Gales Golf and Spa in the first week of September.

Our annual Cypress Lakes day is on Monday, July 28 and as usual a large field will "taste the reds and enjoy the greens", with host superintendent Merv Haywood promising above-freezing temperatures for our early morning shotgun start.

Probably the most pressing issue for NSW superintendents is the fast approaching September 1 deadline for workplace safety compliance. It is very important to protect yourself, your employees and the club from potential fines should an accident occur.

That's all for now. See you around the traps.

Martyn Black
Soon to be Past-President NSWGCSA

VGCSA

With the national conference in Adelaide having just concluded, I am once again heartened by the enthusiasm displayed by the many superintendents that participated in presentations during the week. Congratulations to the AGCSA on an interesting format. From my point of view the contents of the week made the trip across very worthwhile.

Having said that, it was apparent that many Victorian supers were not there. This poses the question, "why not?" It is something I am unable to answer but one I'm sure the AGCSA will want to cover leading up to the scheduling of future events over the next couple of years.

On the local scene, the annual managers/-superintendents golf challenge was conducted at the National Golf Club in June with the managers once again triumphant on the day. Well known media personality John Blackman entertained the group during lunch.

The VGCSA will be heading off to the Swan Hill district on August 11 for the annual Country meeting being held at the beautiful Murray Downs Golf Club. Host superintendent Andrew Abbott is looking forward to a good turn out from the local

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supers, and hopefully many of our city members will follow suit.

Not a great deal else to report on as I am currently enjoying some annual leave. One thing that is apparent, however, is Victoria is still not reaping sufficient rains in the catchments.

Since writing this report, Stage Two water restrictions have been enforced for Metropolitan Melbourne and looks set to stay through until Autumn next year.

Michael Picken
VGCSA President

SAGCSA

Well, what a great week we had in Adelaide for the recent 19th Australian Turfgrass Conference. The AGCSA needs to be congratulated on providing an innovative program, and all the feedback I received during the conference was positive.

A particular highlight was the Venture Corporate Recharge day. It was a superb team building experience and I'm sure many new friendships were made. Anything which challenges the individual to extend themselves in a team environment while strengthening friendships has to be good for our national association.

By the way, I find it interesting that it was alleged Dennis Lillee and Freddie Mercury were last seen acting as tour guides on buses during the day. It's amazing who Tony Fogarty knows!

On the national front, we wish Rob Macdonald and David Warwick all the best after finishing their respective terms on the AGCSA Board. The work these people put in goes largely unnoticed and a big thanks is in order. A job well done gentlemen, and hopefully we will see your smiling faces around the traps in the not too distant future.

Congratulations must go to our two new Board members, Martin Greenwood & Martyn Black, also known as "Little Martin" and "Big Martin" respectively! We wish these gentlemen all the best for the future and I know they carry the best interests of the members close to heart.

Congratulations too to the successful AGCSA Award recipients. All of us here in South Australia are very proud that our own Dene Goldsack was bestowed the Distinguished Service Award. Dene's contribution to the superintendent cause in this state is unsurpassed. Over the past 30 years many a young super has benefited from Dene's willingness to share his knowledge and experiences for the betterment of the profession as a whole.

Congratulations Dene! We believe your success only adds prestige to this award, which is the ultimate honour the AGCSA can bestow upon a member.

Back-to-back-to-back – Daryl Sellar take a bow. Another great round of 76 off the stick to take out this year's Toro-sponsored AGCSA Golf Championships. It was a fine round of golf especially considering the heavy downpour which fell on Adelaide the previous evening.

So it's off to Melbourne next year to see if the streak can be stretched to four Red Jackets. What a record that would be! I wonder if Daryl has considered building an extension to his wardrobe!

On the home front, the SAGCSA is looking to forge closer ties within the SA turfgrass industry. We as an executive see this as a positive step forward, with the possibility of joint meetings in the future. With the consolidation of industry voices and the mixing of ideas, only good can come from this initiative. Watch this space for future developments.

Upcoming diary dates to note include the superintendents and club managers' seminar at McCracken Country Club on August 12 and 13, while on August 27 there is an SAGCSA meeting at Adelaide Shores Golf Course – host superintendent Paul Morley. Also on the cards is the October meeting Clare/ Balaklava Day Trip, dates TBA.

Peter Harfield
President, SAGCSA

TGAA (ACT & Surrounding Region)

As this edition of Australian Turfgrass Management goes to press, the annual seminar is being held at the Burns Club. Although it is too early to speculate on its success, we at the ACT Turf Grass Association trust that all who attended the seminar had an enjoyable and informative day, and we hope to see you at next year's seminar. Keep an eye out for suggestions on next year's topics.

The association's idea behind holding these seminars is to assist people who work or are involved within the turf industry. We aim to help you to keep in touch with the latest technology and products available and new improved management techniques.

We also hope you gain a better overall understanding of the industry while networking in a friendly social environment. What we need to ensure for a successful seminar is to give the attendees what they want. To do this, we urge you to provide your suggested topics for future seminars.

Recently at a graduation ceremony, John McPhillips of Royal Canberra Golf Club and Wade Turner of Queanbeyan Bowling Club where awarded the prestigious ACT TGAA book prizes for outstanding achievements in study at the Weston School of Horticulture. Congratulations from all at the ACT TGAA!

A pat on the back goes to all who graduated on the night and especially to those among the graduates who were the first students to complete the Diploma in Turf Management through the Canberra Institute of Technology, School of Horticulture.

We must also take time to recognise the achievements of a local bowling greenkeeper, Ricky Lindbeck, who works at the Canberra South Bowling Club. Ricky's gift of bowling has seen him inducted into the Under-25 Australian Lawn Bowls team. Congratulations Ricky and all the best.

On a final note, Smartrain are holding a series of chemical users and handlers courses that run for two days and are fully certified. The course itself is AQF Level 4 accredited. Due to the constant changes made to legislation affecting chemical users, this is a must for staff who are involved in the supervision and training of staff in the correct methods to transport, handle, mix and apply chemicals in the workplace. There are no second chances when handling undiluted chemicals and correct training is common sense. For more details call Bruce Davies on (02) 62074623.

Till next time, agrostologists .

Justin A K Haslam
(Committee, TGAA ACT & Surrounding Regions)

TGCSA

Heavy rainfall has been falling in some parts of the state during winter in stark contrast to earlier in the year. Bring back the sun, all is forgiven with the drought!

Our next field day at the Launceston Golf Club is scheduled for August 5. Sponsors Toro will have machinery on site to try and buy and will also provide technical advice on setting up cutting heads.

Toro Irrigation will also be in attendance to demonstrate sprinklers and discuss any future plans you may have in relation to irrigation. Scotts Australia will show us some of their new releases and some data on other fertilizers.

In other news, the state is jumping with new investors in the golf course construction and development areas. It is set to be an exciting time ahead for Tasmania.

To end on a sad note, the TGCSA would like to send its condolences to Danny Gilligan and his wife June for the sad loss of their baby boy.
Our thoughts and prayers are with you both during this very sad time.

Chris Hay
President, TGCSA

VGA

How quickly the season comes around and it won't be long until all bowlers return to the greens. Lack of rain is still a problem which means we could be in for a very difficult summer.

The first state conference in Albury this year was a huge success with all members enjoying a great time together. The first test match against South Australian Greenkeepers was held in Horsham with Victoria getting flogged.
Thanks must go to Greg Dunn and Ross Barnett for their time and effort in helping organise these two events.

More synthetic surfaces have been installed over the winter, as clubs are being led to believe that this is the way of the future. It seems inevitable that most greens will one day be plastic. I hope clubs are saving up for the constant replacement every few years as these surfaces do deteriorate every year.

With falling bowling club membership and the refusal of club Treasurers to increase green fees to cover the cost of maintaining grass greens, and the introduction of narrow bias bowls that has

increased the demand for faster greens, the pressure is really on for the professional greenkeeper to compete against this trend.

Make sure you come along to the annual seminar and AGM that will be held at the Institute of Horticultural Development in Knoxfield on Thursday, August 14. This should not be missed by greenkeepers and greens directors as the topics are important and can have a beneficial effect if you attend. Please contact either David Sharp on 0438 700 119 or myself on 0409 385 340 by August 7 if you want to attend.

Former AFL coach David Parkin will present a talk about dealing with club committees, with the other speakers listed in the flier sent out. An important discussion will also be held on grass types for greens and improved surfaces. A report on grass and synthetic surfaces is underway and an update will be provided to the members at the seminar.

To finish this column, it is with much pleasure that I congratulate Christine and Duncan Knox on the safe arrival of their first child Christian Arthur William on July 6. Everyone is doing well and we hope that continues. Well done, Daddy Dunkie!

Doug Agnew
President

GCSAWA

Many courses are experiencing some good amounts of rainfall this winter, a huge relief for those that have suffered water restrictions for the past two years. Perhaps these guys can have a less stressful summer when it arrives.

It was good to see a strong Western Australian contingent at this year's 19th Australian Turfgrass Conference in Adelaide. I'm sure everyone who attended was able to come away with something positive to take back to their respective golf courses.

Many congratulations to Idris Evans, the winner of the AGCSA Excellence in Golf Course Management Award for 2003. It was great to see Idris rewarded for all the hard work he has put in at the Western Australian Golf Club over the past few years.

Idris gave a superb presentation at the conference and followed this up by presenting it again at the recent seminar at the Western Australian Golf Club in July. Many thanks also to Paul Spencer from Nuturf for his presentation on the day which was well attended.

The next event on our calendar will be the John Deere World Team Challenge which will be held this year at Royal Fremantle. This will be followed later in the month with the AGM. This will be held at Cottesloe Golf Club and I urge all members to attend and be involved in their association.

In closing, I would like to thank all my fellow committee members for all their hard work over the past 12 months. This will be my last report as WA president and I wish the new president all the best for the future.

Allan Devlin
President GCSAWA

TGAA (Vic)

Well, a cheery "Hello" to all members and sponsors of the TGAA Vic, and here's to another Melbourne winter of cooler mornings, some sunny days, and not quite enough rain for anyone. Being July, we have just concluded another very successful Cricket Wicket Seminar.

Before I get onto the report of that day, I must say that our thoughts certainly go out to all members and sponsors who are being adversely affected by this extended drought. While efforts are under way to contribute to the constructive development of more suitable environmental policies for all, there remain considerable obstacles to us as an industry.

One point, however, remains perfectly clear. The current dry climatic conditions do provide an excellent opportunity for us all. We must continue to push for the establishment of more suitable, drought-tolerant turf type sports field surfaces where appropriate, we must expand the use of recycled water in our industry, and we must effectively lobby decision makers with the positive benefits of our industry.

On a brighter note, our seminar, as in past years, was run in conjunction with the Victorian Cricket Association, and this year again highlighted the strength of the relationship between the two organisations. The following is a summary of the day held on July 15 at the Telstra Dome in Melbourne. The day's proceedings were opened by TGAA-Vic President, Anthony Uhr Henry.

Our first presentation dealt with the most critically important subject in turf management at the moment, the issue of water resource management. Geoff Connellan, principal lecturer at Burnley College, University of Melbourne, was our first speaker. His presentation focused on achieving high efficiency in irrigated turf.

Mr. Connellan's presentation covered water management issues, specifically, how do we achieve high efficiency in irrigated turf. His main discussion points were:

- What is irrigation efficiency?
- Major sources of inefficiency and wastage.
- Principles of good irrigation.
- Correct scheduling.
- Evaluation of irrigation performance.
- Auditing of irrigation systems.
- Summary list of key performance indicators.
- Water conservation for turf areas by reducing plant water demand, maximising irrigation applied efficiency, precise control of irrigation and adopting new technologies.

The main advice from Mr. Connellan was that we as an industry must be proactive about the benefits of turf for the broader community. If we are not careful, there will be some who will push for the classification of turf as a non-efficient user of water, and therefore will look to replace turf with other surfaces. So the challenge is there for us all. Be proactive about the benefit of your turf.

Our second presenter was Ernie Gmehling, from Coffey Geosciences. This presentation centred on the trial work that Coffey Geosciences has been undertaking on behalf of the TGAA in relation to the preparation of cricket wickets using a Nuclear Density/Moisture Meter.

As a result of this study, curators now have the ability to determine the most appropriate time to roll their wickets based on the optimum moisture content of the soil. During wicket preparation, as the moisture content of the soil alters, there occurs an opportunity to compact the clay to maximum density.

By monitoring soil moisture and soil density, the curator learns the most opportune time for these works. These results have huge implications for all of our members, and we thank Ernie for his efforts in preparing this report and presentation for us.

Following this presentation, we were very happy to welcome David Hookes, Victorian State Cricket Coach as our next speaker. During an outstanding career in cricket in this country, David has developed a keen understanding of the variances in different cricket wickets, and we are very fortunate to have benefited from his insight.

Probably of more importance, was his appreciation of how properly prepared wickets are the backbone of a successful cricketing nation, and how he encouraged our industry to continue the good work. We would like to thank David for his generous and informative contribution to this day.

Our next presenter was Rob Gell, who many of us know as the face of weather forecasting on Channel 9. What a dynamic and informative presentation he gave.

Rob's interests are very broad, but tend to concentrate on environmental issues facing us all.

With a strong background in geography, Rob took us through many of the issues confronting us as an industry, and encouraged us to look critically at our work, the impact it has on the broader environment, and to see what positive benefits we can incorporate in our work that have a positive environmental impact.

Of particular interest were his concerns with anaerobic black layers within some USGA greens type constructions, the opportunities for the use of recycled water within our industry, the damage caused by overuse of irrigation water in our environment, and the problems caused by the disposal of recycled waters into our marine ecology systems.

After lunch, Michael Robinson from Sportsturf Consultants gave a presentation on ground assessment for winter sport, and our final presentation was from Bruce Stephens, national seed manager for Nuturf. Bruce took us through the different grass types and species, both warm and cool season, available for use in sports turf in Victoria, and suggested a number of useful practices to be considered when preparing for renovation or new sowing.

In summary, this was an excellent seminar that was very well run at a wonderful location. We look forward to seeing you all at our AGM, to be held on August 26 at Riverside Golf Course, Ascot Vale. See you there.

Jim Marchbank
TGAA-Vic Activities

EBS Environmental Business Solutions

Environmental Solutions for your Organisation

Can your organisation demonstrate environmental responsibility?

Are your staff accountable for their environmental actions?

Can your organisation demonstrate environmental due diligence?

EBS environmental management programs can assist you.

GEMS – Golf Environmental Management System

Among all the major land based sports golf has probably the strongest interaction with the environment. Everytime a chemical is used or fertiliser is applied, when greens are mown or re-shaped, when turf areas are irrigated, indeed when any decision is made concerning the construction or maintenance on a golf course, there is risk to the environment.

GEMS is a unique environmental management program for golf courses to minimise your club's environmental risk. It allows you to manage environmental issues strategically, rather than rely on traditional crisis management as illustrated in the following prosecution of a NSW golf club. The NSW Land and Environment Court June 2003 – reported in relation to the prosecution of a golf club for the actions of one of its employees. In this case the Court was told that; staff were not given any, or any sufficient, instructions in relation to the handling of dangerous chemicals. Staff were not given any sufficient instructions in relation to chemical spill management procedures; the club did not have any, or any appropriate, environmental plan or environmental management system or plan in relation to the use of chemicals and/or plant; staff were not given any spill prevention and containment plans.

The Court found, "there were steps the club failed to take which would have prevented or limited the chemical escaping the site" and "it is clear beyond argument that had the spill been contained on-site no environmental harm would have occurred or would have been likely to occur."

The Court found beyond reasonable doubt that, "the golf club breached its duty to take reasonable steps to avoid or minimise harm to the environment. It negligently contributed to the conditions that gave rise to the commission of the offence by its employee. This is because the club failed to implement fundamental safeguards and procedures to protect the environment from harm in the event of an accident or the careless or negligent performance of duties by its employees."

The Court was critical of the club stating, "failure to maintain the condition of the premises to the standard expected by others in the same position warrants criminal punishment." And "Although the failure on the part of the club may not have been wilful nevertheless the Court finds it is beyond reasonable doubt that the club was negligent in a material respect by omitting to take reasonable steps to prevent the escape of a dangerous substance from its premises and thereby contributed to the conditions that gave rise to the commission of the offence by one of its employees."

The ultimate goal of GEMS is to ensure individuals throughout golf clubs recognise their environmental responsibilities, are accountable for their actions, and demonstrate a sense of environmental ownership. GEMS integrates environmental programs and responsibilities into all areas of the club to help the club plot a course away from environmental disasters that could have costly consequences.



Environmental Responsibility Accountability Defensibility

Improved environmental performance, competitive edge, and resource efficiency are just some of the many motivating forces compelling organisations to incorporate effective environmental management into their structures.

EBS can help your organisation manage the impacts of its activities on the environment. We provide a structured approach to planning and implementing environmental protection measures across your organisation to improve environmental performance and enhance business efficiency.

EBS has developed environmental management programs that focus on environmental responsibility, accountability and defensibility that seek to produce excellence in environmental management.

Environmental Audit

EBS audits are a systematic, documented and objective process that will assess your organisation's activities and services. The audit provides the most comprehensive framework within which to evaluate the environmental performance of your organisation. An EBS audit will provide you with information on the strengths and weaknesses of your environmental management programs and also identify opportunities to improve environmental performance.

The programs provide a framework to ensure that your organisation complies with all relevant environmental legislation and moves progressively towards best practice in environmental management

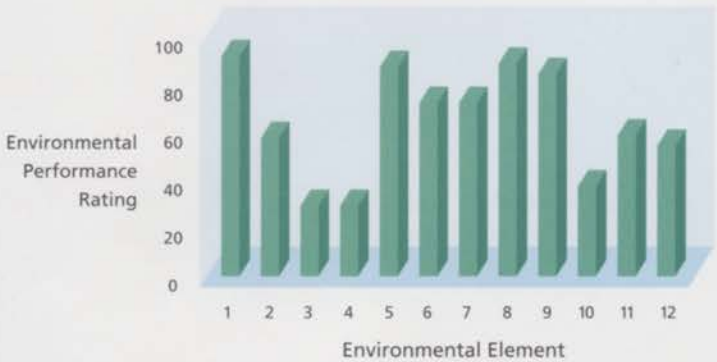
Reactive management strategies such as clean up and remediation and paying penalties for legislative breaches incur financial burdens, undermine profitability and damage corporate reputation. The EBS system is a proactive approach to managing environmental responsibility. This involves adopting risk management to identify and manage environmental hazards. Due diligence and pollution prevention strategies are implemented that translate policy objectives into practice

Importantly you will be in a position to account for the environmental performance of your organisation.

An EBS audit will express the audit findings in the format of a Colour Coded Compliance Chart or as an Environmental Performance Rating Score.

	No compliance deficiencies
	Minor compliance deficiencies
	Major compliance deficiencies
	At least one significant compliance deficiency

Compliance Summary Colour Code



Environmental due diligence quiz:

Do you know the environmental risks associated with the activities of your club?

Do you know how those environmental risks are managed?

Do you know the environmental laws and practices with which you must comply?

Do you carry out environmental assessment or audit procedures?

Do you implement all necessary procedures to ensure the club fully complies with environmental legislation?

Do you provide monitoring and supervision of staff and contractors to ensure compliance with environmental legislation?

Do you have an appropriate environmental incident and reporting system in place?

Do you provide environmental training and awareness for staff and contractors?

Can your staff access up to date environmental legislation?

Is environmental management a high corporate priority?

Do you have procedures in place that commit the club to the protection of the environment?

Do you have an environmental policy?

Do you have environmental performance objectives and targets?

Do you have environmental performance standards in place?

Do you monitor and report on environmental performance?

Winners get increased revenue, decreased operating costs and improved environmental performance

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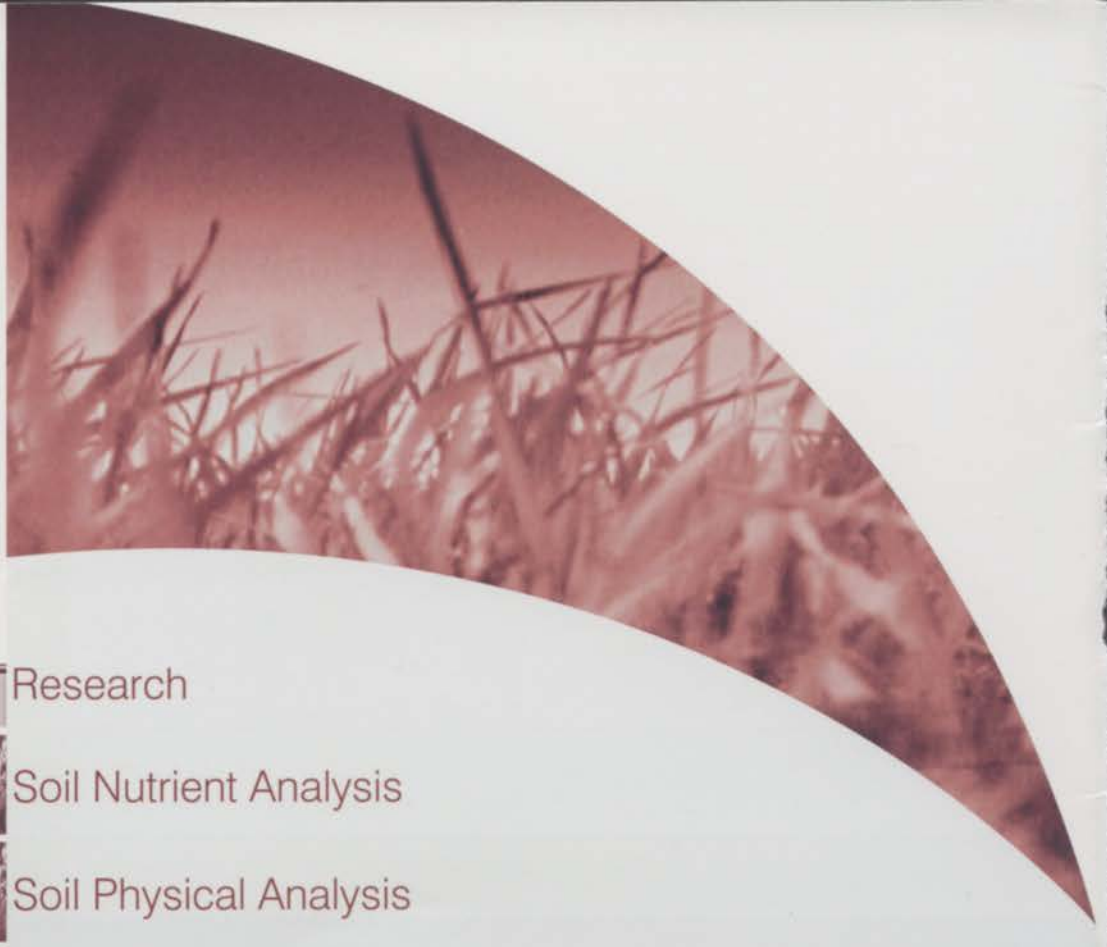


Research

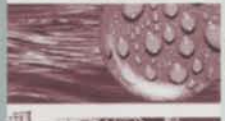
Soil Nutrient Analysis

Soil Physical Analysis

Plant Tissue Analysis

Disease Diagnosis

Nematode Diagnosis



Water Analysis

Advisory Services

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